THE OFFICIAL
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ABVSME, JNU

VOLUME 3 ISSUE 1

INDIA IN SPACE

A Journey Since Independence

INFOMATRIX (IT CLUB)

INFOMATRIX (IT CLUB)

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FROM THE DESK OF EDITOR IN CHIEF

DR PRIYA GUPTA
FACULTY ADVISOR & EDITOR-IN-CHIEF

There is a particular kind of courage that defines India's relationship with space. It is not the courage of abundant resources or guaranteed outcomes, but the courage to begin nonetheless, to think long term, and to trust in human ingenuity even when material means are limited. This spirit makes India's space journey one of the most compelling management stories of our time, and it is this spirit that anchors Volume 3, Issue 1 of InfoMatrix.

When Dr. Vikram Sarabhai envisioned a space programme for a newly independent and resource-constrained nation, he was not merely making a scientific argument. He was articulating a management philosophy rooted in clarity of purpose, institutional continuity, and disciplined resource allocation. From rockets once transported on bicycles to missions reaching the Moon's south pole, ISRO has demonstrated how vision, when supported by execution, can transcend limitations.

For students of management, the lessons are both direct and enduring. Cost discipline can coexist with uncompromising quality. Mission clarity can exist without rigidity. Institutional continuity can be sustained without stagnation. These are not just engineering principles. They are organisational imperatives that are as relevant to a startup in Bengaluru as to a launch at Sriharikota.

This edition also reminds us that India's engagement with the cosmos is not new. From Aryabhata's astronomical insights to the planetary models of the Surya Siddhanta, the pursuit of understanding the universe has long been part of our intellectual tradition. Modern India's space programme is not a departure from that legacy. It is a continuation shaped through institutions, investment, and innovation.

This issue reflects the thoughtful work of our student editors, contributors, and researchers. They have translated these expansive ideas into insightful and accessible narratives. From strategic analyses of ISRO's management principles to case studies, leadership perspectives, and the evolving private space ecosystem, the edition offers meaningful learning for every curious mind.

As Editor-in-Chief, I take immense pride in this team, in their curiosity, their analytical rigour, and the imagination they have brought to a subject as vast as the universe itself.

As you turn these pages, I invite you to carry one enduring thought. The most meaningful frontiers are rarely the easiest ones. They demand that we begin without certainty, build without excess, and persist without guarantee.

That is the Indian space story.
And perhaps, that is the journey each of us is meant to undertake.

FROM THE EDITOR'S BYTE

DIVYA SHARMA

NEWSLETTER VOLUME 3 ISSUE 1

The quest for space has always been about exceeding man's knowledge limits and venturing beyond them. That is the essence of the space odyssey in India, which has had nothing to do with infinite wealth but everything to do with objectives, science, and the belief that if something cannot be done, that just means that the solution has not yet been discovered. Indeed, each step of the space odyssey in India teaches us invaluable lessons.

As MBA students, it is essential to study the planning, execution, and refinement of processes that drive India's space missions. The organization has successfully executed missions at a fraction of the costs of any other space organization in the world through innovation, not compromise. Given that Gaganyaan will be taking Indian astronauts into the orbit of the earth soon and that the private space industry has started emerging through IN-SPACe, the importance of understanding such processes cannot be emphasized enough.

In this edition you will understand space from a managerial perspective – to look past the rockets and satellites, and discover within this voyage the essence of what makes any great organization tick: visionary thinking, efficient implementation, and the determination to start despite not knowing the destination.

We hope this newsletter reminds you that with concentration, imagination, and perseverance, even the farthest frontiers can be reached

FROM THE EDITOR'S BYTE

NANDINI

NEWSLETTER VOLUME 3 ISSUE 1

The journey of India in the field of space is not just about the rockets soaring into the skies, but also about the country learning to dream beyond its own limitations and redefine the possibilities. In the post-independence era, when the country had limited resources and multiple needs to attend to, the decision to venture into the field of space research and development was not just daring but also visionary. This decision proved the point that the country had faith in the role that technological development could play in the process of development.

From the simple times of transporting rocket parts on bicycles and bullock carts to the glorious times of the landmark Chandrayaan and Mangalyaan missions, India has proved time and again that with determination and clear vision, the biggest of challenges can be overcome with the minimum of resources.

In this edition of our newsletter, we hope to bring to you this inspiring story driven by purpose and focused on solving real-world problems, from communication and weather forecasting to disaster management and more. As students and aspiring leaders, we hope to find valuable lessons from this inspiring story. While success is not necessarily built on wealth and resources, it is built on purpose and vision, strategic thinking, and the courage to start taking that first step. Persistence, patience, and flexibility also contribute to our long-term successes.

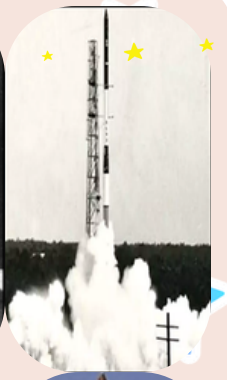
We hope this edition will inspire you to dream big, aim big, & to believe in the power of sustained effort and vision.

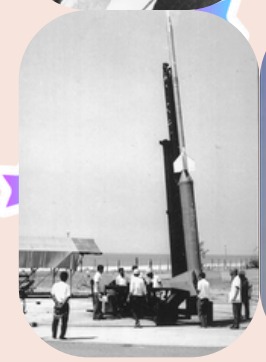
INDIA'S SPACE JOURNEY
FROM CIVILIZATIONAL CURIOSITY TO STRATEGIC LEADERSHIP

Priya Gupta

A DREAM THAT BEGAN WITH SCARCITY

When India became independent in 1947, it was rebuilding a fractured economy. Poverty was widespread, infrastructure was limited, and technology imports were the norm. In that environment, investing in space research appeared unrealistic to many. Yet Dr. Vikram Sarabhai saw something different. He believed space technology was not about prestige. It was about development. He famously said that if India was to play a meaningful role in the community of nations, it must be second to none in the application of advanced technologies to real problems of man and society. In 1969, ISRO was established. The early years were modest. Rockets were transported on bicycles. Satellite components were carried in bullock carts. But behind this simplicity was a powerful management principle: begin small, think long term, and build capability step by step. Unlike NASA or the Soviet programme now known as Roscosmos, India was not competing in a Cold War race. Its goals were developmental, aimed at strengthening communication systems, improving weather forecasting, enhancing remote sensing capabilities, and expanding educational access.

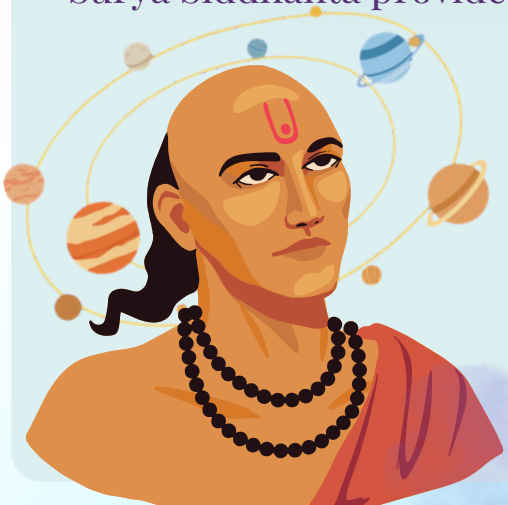


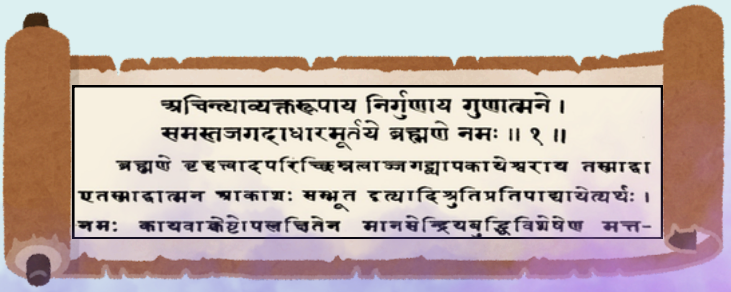


India's first satellite, Aryabhata, was named after the ancient mathematician. It was launched in 1975 and marked India's formal entry into the space age.

CIVILIZATIONAL ROOTS: CURIOSITY ABOUT THE COSMOS

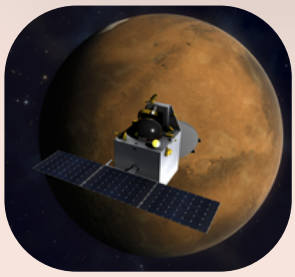
India's fascination with the skies did not begin in the twentieth century. The Rigveda contains philosophical reflections on the origin of the universe. The Surya Siddhanta provided detailed mathematical models of planetary motion.

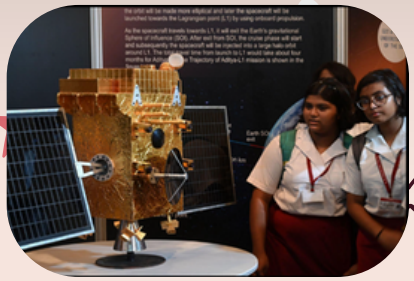




Scholars such as Aryabhata calculated the length of the solar year with impressive accuracy. Varahamihira compiled astronomical knowledge and observational methods. This does not mean ancient rockets existed. It means something more important. India had a culture of systematic observation, mathematical reasoning, and cosmic imagination. Modern India's space programme can therefore be seen as a continuity. Civilizational curiosity evolved into institutional science.

DOING MORE WITH LESS: THE POWER OF FRUGAL ENGINEERING





One of the most striking features of India's space journey is cost discipline. NASA's annual budget is above 25 billion US dollars. China's China National Space Administration receives multi-billion-dollar allocations. In contrast, India's Department of Space budget has typically been around 1.5 to 2 billion US dollars annually in recent years, less than 0.1 percent of India's GDP.

Yet consider what India achieved:

The Mars Orbiter Mission in 2013 made India the first country to reach Mars orbit on its maiden attempt. The mission reportedly cost about 74 million US dollars. That was less than the budget of some Hollywood space movies.

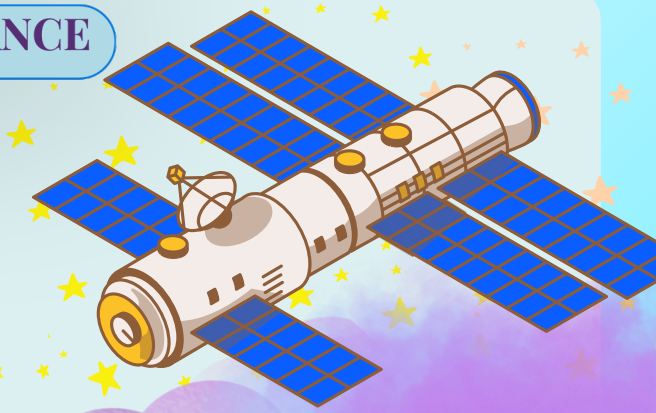
The Mars Orbiter Mission travelled roughly 650 M kilometers to reach Mars.

Chandrayaan-3 successfully landed near the Moon's south pole in 2023. India became the fourth country to achieve a soft landing on the Moon and the first to land near the south polar region.

Aditya-L1, launched in 2023, is India's first dedicated solar mission positioned at the Lagrange Point L1, about 1.5 million kilometers from Earth.

INSTITUTIONAL DESIGN & GOVERNANCE

ISRO functions under the Department of Space, which ensures policy continuity. Over the decades, India developed reliable launch vehicles such as the PSLV, often called ISRO's workhorse, & the heavier GSLV Mk III, now known as LVM3.



The PSLV has launched more than 50 missions with a high success rate and has placed hundreds of foreign satellites into orbit, making India a competitive commercial launch provider. Recent reforms show strategic evolution.

The creation of the Indian National Space Promotion and Authorization Center and NewSpace India Limited opened the sector to private players. Today, India has more than 150 space startups working in launch vehicles, satellite manufacturing, and space analytics. This transition represents a move from a centralized scientific model to a distributed innovation ecosystem.

INDIA'S COMPETITIVE EDGE

India's advantage in the global space economy rests on five strengths:

- Cost leadership through efficient mission design
- Human capital supported by one of the world's largest STEM graduate pools
- Development orientation using satellites for agriculture, fisheries, disaster warning, and telemedicine
- Strategic autonomy with indigenous launch capability
- Collaborative diplomacy, especially with Global South countries

India once set a world record by launching 104 satellites in a single mission using PSLV in 2017.

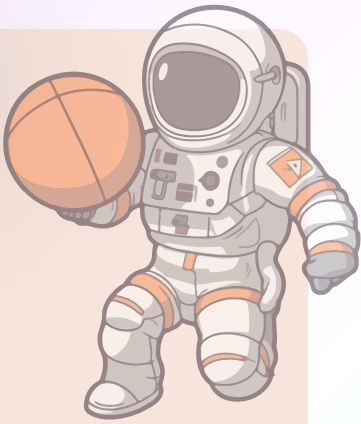
India has launched satellites for over 30 countries. Space-based services support cyclone tracking, which has significantly reduced disaster-related fatalities over the decades.

CHALLENGES AHEAD

India must address several structural issues:

- Increasing public and private investment in research
- Strengthening advanced manufacturing ecosystems
- Building regulatory clarity for private space companies
- Navigating the increasing militarization of outer space
- Ensuring sustainability in space operations and debris management
- The next phase of India's space journey will require regulatory maturity and strategic foresight as much as scientific brilliance.

A CIVILIZATIONAL AND MANAGERIAL SYNTHESIS



India's space story is not only about rockets. It is about vision.

It combines:

- Civilizational memory rooted in astronomical inquiry
- Post-independence developmental state building
- Frugal and disciplined techno-managerial innovation
- The result is a uniquely Indian model of space power. It is neither purely commercial nor purely strategic. It is development-driven and institutionally grounded.

SPACE AND VIKSIT BHARAT 2047

As India approaches 100 years of independence in 2047, space will become an infrastructure rather than a symbol. The Gaganyaan programme aims to send Indian astronauts into low Earth orbit. India is also planning a space station by the 2030s & deeper planetary missions. Satellite networks will strengthen digital governance, climate monitoring, smart agriculture, navigation systems such as NavIC, & telemedicine in rural areas.

The global space economy is projected to cross 1 trillion US dollars by 2040, according to several international estimates. India currently holds a small share, roughly 2 percent, but aims to increase this by 2030 and beyond significantly.

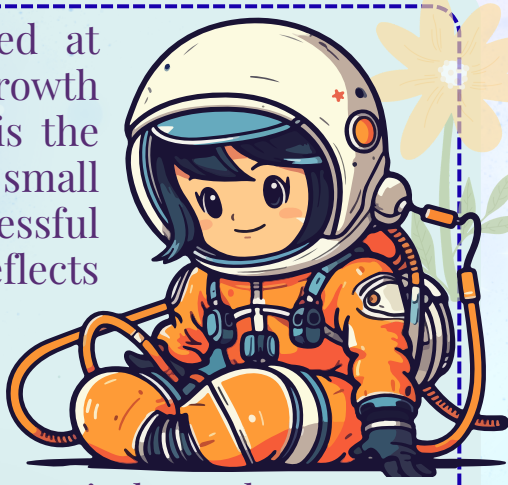
By 2047, under the vision of Viksit Bharat, India's presence in space may not only reflect technological achievement, but also the quiet power of consistent effort, institutional patience, and belief in long-term goals. For management students, this journey is not just about rockets or missions.

It is a reminder that meaningful transformation rarely happens overnight. It is built through clarity of purpose, disciplined execution, and the courage to pursue vision even when resources are limited.

The Evolution of Indian Spaceflight

Dixita Deuri

Introduction

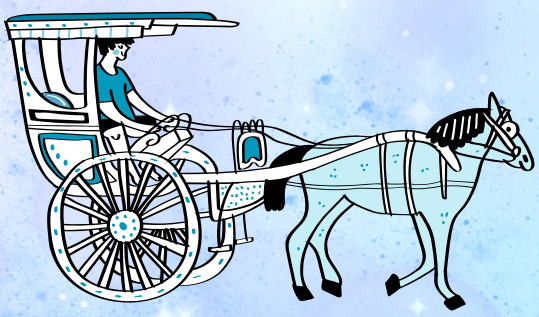


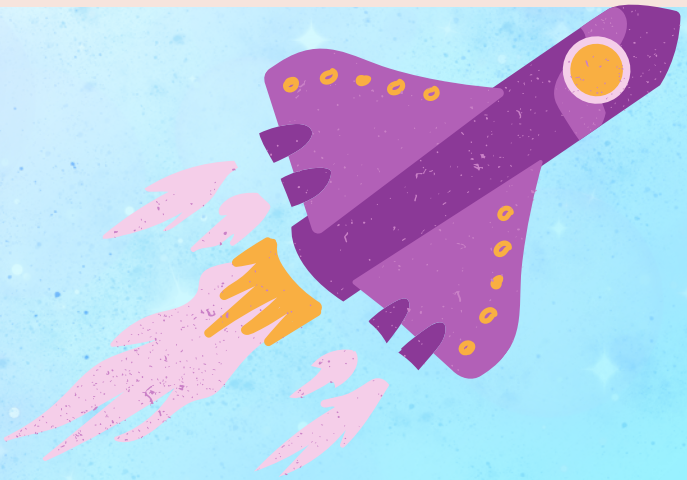
Since gaining independence in 1947, India has looked at science and technology as important tools for national growth and development. Among its greatest success stories is the progress made in space exploration. From launching small experimental rockets in the early years to achieving successful missions to the Moon and Mars, India's space journey reflects determination, innovation, and self-reliance. Guided by the Indian Space Research organization, India has grown into a respected global space power known for carrying out high-quality missions at low cost. This article explores India's inspiring journey in space since independence, highlighting major milestones, key achievements, and future ambitions.

The Early Years of India's Space Journey (1947–1969)

After independence, Indian leaders realized that scientific progress would play a key role in the country's development. One of the most influential figures during this time was Vikram Sarabhai, often called the father of India's space program. He strongly believed that space technology could be used to solve real-life problems such as communication, education, and weather forecasting, rather than being limited to scientific experiments alone.

In the 1960s, India established the Indian National Committee for Space Research (INCOSPAR) to begin experimental space research. Small sounding rockets were launched from Thumba in Kerala, marking the country's first practical steps toward space exploration. These early experiments created a strong foundation for future growth. In 1969, the Indian Space Research organization was officially formed, marking the beginning of India's organized and long-term journey into space.





India's Space Program Takes Shape: Satellites and Rockets (1970s–1990s)

The next phase of India's space journey was all about building its own capabilities. In 1975, India launched its first satellite, Aryabhata, named after the ancient Indian mathematician. Although the mission received technical support from the Soviet Union, it marked a proud moment for the nation and signaled India's official entry into the space age.

During the 1980s, India took important steps toward becoming self-reliant by developing its own launch vehicles. The successful launch of the Rohini satellite using the SLV-3 rocket showed that India could design and operate space missions independently. In the years that followed, the INSAT satellite system transformed communication across the country by improving television broadcasting, telecommunications, and weather forecasting. These decades proved to be crucial, as they helped India move away from dependence on foreign launch services and toward building strong domestic expertise and space technology.

India Steps onto the Global Space Stage (2000–2015)

The twenty-first century marked a turning point in India's space journey. During this period, the Indian Space Research Organisation gained global recognition for its reliable and cost-effective launch vehicles, especially the Polar Satellite Launch Vehicle (PSLV), which successfully launched both Indian and international satellites.

In 2008, India made history with the launch of Chandrayaan-1, its first mission to the Moon. The mission achieved a major scientific breakthrough by confirming the presence of water molecules on the lunar surface, earning widespread appreciation from the global scientific community.

Another landmark achievement followed in 2013 with the Mars Orbiter Mission, popularly known as Mangalyaan. India became the first country to successfully enter Mars orbit on its very first attempt, and it achieved this at a much lower cost compared to many other space agencies. This mission highlighted India's engineering skill, efficiency, and growing reputation as a strong player in global space exploration.

A New Chapter in India's Space Journey (2016–Present)

In recent years, India's space program has reached new heights. The successful landing of Chandrayaan-3 was a proud moment for the country, making India one of the few nations to achieve a soft landing on the Moon. This achievement demonstrated the growing maturity, precision, and technical strength of India's space program.

India has also expanded its scientific focus beyond the Earth & the Moon with the launch of Aditya-L1, a mission designed to study the Sun and its activities.

Alongside such research missions, India has developed navigation systems like NavIC, which support transportation, defense operations, and disaster management, showing how space technology directly benefits everyday life. Looking ahead, one of the most ambitious projects is Gaganyaan, India's planned human spaceflight mission.

The goal is to send Indian astronauts into space, marking a major step forward in the country's journey toward advanced space exploration.

How Space Technology Has Helped India Grow

One of the most unique aspects of India's space program is its strong focus on improving everyday life. Instead of being limited to scientific achievements alone, space technology in India is designed to create real benefits for society. Satellites support areas such as agriculture, disaster management, weather forecasting, communication, and education.

Remote sensing satellites help monitor crops, water resources, and environmental changes, which makes national planning more effective and supports sustainable development.

In addition, India's cost-effective approach has made space technology more accessible to developing countries. Through commercial satellite launches, the Indian Space Research Organisation has attracted international clients, contributing to economic growth while strengthening India's position in the global space industry.

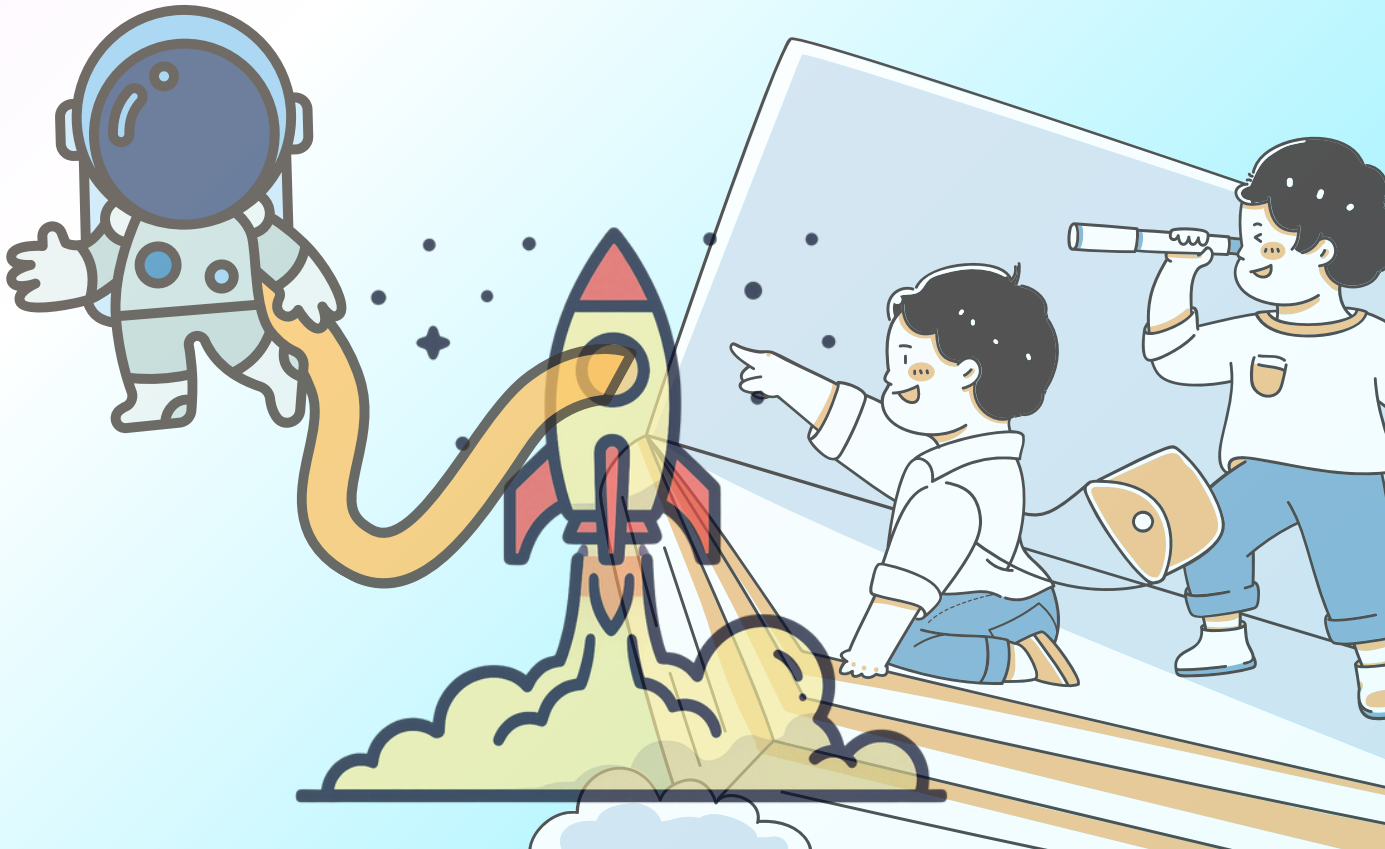
The Road Ahead: Challenges and Future Possibilities

India's achievements in space are truly remarkable, but the journey is not without challenges. As global space activities grow, India faces stronger competition from international space agencies as well as private companies. This means the Indian Space Research Organisation must continue to upgrade its technology, strengthen research, and invest in innovation to stay competitive.

Even with these challenges, the future of India's space program looks very promising. Ambitious plans such as sending astronauts into space through Gaganyaan, exploring more planets, and possibly developing a space station show that India is ready to take on bigger responsibilities in global space exploration.

Collaboration will play an important role in this next phase. Working with international space agencies and supporting private space startups within India can bring fresh ideas, advanced expertise, and additional resources that will help the program grow faster.

Overall, while challenges remain, India's clear vision and steady progress suggest a strong future ahead. With continued innovation, partnerships, and determination, India is well positioned to expand its role as an important player in the global space community.



SPACE TOURISM

Divya Sharma

Why in News?

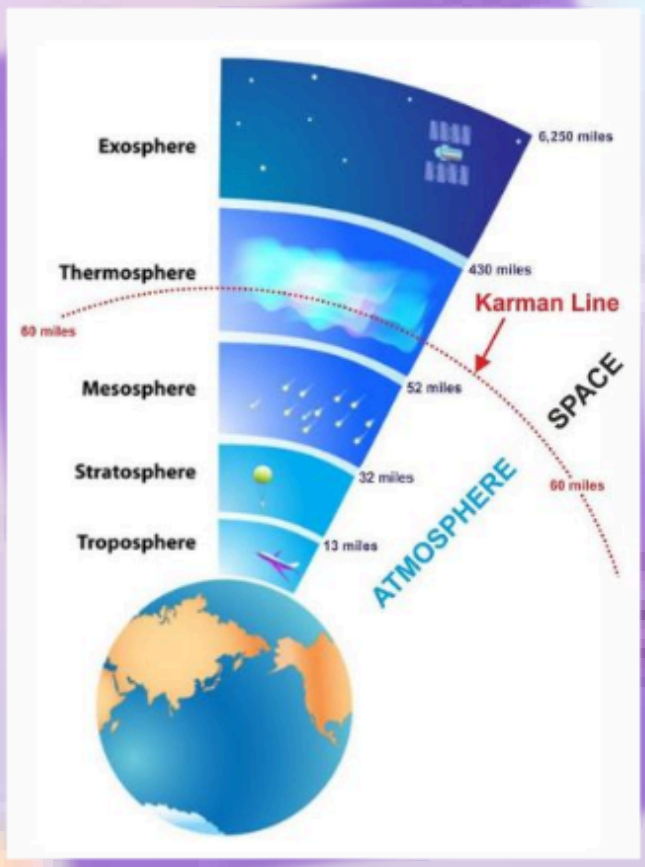
Recently, Gopi Thotakura, an India-born commercial pilot based in the US, became the first space tourist from India. She, along with five other space tourists, made a short recreational trip to space.

What is Space Tourism?

- Space tourism is a niche segment of the aviation industry that seeks to give tourists an experience of space travel for recreational, leisure, or business purposes.
- Space travel begins at about 100 km altitude from Earth, after crossing the Karman line, which is widely accepted as the boundary line separating the Earth's atmosphere from outer space.
    - Anything flying below this altitude is called an aircraft while those crossing this line get classified as a spacecraft.
- Types:
- Suborbital: Here, flights take passengers to the edge of space, where they can experience weightlessness for a few minutes.
- Orbital: Here, flights take passengers into orbit around the Earth. This gives them a chance to see the planet from space and experience weightlessness for a longer period of time.

Karman Line

- The Karman line is the internationally recognised boundary of space.
- The line is named after Theodore von Kármán (1881–1963), a Hungarian American engineer and physicist, who was active primarily in aeronautics and astronautics.
- He was the first person to calculate the altitude at which the atmosphere becomes too thin to support aeronautical flight and arrived at 83.6 km himself.
- The Fédération Aéronautique Internationale (FAI) defines Karman Line as the altitude of 100 kilometres above Earth's mean sea level.
- FAI is the world governing body for air sports, and also stewards definitions regarding human spaceflight.
- However, other organisations do not use this definition. There is no international law defining the edge of space, and therefore the limit of national airspace.



What are the Opportunities for India in the Space Tourism Sector?

- Leveraging ISRO's Expertise:
- The ISRO has a successful history in space missions, including the Mars Orbiter Mission (MOM), demonstrating its technological capabilities. This inspires confidence for future human space endeavours.
- ISRO's cost-efficient space programs could lead to competitive pricing for future space tourism, increasing accessibility for a wider range of participants.
- Fostering a Thriving Public- Private Space Partnership:

- The Indian government is actively encouraging private participation in the space sector. Initiatives like New Space India Limited (NSIL) by ISRO and supportive policies are attracting investments and propelling innovation.
- Eg: PSLV-C53 is the first official public-private collaboration for a space launcher in India.
- Private firms like SpaceX and Blue Origin have demonstrated the viability of such partnerships.
- Future Plans:
- The ISRO is also developing a reusable space tourism module for an estimated cost of Rs 6 crore per trip, which is expected to be launched by 2030.

What is the Future of Space Tourism?

- Accessible to Wealthy:

By 2030, ISRO predicts that space tourism will be accessible to the wealthy with an average ticket cost of around 6 crores. ISRO is working towards commercialising space tourism in India in the near future.

- Beyond Earth's Orbit:

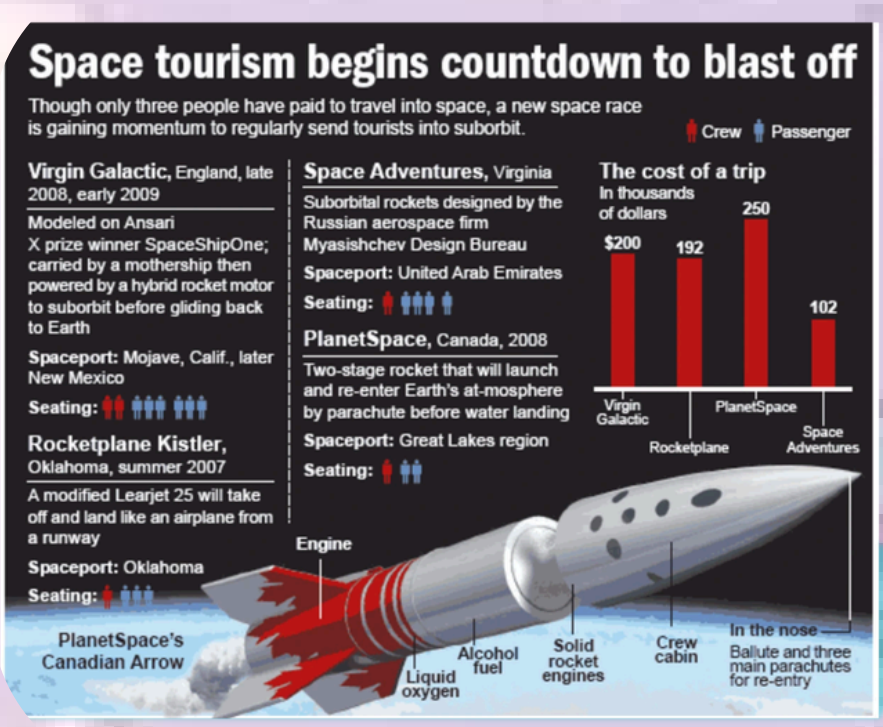
The current focus on suborbital and orbital flights is just the beginning. Companies are already setting their sights on lunar adventures and, ultimately, deep space exploration like missions to Mars such as Mangalyaan (India), Mariner 4(NASA), ExoMars (ESA), Tianwen-1 (China), Hope(UAE).

- **Space Staycations:**

The concept of space tourism is expanding beyond brief trips with companies now designing modules for space tourists to stay in for longer periods.

- **Focus on Sustainability:**

Greater emphasis will likely be placed on developing fully reusable rockets to minimise space debris and make space travel more environmentally friendly.



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A Journey of Persistence and Vision

Pulkita

I Hope was what India, when she became independent in 1947 inherited more than hardware. The nation was in the process of rebuilding and reforming its economy, institutions, and global image. Space exploration then was still a faraway dream - something only superpowers could afford. But within a few decades, India would not only join the space age but also become one of its more acclaimed participants.

Rockets didn't start this journey. It began with vision.

Vision Before Infrastructure

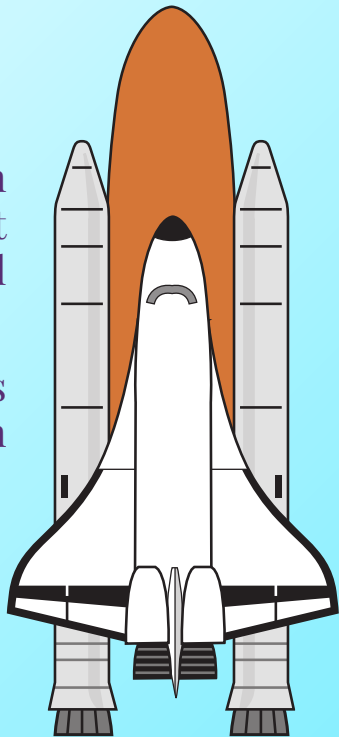
In the 1960s, when India was largely poor & other nations defined space as a marker of wealth & military strength, Indian scientists took a different view. Leaders such as Dr. Vikram Sarabhai felt that space technology could help solve the developmental problems of India telling the farmer information on weather; to tell a fisherman which waters are teeming with fish; to make education available anywhere."

Indian National Committee for Space Research (INCOSPAR) was set up in 1962. In 1969, it was transformed into an autonomous agency of Government of India, Indian Space Research Organisation (ISRO). The equipment would be carried on bicycles and bullock carts to facilities such as Thumba Equatorial Rocket Launching Station in its early days. It was unassuming, almost unlikely and it was resolute.

The First Leap: Aryabhata and Beyond

India's first satellite, Aryabhata, was launched in 1975. Although constructed in India, it was sent aloft with the help of the Soviet Union. Aryabhata represented India's entry into the international space community. Not just a satellite, but that India had arrived.

Another success was met in the 1980s when satellite, SLV-3 was injected into orbit. India had proved, that it could make its own spacecraft and then both build and launch them.



Gradually, communication satellites under INSAT program were revolutionising television broadcasting, telemedicine & disaster management. Weather satellites increased forecast accuracy, increasing agriculture production as well as coastal safety. Space was no longer abstract, it was woven into the fabric of Indian life.

Reaching for the Moon and Mars

The 21st century gave it worldwide attention. Chandrayaan-1 blasted off for the moon in 2008. The spacecraft's findings included detecting, for the first time, water molecules on the lunar surface a discovery that transformed our understanding of that airless world.

Then came 2013. India's Mars Orbiter Mission (Mangalyaan) made the country the first to reach Mars orbit on its first attempt and is a competitor in space race. What was even more amazing was that it was cheap. The mission proved that creativity, accuracy and good engineering could lead to great results without huge amounts of money.

These achievements shifted global perception. India was not a novice anymore; it was an experienced, able country with spacefaring capabilities.

Chandrayaan-3 and a Historic Landing

In 2023, India did something historic. Chandrayaan-3 landed safely near the Moon's south pole, becoming the first country in the world to do so. The minute the Vikram lander failed to touch down, it got personal for tens of millions of Indians who were watching live.

It was a national moment, not just a scientific success. From classrooms to boardrooms, talk turned to the sky. Space had been a metaphor for collective aspiration.

Building Capabilities at Home

India's journey into space has always been about self-reliance. The emergence of indigenous launch vehicles such as PSLV and GSLV also facilitated a degree of self-reliance in space activities.

PSLV, dubbed ISRO's "workhorse" has not just put satellites in orbit for India but also for various countries across the globe. Commercial launches have enabled India to be seen as a reliable partner in space applications and services, worldwide.

Closely following behind is a space-powered NavIC that supports navigation (NavIC), as well as climate monitoring, border protection and digital connectivity. It invisibly fuels many of the systems modern India relies on.

The Human Space Era

Today, India is at the dawn of human spaceflight with the mission Gaganyaan. The notion of Indian astronauts traveling to space on an indigenous platform is as much an emblem of national progress (moving from borrowed launch platforms to human-space capability) as it is a technology demonstrator.

Simultaneously, private players and startups are entering the ecosystem driven by policy changes and institutional backing. Space is no longer the domain of a single agency, it's an industry now.

India's first satellite *Aryabhata* shown before launch


Soviet-built Intercosmos rocket launching Aryabhata


Indian scientists monitoring *Aryabhata*'s mission progre

More Than Rockets

India's space story is as much about technology. It's about what resilience and resourcefulness and purpose can accomplish. According to live-mint Unlike many countries, whose nascent space programs were forged with geopolitical rivalries in mind, India's was driven by development and social impact.

From broadcasting education programs to villages in the 1970s to monitoring natural resources and responding to disasters today, the country has always tethered its space ambitions to societal needs.

Seventy-plus years after Independence, space has become a manifestation of the rise of a nation that dared to dream despite constraints. The journey goes on — to the moon and other worlds, with space startups and human spaceflight beckoning.

From bicycles lugging rocket parts the space story has evolved into a tale of quiet confidence and global reverence. And if history is any indicator, the next chapter will be penned not only in laboratories and on launchpads — but also in the dreams of young Indians who gaze up into the night sky and see an opportunity.

India's journey in space is still unfolding. And it is far from over.

India's Space Story of Capital Discipline

Hester

In an era where space exploration is often measured in billions of dollars and geopolitical spectacle, India has built its ascent on something quieter that is restraint. While major powers expanded through fiscal scale, India expanded through sequencing, optimisation, and disciplined allocation of capital. Over the last six decades, this approach transformed a resource-constrained programme into a globally credible space power.

With an annual budget of roughly ₹13,700 crore less than 0.3% of total Union expenditure and about 0.04% of GDP India has achieved lunar landings, interplanetary missions, and one of the world's most reliable launch systems. This is not merely a story of rockets and satellites. It is a case study in how strategic patience and financial discipline can convert limited public resources into enduring national capability.

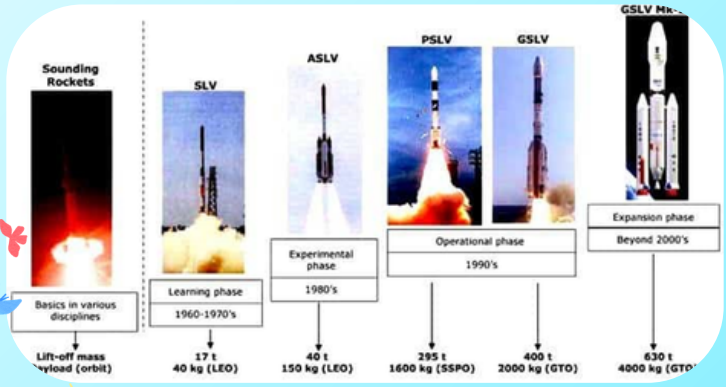
The Foundational Years of India's space program (1947–1980s)

In the decades after independence, India faced pressing economic priorities poverty alleviation, food security, industrialisation, & infrastructure creation. Any allocation to space required developmental justification. Prestige alone could not sustain public expenditure.

The programme therefore evolved with an application-first philosophy. Investments focused on communication, meteorology, and resource mapping. Infrastructure expanded gradually. Indigenous capability was prioritised to reduce foreign exchange dependence in a capital-scarce economy. Rather than committing large sums upfront, India adopted incremental development mastering one capability before expanding into the next. Scarcity did not suppress ambition but it structured it.

From Experiments to Infrastructure (1990s–2000s)

By the 1990s, India had operational satellites and dependable launch vehicles. The programme shifted from experimentation to asset creation. Communication satellites expanded rural broadcasting & telephony. Remote sensing supported agricultural forecasting, disaster management, & water planning.



Satellites were no longer symbolic milestones, they became economic infrastructure. Standardised satellite platforms and incremental launch upgrades reduced marginal costs. Reuse became embedded practice. Space expenditure increasingly resembled capital investment generating recurring productivity gains rather than one time technological display.

Frugality as Competitive Advantage

India's reputation for cost-efficient missions reflects institutional engineering rather than austerity alone. Budget ceilings encouraged design optimisation. Indigenous component development reduced external dependency. Project management discipline limited cost overruns.

The Mars Orbiter Mission, executed at approximately ₹450 crore, demonstrated that interplanetary capability need not require extravagant budgets. Constraint became a design principle. This efficiency translated into commercial credibility. India emerged as a competitive launch provider for small and medium satellites. Reliability combined with affordability generated international demand, reinforcing fiscal sustainability. Efficiency became exportable.

Transitional Era (2010s)

The 2010s marked an era of higher visibility missions advanced lunar exploration and preparation for human spaceflight. Yet ambition remained sequenced. Chandrayaan-3's successful lunar south pole landing in 2023 symbolised technological maturity achieved within disciplined fiscal boundaries. Space allocations roughly doubled over the decade, implying steady annual growth rather than sudden escalation. Expansion aligned with institutional readiness. Aspiration has advanced but only after capability validated it.

Rewriting the Capital Model (2020s)

The Indian Space Policy 2023 marked a structural shift. By separating regulatory, operational, and commercial roles and enabling non-government participation, the state redesigned the financial architecture of the sector. Sovereign capital continues to anchor high-risk strategic missions such as Gaganyaan. Private enterprises assume commercial manufacturing and downstream service risk. Public capital acts as a catalyst rather than a substitute. India's space economy, currently valued at approximately $8–9 billion, is projected to expand toward $40–44 billion by 2033. Much of this anticipated growth stems from private activity built upon public infrastructure a multiplier effect driven by disciplined foundational investment.

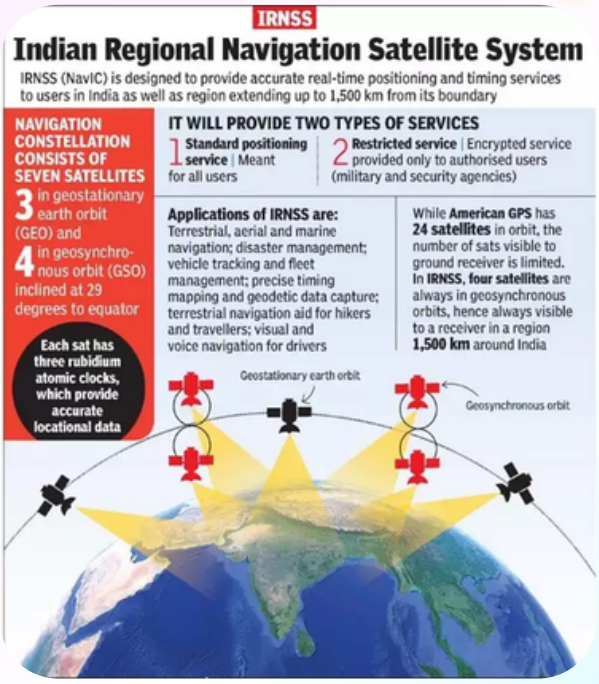
Credibility as Capital

Space programmes inevitably encounter setbacks. What distinguishes India's trajectory is fiscal steadiness. Budgets remain predictable. Reviews are incremental. Corrections avoid volatility. Across political transitions over the years, the strategic direction of the programme has remained intact. That continuity reduces institutional risk and strengthens long-term planning. In economic terms, predictability lowers uncertainty. Stability itself becomes strategic capital.

Compounding Returns

Today, space systems underpin navigation (NavIC), telecommunications, digital governance, disaster management, and national security. These services form invisible but foundational layers of economic activity.

Infrastructure demands upfront capital but generates compounding returns over time. India's phased model ensured expansion only when foundational strength permitted it. As satellite broadband, earth observation analytics, and downstream applications expand, economic value deepens. The fiscal share remains modest. The strategic and economic footprint is not.



Conclusion

The coming decades will demand larger investments human spaceflight, next-generation launch vehicles, deeper exploration. The challenge is not whether spending will rise, but whether discipline will endure as scale increases.India's space programme demonstrates that technological leadership need not be built on fiscal extravagance.

It can emerge from the coherence of sustained allocation, infrastructure prioritisation, risk distribution, and engineering efficiency. In a domain often defined by who spends the most, India offers a different proposition, Sustainable power in space is not achieved through escalation. It is achieved through disciplined, compounding investment over time.

"From once navigating constraints to commanding the cosmos now, India's space journey proves that disciplined ambition can outlast dominance."

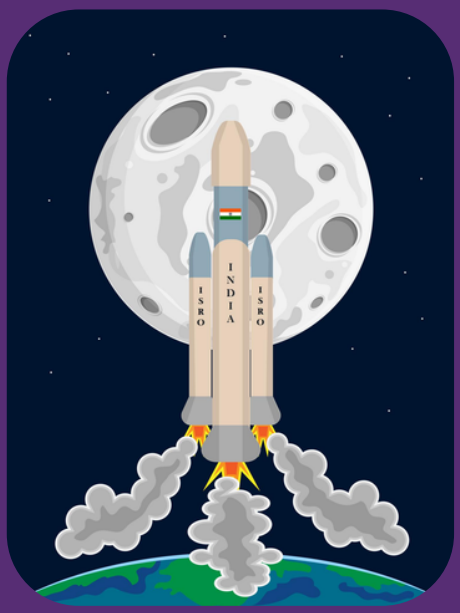
CURRENT NEWS

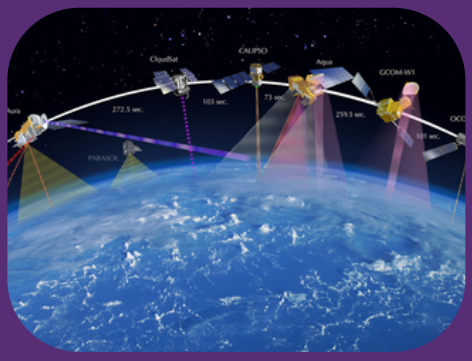
SPACE NEWS

Mokshika Arya

INDIA–US GAGANYAAN DOCKING WITH ISS

INDIA AND THE UNITED STATES ARE DISCUSSING A PROPOSAL FOR AN UNCREWED DOCKING OF THE GAGANYAAN SPACECRAFT WITH THE INTERNATIONAL SPACE STATION (ISS). THIS MISSION WOULD TEST ADVANCED RENDEZVOUS AND DOCKING TECHNOLOGIES THAT ARE ESSENTIAL FOR FUTURE HUMAN SPACEFLIGHT MISSIONS. THE DISCUSSIONS ARE BEING HELD UNDER THE INDIA–US CIVIL SPACE JOINT WORKING GROUP FRAMEWORK. IF SUCCESSFUL, THIS COLLABORATION WOULD PLACE INDIA AMONG A SELECT GROUP OF NATIONS CAPABLE OF DOCKING OPERATIONS IN SPACE.





NISAR SATELLITE PROVIDING EARTH OBSERVATION DATA

THE NISAR (NASA-ISRO SYNTHETIC APERTURE RADAR) SATELLITE IS DELIVERING HIGH-RESOLUTION SOIL MOISTURE AND LAND DEFORMATION DATA OVER INDIA. THIS DATA IS EXTREMELY USEFUL FOR AGRICULTURE PLANNING, FLOOD MONITORING, AND CLIMATE STUDIES. THE SATELLITE USES ADVANCED RADAR TECHNOLOGY THAT WORKS DAY AND NIGHT AND THROUGH CLOUDS. NISAR HIGHLIGHTS THE BENEFITS OF INTERNATIONAL COOPERATION IN SPACE RESEARCH.

ISRO INTERNSHIP OPPORTUNITIES FOR STUDENTS

THE VIKRAM SARABHAI SPACE CENTRE HAS ANNOUNCED INTERNSHIPS FOR UNDERGRADUATE AND POSTGRADUATE STUDENTS IN SCIENCE AND ENGINEERING. THESE INTERNSHIPS PROVIDE HANDS-ON EXPOSURE TO REAL SPACE RESEARCH AND DEVELOPMENT PROJECTS. THE INITIATIVE HELPS BUILD A SKILLED WORKFORCE FOR INDIA'S GROWING SPACE SECTOR. IT ALSO ENCOURAGES YOUNG STUDENTS TO PURSUE CAREERS IN SPACE SCIENCE.

ISRO CHIEF ON COOPERATIVE SPACE VISION

THE ISRO CHAIRMAN EMPHASIZED THAT INDIA'S SPACE PROGRAMME IS BASED ON COOPERATION RATHER THAN RIVALRY. HE HIGHLIGHTED INTERNATIONAL PARTNERSHIPS AND PEACEFUL USE OF OUTER SPACE. INDIA FOCUSES ON SPACE APPLICATIONS THAT BENEFIT SOCIETY SUCH AS COMMUNICATION, NAVIGATION, AND DISASTER MANAGEMENT. THIS APPROACH HAS EARNED INDIA GLOBAL TRUST AND RESPECT.

PREPARATORY TESTS FOR GAGANYAAN MISSION

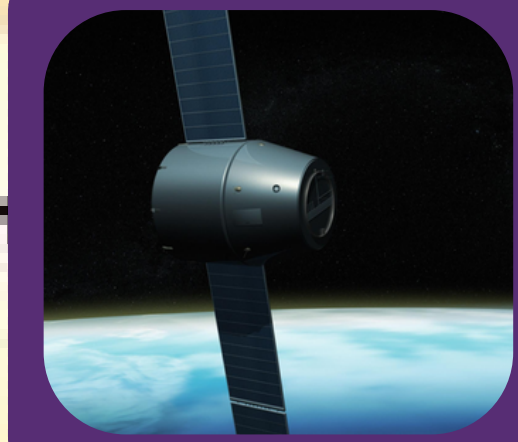
ISRO IS CONDUCTING SEVERAL PREPARATORY TESTS FOR THE GAGANYAAN HUMAN SPACEFLIGHT MISSION. THESE INCLUDE CREW MODULE RECOVERY TESTS, PARACHUTE TRIALS, AND LIFE-SUPPORT SYSTEM VALIDATION. EACH TEST IS AIMED AT ENSURING ASTRONAUT SAFETY AND MISSION RELIABILITY. THESE STEPS ARE CRUCIAL BEFORE ATTEMPTING A CREWED LAUNCH.

MULTIPLE SATELLITE LAUNCHES PLANNED

ISRO IS PLANNING MULTIPLE SATELLITE LAUNCHES COVERING EARTH OBSERVATION, COMMUNICATION, AND EXPERIMENTAL MISSIONS. THESE LAUNCHES WILL STRENGTHEN INDIA'S SPACE INFRASTRUCTURE AND MEET CIVILIAN AND STRATEGIC NEEDS. INCREASED LAUNCH FREQUENCY ALSO SUPPORTS COMMERCIAL SPACE ACTIVITIES. THIS REFLECTS INDIA'S AMBITION TO EXPAND ITS ROLE IN THE GLOBAL SPACE SECTOR.

EOS-05 (GISAT-1A) EARTH OBSERVATION MISSION

THE EOS-05 SATELLITE IS DESIGNED TO PROVIDE NEAR REAL-TIME EARTH OBSERVATION FROM GEOSTATIONARY ORBIT. IT WILL HELP IN MONITORING CYCLONES, FLOODS, FOREST FIRES, AND ENVIRONMENTAL CHANGES. THE MISSION WILL SIGNIFICANTLY IMPROVE DISASTER MANAGEMENT AND EARLY WARNING SYSTEMS. IT STRENGTHENS INDIA'S REMOTE SENSING CAPABILITY.



TECHNOLOGY DEMONSTRATION SATELLITE TDS-01

ISRO IS DEVELOPING THE TECHNOLOGY DEMONSTRATION SATELLITE-01 TO TEST ADVANCED SPACE TECHNOLOGIES. THESE INCLUDE ELECTRIC PROPULSION, ADVANCED COMMUNICATION SYSTEMS, AND NAVIGATION TECHNOLOGIES. SUCCESSFUL TESTING WILL REDUCE COSTS AND IMPROVE EFFICIENCY OF FUTURE MISSIONS. TDS-01 REPRESENTS INDIA'S MOVE TOWARDS NEXT-GENERATION SPACE SYSTEMS.

CURRENT NEWS

WATCHLIST

Indian Space Missions on Screen

Anshul Yadav

Mission Mangal

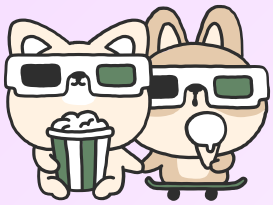
Released in 2019, the movie follows a group of Indian scientists working on the country's first interplanetary mission. The film stars Akshay Kumar, Vidya Balan, Taapsee Pannu, & Sonakshi Sinha. It mixes science, emotion, & humour while showing the personal & professional lives behind a national mission.

- Celebrates India's ability to innovate and manage a major mission with limited resources
- Focus on teamwork, diligent planning, and thinking outside the box.

Rocketry

Released in 2022, the film portrays the life of ISRO scientist Nambi Narayanan played by R. Madhavan, who also directed and co-wrote the movie. It showcases India's achievements in satellite technology and the resilience of scientist facing scandals.

- Highlights dedication and perseverance in India's space program.
- Portrays management challenges and the unfair accusations against Nambi



TIK TIK TIK

Released in 2018 is widely known as India's first mainstream space action spectacle. Starring Jayam Ravi, the film revolves around a team sent on a dangerous mission to prevent asteroid strike. While fictional, it brought space adventure into popular cinema and expanded interest in planetary defense.

- Celebrates India's ability to innovate & manage major missions under pressure.
- Focus on teamwork, planning, & thinking outside the box.
- For MBA students, it underlines how clarity, confidence, & speed can define outcomes in crises.

Space Gen

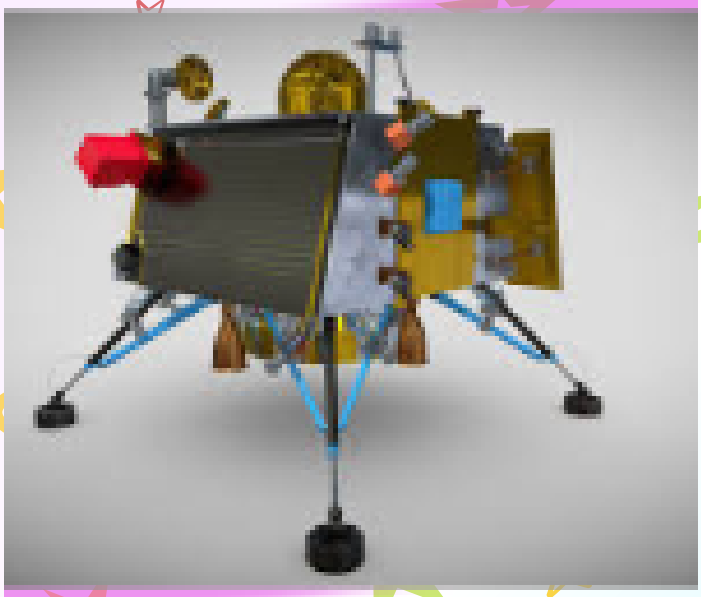
Released in 2026 Hindi-language Indian series created by Arunabh Kumar & produced by Premsheela Kumar & N. Kumar under The Viral Fever. Instead of retelling the past, it looks forward asking what India's role in global space leadership could be in the coming decades.

- The management viewpoint emphasizes shifts toward innovation, pipelines, young leadership, and strategy.
- For aspiring managers, the message is about preparing for future opportunities & leading change.

ONE MISSION, ONE MANAGEMENT LESSON

Yashika Choudhary

Mission: Chandrayaan-3



When I think about India's space journey, one mission that truly stands out to me is Chandrayaan-3. We all remember the silence in the ISRO control room in 2019 when Chandrayaan-2 lost contact just 2.1 km from the lunar surface. After the partial setback of Chandrayaan-2, many countries would have slowed down. But India chose to learn, improve, and come back stronger. Instead of abandoning the project, ISRO spent four years analyzing every millisecond of data from that crash. On 23 August 2023, Chandrayaan-3 didn't just land; it "soft-landed" with such precision that it made India the first nation to reach the lunar South Pole.

The Management Lesson: Resilience and Iterative Improvement

To me, the biggest lesson from Chandrayaan-3 is that failure is not the opposite of success, it is part of the process. ISRO Chairman S. Somanath famously said that for Chandrayaan-3, they moved to a "Failure-Based Design." Instead of designing a mission that could succeed, they designed a mission that couldn't fail.

After Chandrayaan-2's landing didn't go as planned, Indian Space Research Organisation did not treat it as a defeat. Instead, they conducted detailed failure analysis, improved the landing algorithms, strengthened the lander's legs, added more fuel margin, and simplified mission objectives. This shows a important management principle: Analyze, Adapt, and Advance.

More Insights from Chandrayaan-3

1. Risk ManagementISRO identified the critical risk areas from the previous mission and redesigned the system with redundancies. They strengthened the lander's legs, added more fuel, and included extra sensors like the Laser Doppler Velocimeter. Good management always prepares for worst-case scenarios.
2. Learning Organization CultureInstead of blaming individuals, the focus was on system improvement. This creates a psychologically safe and growth-oriented work environment.
3. Clear Goal AlignmentThe mission objective was more focused: safe landing and rover deployment. Simplifying goals increases the probability of success.
4. Cost EfficiencyDespite being technologically advanced, the mission was completed at a relatively low budget (a budget of roughly $74 million) as compared to global standards. This reflects strong resource optimization and strategic planning.
5. Leadership Under PressureLeaders remained calm, transparent, and confident. This maintained team morale and public trust.

Chandrayaan-3 teaches that real leadership is shown not when everything goes right, but when things go wrong. The mission proves that resilience, teamwork, data-driven decision-making, and continuous improvement are the foundations of long-term success.
In management terms, Chandrayaan-3 is not just a lunar mission, it is a masterclass in strategic comeback and sustainable execution.

Mission: Mars Orbiter Mission (Mangalyaan)

When I think about India's boldest space achievements, Mangalyaan immediately comes to mind. Launched in November 2013 by the Indian Space Research Organisation, it successfully entered Mars orbit on 24 September 2014. What makes this mission extraordinary is that India became the first country in the world to reach Mars orbit on its very first attempt.
But beyond the scientific milestone, what truly inspires me is the management excellence behind it.

The Management Lesson: Frugal Innovation with Strategic Clarity

The Mars Orbiter Mission was completed at a remarkably low cost compared to similar global missions. Instead of overdesigning the spacecraft, ISRO clearly defined limited but achievable objectives, mainly to demonstrate interplanetary mission capability and gather specific scientific data.
This teaches an important management principle: Success does not depend on spending more. It depends on planning smarter.

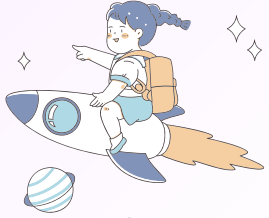
More Insights from Mangalyaan

1. Clear and Focused Objectives

The primary goal of the mission was a focused technology demonstration, proving that India could independently design, launch, and manage a complex interplanetary journey. By strategically avoiding unnecessary complexity and focusing on core deliverables, the team ensured a much higher probability of success, illustrating a vital management principle: when objectives are clearly defined and not overloaded, execution becomes significantly more efficient, measurable, and resilient to failure.

2. Optimal Resource Utilization

The mission strategically reused existing PSLV launch vehicle technology instead of waiting years for a heavier rocket, forcing engineers to work within tight constraints rather than demanding ideal conditions. From a management perspective, this proves that constraints can actually drive creativity; when resources are limited, teams are encouraged to move past traditional thinking and adopt innovative problem-solving techniques that often result in more elegant and efficient solutions.



3. **Speed with Precision**

The mission was conceptualized and executed within an incredibly short time frame, which required rapid decision-making, minimal bureaucratic delay, and seamless coordination across multiple departments. From a management perspective, this illustrates that in highly competitive or fast-moving environments, timely execution and "speed-to-market" are just as critical as technical perfection; a perfect solution that arrives too late is often less valuable than a viable one that meets the mission window.

4. **Risk Calculation, Not Risk Avoidance**

Deep-space missions inherently carry high levels of uncertainty, yet instead of avoiding the challenge, ISRO calculated risks carefully and developed robust contingency strategies. From a management perspective, this reinforces the idea that good managers don't seek to eliminate risk but instead learn to manage it intelligently by balancing ambition with preparation.

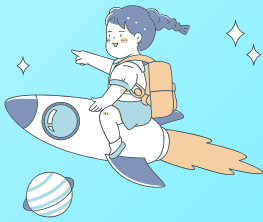
Mangalyaan proves that vision combined with disciplined execution can overcome financial and technological limitations. It reflects confidence, efficiency, and strategic thinking at the highest level.

From a management perspective, this mission teaches that:

- Ambition should be backed by clarity
- Innovation thrives under constraints
- Team coordination determines outcome
- And bold goals require calculated courage

Mangalyaan was not just India reaching Mars. It was India proving that with smart management and strong teamwork, even the most distant goals can become achievable.

Mission: Aditya-L1



Aditya-L1 is India's first dedicated solar mission, launched in September 2023 by the Indian Space Research Organisation. Unlike missions that travel to planets or the Moon, this spacecraft was placed in a halo orbit around the L1 (Lagrange Point 1), approximately 1.5 million kilometers from Earth, where it can continuously observe the Sun without interruption.

For me, what makes Aditya-L1 special is that it reflects India's shift from exploration-driven missions to research-driven missions. It is not just about reaching somewhere—it is about understanding something fundamental: the Sun, which directly affects Earth's climate, communication systems, and satellites.

The Management Lesson: Strategic Diversification and Future Preparedness

Until recently, India's major milestones were lunar and Mars missions. With Aditya-L1, ISRO expanded into solar science and space weather research. This reflects a powerful management principle: Sustainable organizations diversify their expertise to remain relevant in the future.

Instead of repeating similar missions, ISRO entered a new scientific domain that has long-term importance for national infrastructure and global research.

More Insights from Aditya-L1

1. **Long-Term Vision**

Studying the Sun is not merely about immediate visible success; it is about building long-term scientific capability and preparing for future global challenges, such as solar storms that can disrupt power grids and satellite communications. From a management perspective, this proves that strong leadership must invest in projects whose benefits may not be immediate but are strategically essential for long-term survival and stability.

2. **Risk Distribution**

Every organization faces risk concentration if it focuses only on one area; by expanding into solar observation with Aditya-L1, ISRO effectively reduced its institutional dependency on a single type of mission. From a management perspective, this demonstrates that diversification strengthens stability and resilience, ensuring that an organization remains relevant and functional even if one specific sector faces challenges or delays.

3. Capability Building

Aditya-L1 required the development of advanced payloads, precision orbit insertion into the L1 point, and sophisticated deep-space communication systems, all of which significantly increased the technological depth within ISRO. From a management perspective, this underscores that organizations must continuously upgrade their skills and infrastructure to remain competitive; by pushing the boundaries of what is technically possible today, a team ensures they are equipped to handle the even greater complexities of tomorrow.

4. Proactive Problem Prevention

Solar activity directly impacts critical modern infrastructure, including satellites, GPS systems, aviation, and communication networks; by studying the Sun today, India is building the capability to predict and manage these high-stakes risks before they escalate. From a management perspective, this reinforces the idea that proactive planning is investing in early detection and foresight is always more effective and cost-efficient than reactive crisis management once a disruption has already occurred.

Aditya-L1 represents maturity in India's space program. It shows that leadership is not only about achieving historic "firsts," but also about strengthening systems for long-term sustainability.

From a management perspective, this mission teaches that:

- Growth requires diversification
- Strategic investments build future security
- Knowledge is a long-term asset
- Preparedness prevents crises

Aditya-L1 is not just a mission to study the Sun—it is a lesson in forward-thinking leadership and strategic expansion.

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LEADERSHIP INSIGHTS: PEOPLE BEHIND INDIA'S SPACE JOURNEY

Vidhi Sharma

1st chairperson of Dr Vikram Sarabhai
In office
1969-71

Father of the Indian space program

Vikram Ambalal Sarabhai (12 August 1919 – 30 December 1971) was an Indian physicist and astronomer who initiated space research and helped to develop nuclear power in India. Often regarded as the "Father of Indian space program",[2] Sarabhai was honored with Padma Bhushan in 1966 and the Padma Vibhushan (posthumously) in 1972.
Vikram Sarabhai was born on 12 August 1919 in a Gujarati Śvetāmbara Shrimali Jain family, in Ahmedabad, India. His father was Ambalal Sarabhai, a major industrialist committed to the Indian independence movement.
Known as the cradle of space sciences in India, the Physical Research Laboratory (PRL) was founded in 1947 by Vikram Sarabhai.[7] PRL had a modest beginning at his residence, the "RETREAT", with research on cosmic rays.

President of India
In office
25 July 2002-25 July 2007

Known as the "Missile Man of India"

Avul Pakir Jainulabdeen Abdul Kalam; 15 October 1931 – 27 July 2015) was an Indian aerospace scientist and statesman who served as the president of India from 2002 to 2007.

Born and raised in a Muslim family in Rameswaram, Tamil Nadu, Kalam studied physics and aerospace engineering. He spent the next four decades as a scientist and science administrator, mainly at the Defence Research and Development Organisation (DRDO) and Indian Space Research Organisation (ISRO) and was intimately involved in India's civilian space programme and military missile development efforts. He was known as the "Missile Man of India" for his work on the development of ballistic missile and launch vehicle technology. He also played a pivotal organisational, technical, and political role in Pokhran-II nuclear tests in 1998, India's second such test after the first test in 1974.

Indian space programme
In office
1972-1984

Advocated for self-reliance in space technology

Satish Dhawan (25 September 1920 – 3 January 2002) was an Indian mathematician and aerospace engineer. He served as the chairman of ISRO from 1972 to 1984 and is often regarded as the father of experimental fluid dynamics research in India.In 1972, Dhawan became chairman of the Indian Space Research Organisation (ISRO) and secretary to the Government of India at the Department of Space

Dhawan carried out pioneering experiments in rural education, remote sensing and satellite communications. His work resulted in operational systems including INSAT, a telecommunications satellite; IRS, an Indian Remote Sensing satellite; and the Polar Satellite Launch Vehicle (PSLV), which established India as a space-faring country.

Dhawan died on 3 January 2002 in Bangalore.[8] In honor of his contributions, the satellite launch center in Sriharikota, Andhra Pradesh, was renamed the Satish Dhawan Space Centre following his death. Satish Chander Dhawan Government College For Boys in Ludhiana is named after him.

9th Chairman of ISRO
In office
15th January 2018-14th January 2022

Known for his humble leadership style

Kailasavadivu Sivan (born 14 April 1957) is an Indian aerospace engineer who served as the secretary of the Department of Space and chairman of ISRO and Space Commission.[1][2] He has previously served as the director of the Vikram Sarabhai Space Center and the Liquid Propulsion Systems Centre.Sivan was appointed the chief of ISRO in January 2018 and he assumed office on 15 January. [14] Under his chairmanship, ISRO launched Chandrayaan-2, the second mission to the Moon on 22 July 2019, of which Vikram lander and the Pragyan rover crashed; the orbiter was not affected and is still orbiting the Moon as of September 2023.

11th chairman of ISRO
In office
14th January 2025

Leading ISRO into new frontiers: Chandrayaan-3 Aditya-L1 solar mission, Gaganyaan

V.Narayanan (born 14 May 1964) is an Indian cryogenic engineer and rocket scientist who is serving as Chairman of ISRO and the Secretary of the Department of Space (DoS) since 14 January 2025.[2][3][4] He was the Director of the Liquid Propulsion Systems Centre (LPSC) from 23 January 2018 to 14 January 2025, the day when he assumed the chairmanship of ISRO.[5] He is to lead the organisation during the ongoing development of various upcoming programmes, including the Gaganyaan and Chandrayaan-4 missions, as well as the launch of India's first space station in the forthcoming years.

CLUB ACTIVITIES

Nandini

QUALITATIVE RESEARCH WITH ARTIFICIAL INTELLIGENCE

Mr. James Goh presented the features and capabilities of AILYZE, an AI-powered qualitative research platform.

Key Features Demonstrated:

a)Data Upload & Multilingual Support

Upload of documents in 100+ languages.

Support for audio, video, surveys, research papers, and articles.

Automated transcription and translation features.

b) AI Analytical Tools

Thematic analysis with structured codebook creation.

Cross-segment analysis.

Frequency and content analysis.

Media scraping functionality.

Automated coding with citation support.

c) AI Insights Hub
Interactive research chatbot.
Codebook refinement and customization.
Custom report generation.
Collaboration tools for research teams.

AI can significantly enhance efficiency in qualitative research when used responsibly.Human interpretation remains central to qualitative methodologies.Specialized research platforms differ substantially from general-purpose AI tools.There is growing relevance of AI-assisted analysis in academic research.

The workshop concluded with a vote of thanks to both speakers for delivering an informative and engaging session. The event successfully facilitated a deeper understanding of Artificial Intelligence applications in qualitative research among participants

TECHNOLOGY, SUSTAINABILITY & ESG ANALYTICS

The session began with the speaker introducing the growing urgency of climate change and sustainability challenges. The speaker highlighted that global temperatures have already increased by approximately 1.1°C above pre-industrial levels, and nearly 45% of organizations still lack reliable ESG data for informed decision-making. This gap, combined with a large global investment requirement for sustainable infrastructure, makes data-driven sustainability not just desirable but necessary. The speaker emphasized that ESG is no longer merely a compliance requirement; rather, it has evolved into conscious governance where organizations balance environmental responsibility, social welfare, and economic growth.

The speaker then explained the role of ESG within organizations, focusing on strategy integration, regulatory compliance, risk assessment, stakeholder engagement, and continuous improvement. ESG governance was presented as a structured organizational function that includes environmental stewardship, social responsibility, and governance oversight. The speaker also highlighted the growing influence of global ESG frameworks such as Sustainable Development Goals (SDGs), UN Global Compact, and national guidelines like NGRBC in shaping corporate sustainability strategies.

Moving forward, the speaker discussed the importance of data in sustainability analytics. A comprehensive sustainability data ecosystem was introduced, consisting of remote sensing, IoT sensors, enterprise ESG data, open climate datasets, financial data, and operational business information. These diverse data sources allow organizations to track emissions, optimize resources, and make evidence-based sustainability decisions. The speaker stressed that without real-time data and analytics, organizations cannot accurately measure progress toward net-zero targets or identify operational inefficiencies.

The session further introduced a five-step sustainability analytics framework consisting of data ingestion, processing, analysis, visualization, and action. Advanced technologies such as machine learning, deep learning, natural language processing, computer vision, and digital twins were discussed as enablers of this framework. The speaker demonstrated how these technologies convert raw environmental data into actionable climate insights and decision-support systems Several real-world applications of sustainability analytics were discussed, including AI-based energy optimization, water resource management through sensor networks, carbon footprint tracking across supply chains, and biodiversity monitoring using remote sensing. .

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The speaker highlighted measurable outcomes from these implementations, including up to 40% energy cost reduction, faster regulatory compliance, and improved ESG reporting accuracy. These examples illustrated the practical value of data-driven sustainability approaches.

The speaker also emphasized that climate risk should now be viewed as financial risk. Various forms of climate risks such as physical risks, transition risks, and market risks were explained. The speaker introduced a risk quantification model defined as Risk = Hazard × Exposure × Vulnerability, which helps organizations assess and manage climate-related financial risks. The importance of predictive climate modeling and scenario analysis was also discussed in this context.

The session further explored climate modeling techniques such as CMIP6 global climate models, statistical downscaling, regional climate models, and AI-based deep learning projections. These techniques help translate large-scale climate predictions into local-level business insights. The speaker emphasized that data science acts as a bridge between global climate science and practical organizational decision-making.

An implementation roadmap for data-driven sustainability was then presented in four phases: foundation, integration, analytics, and scaling. This phased approach included data audits, sensor deployment, machine learning model development, and cross-organizational integration for long-term sustainability optimization. A case study of a global manufacturing corporation was also presented, where IoT sensors and AI analytics helped reduce emissions by 23% and achieve significant cost savings.

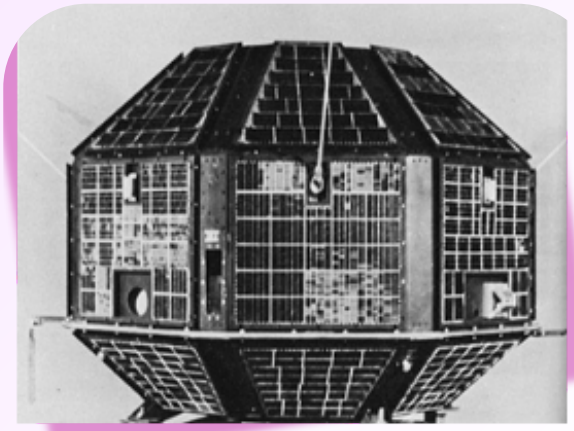
The speaker concluded by discussing emerging technologies such as digital twins, generative AI, real-time ESG tracking, and quantum computing for climate analytics. These technologies were presented as future drivers of sustainable transformation. The session ended with key takeaways emphasizing that sustainability is data-intensive, AI is a major enabler, and climate risk must be integrated into business strategy. The speaker concluded by encouraging organizations and researchers to adopt data-driven sustainability practices to build resilient and environmentally responsible systems.

DID YOU KNOW?

Yuktika Duggal

Rare & Fascinating Facts about India in Space

India entered space quietly in 1975.
Aryabhata, India's first satellite, was launched from the Soviet Union, making India one of the earliest space-faring nations among developing countries



ISRO holds the world record for most satellites launched in a single mission.
In 2017, **PSLV-C37** deployed **104 satellites** in one launch — a global milestone.

ISRO once transported rocket parts on bicycles and bullock carts.
In its early days, rocket components were carried through villages in Kerala due to lack of infrastructure — a symbol of India's frugal innovation.

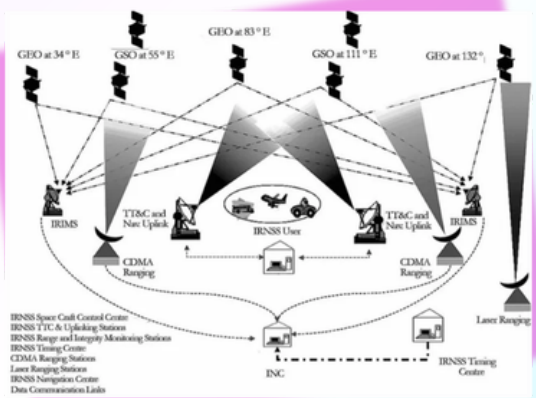
India's rockets are so reliable that foreign nations queue up.
Over **34 countries** have used ISRO launch services, making space a quiet but powerful export sector.

India is the only country to reach Mars on its first attempt.
The Mars Orbiter Mission (Mangalyaan) succeeded in 2014 with a budget lower than many Hollywood films.

Chandrayaan-1 discovered water on the Moon — first ever confirmation.
In 2008, India became the **first country to detect water molecules on the lunar surface,** reshaping global lunar science.

Chandrayaan-3 landed where no one else could.
India is the **first nation to land near the Moon's south pole,** an area critical for future human missions due to water-ice potential.

ISRO designs missions assuming failure — deliberately.
Unlike many agencies, ISRO's engineering philosophy includes planned redundancy and failure tolerance to reduce cost and risk.



India runs one of the world's largest satellite navigation systems — NavIC.
NavIC provides positioning accuracy over India and nearby regions, even in **dense urban and disaster-prone areas.**

Women have led India's most complex space missions.
From **Mars Orbiter Mission** to **Chandrayaan-3,** Indian women scientists have played key leadership roles — quietly rewriting global stereotypes.

CASE STUDIES

Ananya Rastogi

CASE STUDY 1

MANGALYAAN (MARS ORBITER MISSION): COST LEADERSHIP IN HIGH-TECHNOLOGY INNOVATION

Launched in 2013 by ISRO, Mangalyaan positioned India as the first country to successfully reach Mars orbit on its maiden attempt. What made the mission globally remarkable was its cost efficiency completed at a fraction of the budget of comparable international missions. ISRO adopted a frugal engineering model, leveraging existing launch vehicle technology, optimizing payload design, and implementing lean project management practices. Strategically, the mission enhanced India's global technological credibility and demonstrated that emerging economies can compete in high-technology sectors through innovation rather than scale. Beyond scientific outcomes, Mangalyaan functioned as a national branding exercise, reinforcing India's reputation as a cost-effective and reliable space power

Discussion Questions:

How did frugal innovation create strategic advantage for India in the global space sector?

Can cost leadership be sustained in high-risk, high-technology industries?

What management lessons can public organizations draw from ISRO's execution model?

CASE STUDY 2

CHANDRAYAAN-3: ORGANIZATIONAL LEARNING AND STRATEGIC RESILIENCE

Chandrayaan-3, launched in 2023, followed the unsuccessful soft-landing attempt of Chandrayaan-2. Instead of retreating, ISRO conducted a detailed failure analysis, redesigned critical landing systems, strengthened testing protocols, and improved risk mitigation processes. The mission achieved a historic soft landing near the Moon's south pole, making India the first country to reach this region. From a management perspective, Chandrayaan-3 represents a strong case of institutional resilience, data-driven decision-making, and stakeholder confidence management. The mission demonstrates how organizations operating in high-risk sectors can convert setbacks into long-term strategic success through structured learning and persistence.

Discussion Questions:

How can organizations transform failure into long-term competitive advantage?

What leadership practices support resilience in high-risk projects?

How does stakeholder trust influence the continuation of large national missions?

CASE STUDY 3

CHANDRAYAAN-1: STRATEGIC POSITIONING THROUGH SCIENTIFIC DISCOVERY

Launched in 2008, Chandrayaan-1 marked India's transition from a development-focused space program to a globally competitive scientific player. The mission's most significant achievement was confirming the presence of water molecules on the Moon, which reshaped global lunar research. By including international scientific payloads, ISRO strengthened collaboration and enhanced India's diplomatic and technological standing. Strategically, Chandrayaan-1 elevated India's image as a credible participant in deep-space exploration and demonstrated how targeted scientific breakthroughs can enhance national reputation and soft power.

Discussion Questions:

How do scientific discoveries influence national branding and global positioning?

What are the strategic benefits of international collaboration in space missions?

How can emerging economies use niche innovation to compete globally?

SPACE QUIZ

Ankita Singh

1 Which organization laid the foundation of India's space programme before the formation of ISRO?

- A. Atomic Energy Commision
- B. Defence Research and Development Organisation
- C. Indian National Committee for Space Research
- D. National Remote Sensing Agency

2 The Indian space programme was primarily conceptualized under the leadership of:

- A. Homi J. Bhabha
- B. Vikram Sarabhai
- C. Satish Dhawan
- D. A. P. J. Abdul Kalam

3 The establishment of ISRO in 1969 was under the administrative control of:

- A. Ministry of Defence
- B. Department of Atomic Energy
- C. Department of Science and Technology
- D. Prime Minister's Office

4 Which mission first confirmed the presence of water molecules on the lunar surface?

- A. Chandrayaan-2
- B. Chandrayaan-3
- C. Chandrayaan-1
- D. Lunar Reconnaissance Orbiter

5 India's first indigenous navigation satellite system is called:

- A. GPS-India
- B. NavStar
- C. NavIC
- D. IRNSS-Global

6 The headquarters of Indian Space Research Organization is located in:

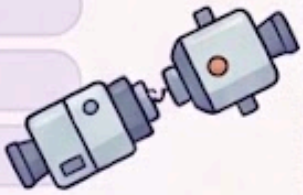
- A. Mumbai
- B. New Delhi
- C. Hyderabad
- D. Bengaluru

7 Which ISRO mission achieved the first soft landing near the Moon's south pole?

A. Chandrayaan-1
B. Chandrayaan-2
C. Chandrayaan-3
D. Lunar Orbiter Mission

8 Which Indian mission demonstrated space docking capability and human-space-sflight technology tests?

A. Astrosat
B. Mangalyaan
C. GSLV Mk II
D. Gaganyaan



9 Which mission launched in 2023 is India's first dedicated solar observation mission?

A. Astrosat
B. Aditya-L1
C. Chandrayaan-3
D. Mars Orbiter Orbision

10 The astronauts selected for the Gaganyaan mission are being trained in collaboration with which country?

A. United States
B. Russia
C. France
D. Japan

11 According to the Union Budget 2025-26, the allocation for the Department of Space was approximately

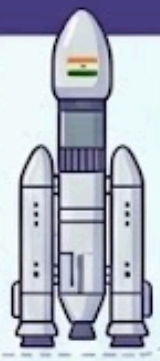
A. ₹10,700 crore
B. ₹12,500 crore
C. ₹13,416 crore
D. ₹15,000 crore

12 India's first satellite, Aryabhata, was launched from which launch site?

A. Sriharikota
B. Balkonur Cosmodrome
C. Cape Canaveral
D. French Gulana

13 Which launch vehicle is primarily used by ISRO for heavy communication satellites?

A. SLV
B. ASLV
C. GSLV
D. PSLV



14 India's first private rocket launch in 2022 was conducted by which startup

A. Skyroot Aerospace
B. Agnikul Cosmos
C. Bellatrix Aerospace
D. Pixxel

Answers

01 C- Indian National Committee for Space Research

02 B — Vikram Sarabhai

03 B — Department of Atomic Energy

04 C — Chandrayaan-1

05 C — NavIC

06 D — Bengaluru

07 C — Chandrayaan-3

08 D — Gaganyaan

09 B — Aditya-L1

10 B — Russia

11 C — ₹13,416 crore

12 B - Baikonur Cosmodrome

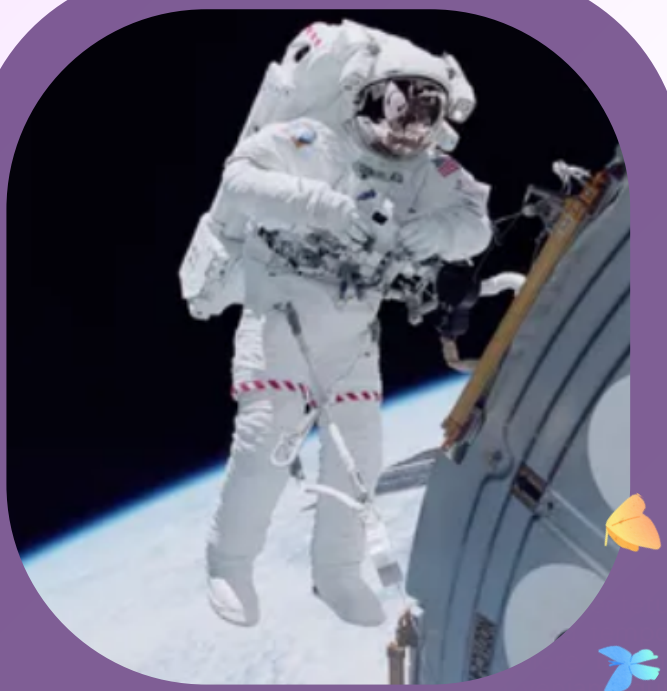
13 C — GSLV

14 A — Skyroot Aerospace

STRATEGIC OUTLOOK

LOOKING AHEAD IN INDIA'S SPACE JOURNEY

Yashika Verma



India's space story began with small rocket launches and big dreams. Today, it stands as one of the world's most respected space nations. But the real excitement lies in what comes next- India is not just aiming to reach space anymore, it is preparing to live, explore, and lead there.

FROM MISSIONS TO HUMAN SPACEFLIGHT

One of the biggest future goals is the ISRO Gaganyaan Mission, which aims to send Indian astronauts into space. This project is more than just a mission — it represents confidence, technological maturity, and India's readiness to enter the era of human spaceflight. It will strengthen skills in astronaut training, safety systems, and advanced engineering.

For India, this means moving from observing space to actually experiencing it.

A SPACE STATION OF OUR OWN

Looking ahead, India is planning the Bharatiya Antariksh Station, a future space station that could give the country a permanent presence in orbit. This station will allow long-term scientific experiments, space research, and collaboration with students and researchers. It shows that India's strategy is not short-term success — but sustained growth in space.

BEYOND THE MOON: BIGGER SCIENTIFIC GOALS

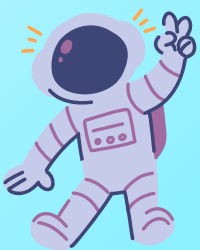
After successful lunar missions, India's future plans include deeper planetary exploration and advanced research opportunities. Future missions are expected to focus on learning more about planets, climate systems, and the universe — helping science on Earth while expanding knowledge beyond it.
The idea is simple: space exploration is not only about prestige but about solving real-world problems using space technology.

TECHNOLOGY, INDUSTRY & GLOBAL PARTNERSHIPS

India's strategy also involves stronger partnerships and greater involvement of private industries. Space is becoming a global economy, and India aims to become a major contributor through affordable launches, innovation, and collaboration with international space agencies.
This shift will create new opportunities for startups, engineers, and young innovators.

THE BIGGER VISION

India’s future in space is not just about rockets — it is about inspiration, innovation, and national growth. Human missions, space stations, and global collaborations show that India is preparing for a long journey ahead.
The next chapter of India’s space story will likely be written by today’s students and young professionals — turning imagination into achievement.



STUDENT ACHIEVEMENT CORNER

ANANYA RASTOGI
KESHAV SHARMA

Best Paper Award | Research Paper – Sustainable Agriculture & Climate Resilience.
International Conference organized by ICSSR, Maharaja Agrasen College, University of Delhi (2025).

YASHIKA VERMA
DIXITA DEURI

Second position in International Student Paper Presentation (2026) organized by DAV Centenary College.
Topic- Sentiment Analysis of Indian E-Commerce Customer Reviews using Artificial Intelligence.

YUKTIKA DUGGAL
ANSHUL YADAV
VIDHI SHARMA

Presented paper titled, "AI-Powered Comparative Predictive Model Analysis for Currency Hedging in Agricultural Exports" at the First International Conference on Artificial Intelligence, Computation, Communication & Network Security (AICCoNS 2025) organized by University of Wollongong in Dubai, UAE

KESHAV SHARMA

Participated and won teasure hunt

YUKTIKA DUGGAL
ANSHUL YADAV
YASHIKA CHOUDHARY
PULKITA

Presented a paper titled, "Financial Performance & Qualitative Drivers of Fintech NBFCs in India through an Integrated Analytical Framework" at International Conference on Computational Intelligence & Data Communication (ICCIDC 2025), held in Bali, Indonesia.

NANDINI
DIVYA SHARMA

Paper titled, “Green Currency Swaps and Their Role in Financing India’s Renewable Energy Imports” Presented at the International Conference on Climate Change & Sustainable Development, organized by School of Environmental Science Jawaharlal Nehru University

ANANYA RASTOGI
KESHAV SHARMA

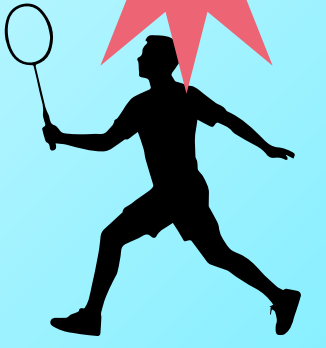
Research paper presented at international conference organised by Shahid Sukhdev University of Delhi (2026).
Research paper will publish in scopus

MOKSHIKA ARYA

Participated in "Anamnesis: International Conference on Climate Change & Sustainable Development" organized by the School of Environmental Sciences (SES) as part of the Golden Jubilee celebrations. Presented work on "Sustainable Computing: Reducing Water and Energy Footprint of AI Data Centers."

SPORTS ACHIEVEMENTS

Organised By ABVSME



CASE STUDIES SOLUTIONS

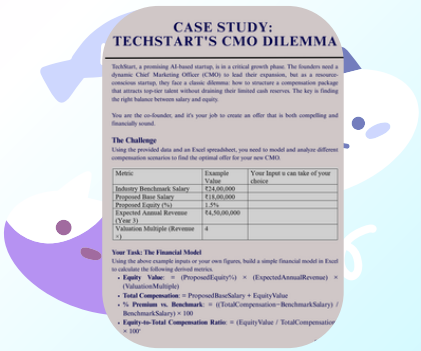
VOLUME 2

INSIGHTS BY INFOMATRIX VOL. 2 #ISSUE 1

Beyond the Bottom-Line Aligning IT Budgets with Budget 2025

INSIGHTS BY INFOMATIX VOL. 2 #ISSUE 2

TECHSTART'S CMO DILEMMA



INSIGHTS BY INFOMATIX VOL. 2 #ISSUE 3

Festive Surge: Powering Digital India

INSIGHTS BY INFOMATIX VOL. 2 #ISSUE 4

Quantum Computing Strategies of IBM and Google

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FACULTY ADVISOR AND EDITOR IN CHIEF:

DR PRYA GUPTA
priyagupta@jnu.ac.in

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IN OUR NEXT ISSUE:
"FROM GENERATIVE AI TO AGENTIC AI: THE NEXT BUSINESS REVOLUTION"

INSIDE THE INFOMATRIX