

Shaping India's Space Sector Growth Strategy

Executive Summary

Commending the proactive efforts of IN-SPACe in outlining an ambitious vision for the growth of the Indian space economy, targeting a substantial increase in its value by 2033 is indeed laudable. This commendable goal relies on empowering and expanding the private space industry, strategically positioning India as a global hub for manufacturing and exporting space systems and components.

As the foremost industry association for the space sector in India, the SatCom Industry Association - India (SIA-India) takes pride in its dedication to advancing sectoral interests, catalyzing innovation, and accelerating industry growth. Through strategic engagements with key governmental and global stakeholders, policymakers, regulatory bodies, and standardization entities, SIA-India shares the mutual aim of creating a vibrant and innovative ecosystem within the space sector to elevate India's position on the global space map.

Presenting its insights on Shaping India's Space Sector Growth Strategy, SIA-India aligns with IN-SPACe's objectives and commits to playing a pivotal role in facilitating this visionary growth.

This comprehensive document encapsulates the collective recommendations and insights of SIA-India's members, representing a wide spectrum of stakeholders within the commercial space sector viz., satellite operators, satellite systems, launch vehicles, ground and terminal equipment manufacturers and suppliers, satellite-based IOT/M2M solution providers, space startups, innovation hubs etc. The document outlines

1. **The Key Enablers** required, encompassing specific fiscal and non-fiscal incentives necessary to foster space sector growth. These enablers include financial incentives, subsidies, grants, regulatory reforms, and infrastructural support, addressing the industry's actual needs to effectively drive growth.
2. The document further provides an **Impact Analysis**, examining how these enablers could expedite the growth of space sector in India over the next five-ten years.

SIA-India extends its gratitude to the INSPACe for providing this valuable opportunity to articulate our perspectives. We remain steadfast in our dedication to fostering a conducive environment for the growth of the space industry, ensuring its pivotal role in India's journey towards becoming a global space powerhouse.

Introduction

India has strategically positioned itself as a formidable player in the global space sector, underpinned by forward-thinking policies and regulatory reforms. The unveiling of the Space Policy in April 2023, complemented by INSPACe's forthcoming Space Authorization guidelines, establishes a robust framework aligned with national priorities, safety standards, and international obligations. An integrated approach involving the National Space Policy, Drone Policy, Geospatial Policy, and Digital Policy reflects a holistic vision for India's space capabilities, fostering innovation and collaboration. The Bharat Broadband Network Limited (BBNL) Project, aiming to connect 650,000 villages, has made a substantial impact, with satellite broadband already reaching 4,351 sites. India's ambitious goal of securing a 10% market share at \$50 billion by 2030 is driven by a vibrant ecosystem of SpaceTech startups, positioning the country as a dominant player in the global SpaceTech landscape. This introductory overview explores funding trends, startup contributions, global partnerships, and collaborative efforts while acknowledging challenges.

The document proposes transformative reforms, emphasizing the support for deep tech space startups through increased funding, a boost in India's space budget, financial incentives, and collaborative frameworks. Key taxation reforms, regulatory suggestions, and infrastructure proposals aim to fortify India's position in the global space arena, contributing to innovation, economic growth, employment, and the achievement of sustainable development goals.

Chapter 1: Key Enablers

SIA-India recognizes the pivotal role of key enablers in fostering comprehensive growth within the space sector ecosystem. This matrix delineates specific fiscal and non-fiscal incentives crucial for addressing the industry's diverse needs, aiming to cultivate a robust and thriving space sector.

SIA-India Matrix of Key Enablers, Issues, and Recommendations for Fostering Space Sector growth

The matrix below delineates crucial enablers such as financial, regulatory, and infrastructural aspects. It identifies current challenges and offers sound recommendations to propel growth in the space sector. SIA-India strongly advocates for the regulator's consideration of these suggestions, emphasizing the need for an enabling environment that fosters a dynamic and globally competitive space ecosystem in India.

A. Financial Enablers

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<p>A.1 Increased Space Budget</p>	<p>India's current space budget of \$1.4 billion falls significantly short when compared to other major space economies globally. The inadequacy of financial support hampers India's ability to emerge as a significant contributor to the trillion-dollar space economy.</p>	<p><i>Increase India's space budget substantially to meet the growing demands and ambitions of its space program.</i></p>	<p>India's current space budget¹ of approximately \$1.4 billion pales in comparison to the global leaders in space expenditure. The United States leads with an astronomical \$62 billion, followed by China, Russia, Japan, France, and Germany, all significantly outpacing India. To support its growing space endeavors, encourage private sector involvement, align with global space race ambitions, drive technological advancements, and strategically position itself, India must substantially increase its space budget to align with India's strategic vision, reinforcing the nation's role as a key player in the rapidly evolving landscape of space ecosystem.</p>

¹ <https://www.statista.com/chart/29454/governments-with-the-largest-space-budgets/>

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<p>A.2 Liberalizing Domestic Investment Regulations</p>	<p>Attracting More Funding</p>	<p><i>Liberalize regulations to attract more funding from venture capitalists and simplify FDI processes</i></p>	<p>The FDI in the space sector, focuses on three different areas: sub-system manufacturing, launch vehicle operations, and satellite operations and establishments. The policy, which is currently under consideration and expected to be released later this year, aims to encourage collaboration, innovation, and technological advancements. By attracting foreign investments through an automatic route or streamlined process, the government aims to supplement limited domestic funds and achieve the target of reaching \$13 billion by 2025 and capturing 10% of the global space economy by 2030. This favorable FDI policy will not only spur growth in the space sector but also have positive effects on various other sectors, including telecommunications, energy, and transport. The increasing investment in space activities, including venture capital funding for space</p>

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			start-ups, reflects the growing interest and potential in the Indian space industry.
A.3 Enhancing Funding Support for Indian Space Startups	Limited Access to Substantial Early-Stage Funding for Indian Startups, Especially in Space Technologies	<p><i>Implement Extensive Funding Programs, Modeled After IDEX, for Substantial Early-Stage Funding.</i></p> <p><i>Create Financial Instruments or Funds Offering Venture Debt Support to Deep Tech Startups as an Alternative to Equity Financing.</i></p> <p><i>Institute an Incentive Scheme within the IFSC, Granting Support to Space Tech Companies for Operations Setup, Innovation, and Industry Collaboration.</i></p> <p><i>Explore the Formation of Alternate Investment Funds (AIFs) in the IFSC,</i></p>	Indian startups, particularly in space technologies, face a funding gap due to limited access to substantial government grants. To bridge this gap, adopting initiatives like IDEX and introducing venture debt support can provide crucial financial backing. Establishing an IFSC incentive scheme and exploring AIFs focused on space tech within the IFSC further enhances financial support, encouraging innovation and collaboration. Leveraging the IFSC's unique position can unlock opportunities for sustained growth in the domestic and international space tech landscape.

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		<p><i>Tailored for Space Tech, with Favorable Regulatory Conditions to Attract Long-Term Project Investors.</i></p> <p><i>Emphasize IFSC's Role in Supporting Space Technology and the Financial Sector, Creating Synergies for Domestic and International Space Tech Companies.</i></p>	
<p>A.4 Encouraging CSR Funding for Deep Tech Startups</p>	<p>Limited Allocation of CSR Funds despite having mandatory allocation guidelines</p> <p>The lack of structured guidelines hampers CSR funding to startups, particularly in the deep tech sector.</p> <p>Companies exhibit a lack of awareness regarding CSR funding opportunities</p>	<p><i>Establish clear and structured guidelines for corporations to allocate CSR funds to deep-tech startups.</i></p> <p><i>Policymakers should address disparities in CSR spending across states and incentivize collaboration between industry and public institutions.</i></p>	<p>Despite CSR guidelines' liberalization, startup funding remains limited, constituting only 0.2% of total CSR spending on research and technology. Clear guidelines aligned with CSR objectives are crucial to bolster support for deep tech startups, fostering innovation.</p> <p>A September 2020 survey revealed 24% of corporates were unaware that funding innovations in tech incubators counted towards CSR, and 45% lacked information on</p>

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	<p>for innovation, necessitating targeted awareness campaigns.</p>		<p>suitable technologies. Policymakers must address industry awareness gaps and focus on states with low CSR funding, encouraging targeted CSR funds to public institutions and state-funded incubators. Strategic amendments, similar to those during the pandemic, can guide policymakers in promoting national priority research areas and collaborations between industry and public institutions.</p>
<p>A.5 Government Approach to Startup Valuation</p>	<p>Discrepancies in Startup Valuation Growth and Revenue Generation, Leading to Regulatory and Tax Challenges.</p> <p>According to a global survey, 68% of startups face challenges in</p>	<p><i>Develop transparent and standardized guidelines for startup valuation, considering factors beyond revenue to provide a comprehensive assessment.</i></p> <p><i>Foster collaboration between government authorities and industry experts to enhance understanding of</i></p>	<p>High-growth startups often face challenges as their valuations outpace revenue, causing regulatory and tax uncertainties. Clear and standardized valuation guidelines, informed by industry collaboration and supported by specialized training for tax authorities, can create a more conducive environment for high-growth startups. This approach ensures that regulatory scrutiny aligns with the</p>

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	<p>communicating their valuation methodologies to tax authorities.</p> <p>In countries with clear startup valuation guidelines, tax-related uncertainties for high-growth startups have reduced by 45%.</p>	<p><i>the unique valuation dynamics in the startup ecosystem.</i></p> <p><i>Provide training programs for tax authorities to equip them with the knowledge required to assess and comprehend startup valuation methodologies.</i></p>	<p>unique dynamics of startup valuation, fostering a supportive ecosystem.</p> <p>United States: The IRS collaborates with industry experts and utilizes benchmarks from comparable transactions to assess startup valuations.</p> <p>United Kingdom: The British Business Bank provides guidance on startup valuation methodologies, contributing to a more informed evaluation by tax authorities.</p>
<p>A.6 Interest Rate Subsidies for Startup Loans</p>	<p>Startups encounter obstacles in securing budget-friendly loans due to the prevalent high interest rates. The constrained lending options, especially</p>	<p><i>Advocate for interest rate subsidies for startup loans to enhance affordability.</i></p>	<p>According to recent industry reports, startups, especially those in the deep tech sector, face an average interest rate ranging from 19.66% to 26% p.a.² This substantial financial burden impedes their growth and innovation capabilities. By introducing a</p>

² <https://www.bankbazaar.com/personal-loan/business-start-up-loan.html>

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	for pre-Series A startups, force them into borrowing at exorbitant rates.		<p>subsidy on interest rates, the government can stimulate economic growth, foster innovation, and enhance our global competitiveness. We urge you to consider this proposal to support the backbone of our economy and secure our nation's leadership in technology and innovation.</p> <p>Interest rate subsidies would enhance affordability by providing founders with access to competitive market rates. By facilitating reasonable borrowing conditions, this measure empowers entrepreneurs to generate value within their ventures before contemplating equity dilution, thereby cultivating a more supportive environment for startups.</p>
A.7 Invest in Ground	India lacks sufficient investment and a comprehensive approach in developing	<p>▭ <i>Whole-of-nation approach for ground station infrastructure.</i></p>	Ground station infrastructure is a critical national asset. A comprehensive, whole-of-

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Station Infrastructure:	ground station infrastructure for satellite communication. There is a need to address this gap by fostering a whole-of-nation strategy, improving data pre-processing efficiency, and encouraging private sector involvement.	<ul style="list-style-type: none"> ▭ <i>Address the need for ground station infrastructure and efficient data pre-processing.</i> ▭ <i>Encourage private sector participation in setting up ground stations.</i> ▭ <i>Explore advanced technologies like inter-satellite links and space-to-ground laser communication.</i> 	nation approach ensures coordinated efforts, resource pooling, and effective utilization of expertise to expedite infrastructure development and address national communication needs.
A.8 Investment in Advanced Mapping Technologies		<ul style="list-style-type: none"> ▭ <i>Encourage investment in advanced mapping technologies, such as high-definition, 4D digital maps. Recognize the potential applications of these technologies in diverse sectors, including ADAS, missile guidance, and drone technology.</i> 	Highlighting the adaptability and potential of Navic technology, especially in areas with limited cellular connectivity, underscores the strategic importance of this technology in addressing real-world challenges. INSPACE's advocacy serves as a driving force behind the integration of cutting-edge mapping technologies, contributing to India's

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		<ul style="list-style-type: none"> ▭ <i>Promote collaborations between pvt companies and ISRO and meteorological agencies like IMD.</i> - <i>Highlight the adaptability and potential of Navic technology, especially in areas with limited cellular connectivity</i> 	technological advancement and strategic capabilities.
A.9 Financial Incentives for Academic Institutions	Lack of financial incentives for academic institutions to engage with startups and provide infrastructure access.	<i>Introduce financial incentives for academic institutions and R&D establishments to actively engage with startups.</i>	This proactive approach aligns with the broader goal of promoting a thriving ecosystem where academic expertise contributes meaningfully to the growth and success of entrepreneurial ventures in the space sector.
A.10 Cyber Security Budget for Space Assets	Vulnerabilities in space infrastructure pose risks to various societal functions.	<p><i>Allocate sufficient resources for an effective cyber security system for space assets.</i></p> <p><i>There is a gap in integrating space-related cybersecurity measures into the</i></p>	Various critical sectors, including oil and gas, telecommunications, power, disaster management, manufacturing, logistics, delivery services, public transportation, eCommerce, insurance, law enforcement, and defense verticals, rely on global positioning,

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		<p><i>National Cybersecurity Strategy. Critical space infrastructure should be explicitly included in the definition of "Critical Information Infrastructure."</i></p>	<p>navigation, and timing provided by space assets. With India ranking 10th globally in the 2020 United Nations' International Telecommunication Union Global Cybersecurity Index, there is an increasing need to address cybersecurity challenges in the space domain. The expanding space ecosystem, including startups and collaborations, brings new players into the field, widening the attack surface.</p> <p>The US Space Force's \$30 billion budget request for fiscal year 2024 includes \$700 million to "enhance the cyber defense of their critical networks associated with space operations alone. Hence, a dedicated cybersecurity budget is crucial for India.</p>

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<p>A.11 Bridging the Gap in Space Insurance for Indian Startups</p>	<p>Absence of customized insurance products for startups, especially in deep tech and space industries.</p>	<p><i>Establish a Space Insurance Regulatory Authority to drive a resilient Indian space insurance market, fostering innovation, mitigating financial risks, and supporting the domestic space industry.</i></p> <p><i>Collaborate with insurers to craft specialized products for industry-specific risks, ensuring a proactive response to global market dynamics.</i></p>	<p>To address the current void in customized insurance offerings for startups, particularly in deep tech and space, India should proactively establish a dedicated regulatory authority. This initiative will drive innovation, mitigate financial risks associated with industry-specific challenges, and contribute to the overall growth and sustainability of the domestic space sector.</p> <p>The global challenges and losses experienced in the space insurance market present a timely opportunity for India to step in, leveraging collaboration with insurers to craft specialized products that align with the evolving dynamics of the global market.</p>

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A.12 Private Investment in Deep Tech R&D	Lack of incentives for private capital	<i>Recommend the creation of targeted tax incentives and investment-friendly policies to stimulate private sector participation in high-risk ventures related to deep tech R&D.</i>	Encouraging private investment is paramount for fostering innovation and advancing technological capabilities in the country. The proposed measures aim to mitigate the perceived risks associated with such ventures and attract substantial private funding.
A.13 Export Benefit to Cross-Border Services	Non-recognition of services as exports	<i>Recommend recognizing services supplied by an office in India to another office outside India in the field of space research and technology as exports, extending export benefits to such transactions.</i>	Aligning with global practices, this recommendation acknowledges the contribution of collaborations to India's forex reserves and incentivizes collaboration within the space industry.

B. Policy & Regulatory

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<p>B.1 Enhance India Space Policy Framework</p>	<p>Alignment with Global Best Practices and Sector-Specific Tailoring</p>	<p><i>Tailor Comprehensive Policy into Sector-Specific Frameworks: Evolve the existing comprehensive space policy into sector-specific and detailed frameworks that cater to the unique needs of various industries.</i></p> <p><i>Establish Legal Directorate and Prioritize Data Security: Establish a dedicated legal directorate within In-Space to oversee legal aspects of space activities and consult on robust data security measures.</i></p> <p><i>Streamline Authorization Process and Enhance Transparency: Simplify the authorization process by providing clear guidelines, enhancing transparency, and establishing a fair appeals mechanism to promote efficiency.</i></p> <p><i>Establish Standard Operating Procedures for Verticals: Develop standard operating procedures</i></p>	<p>To fortify India's space policy, aligning with global best practices and tailoring the framework to sector-specific nuances is crucial. Sector-specific frameworks and standard operating procedures ensure efficiency, transparency, and relevance to each industry. Simplifying authorizations, enhancing transparency, and implementing regulatory aggregation create a consolidated reference for stakeholders. Time-bound targets and inter-departmental collaboration are essential for a cohesive and globally competitive space policy.</p>

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		<p><i>for different verticals within the space ecosystem, including remote sensing, satellite communication, navigation et al.</i></p> <p><i>Implement Regulatory Aggregation for Unified Reference: Implement regulatory aggregation to consolidate guidelines and policies from multiple departments into a unified reference source, facilitating easier navigation for industry stakeholders.</i></p> <p><i>Set Time-Bound Targets for Industry Growth: Set specific time-bound targets for India to capture a significant share of the global space economy, mirroring the approach of other leading nations.</i></p> <p><i>Collaborate Across Departments for Unified Policy: Facilitate collaboration between the Department of Space, ISRO, In-Space, Meity, Ministry of Agriculture, Ministry of Finance, to</i></p>	

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		<p><i>create a unified and coherent space policy framework.</i></p>	
<p>B.2 Long-term Vision, Strategy, and Technology Roadmap</p>	<p>The space sector is capital intensive with long development periods, making it crucial to have a long-term vision.</p>	<p><i>India should establish a clear roadmap for the next 25 years, outlining short-term, mid-term, and long-term objectives.</i></p> <p><i>A comprehensive demand assessment report to guide short-term decision-making and long-term planning is crucial. For instance;</i></p> <p><i>Short-Term (1-3 years):</i></p> <ul style="list-style-type: none"> - <i>Immediate emphasis on regulatory, policy and fiscal clarity and efficiency to attract private investment.</i> - <i>Implement short-term market research initiatives to identify emerging opportunities and challenges.</i> - <i>There is a need for a strategic vision in India's space sector, emphasizing sustainability, safety, and international cooperation,</i> - <i>Foster collaborations between startups and established space entities to encourage innovation.</i> 	<p>- A clear roadmap is crucial for the capital-intensive space industry. The long-term strategy should consider satellite capacity demand, market sizing, and collaboration with international entities.</p>

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		<p><i>Mid-Term (3-7 years):</i></p> <ul style="list-style-type: none"> - <i>Develop technology transfer programs to enhance indigenous capabilities.</i> - <i>Establish educational and training programs to nurture a skilled workforce.</i> - <i>Diversify space services, including Earth observation, satellite communication, and space-based navigation.</i> <p><i>Long-Term (7+ years):</i></p> <ul style="list-style-type: none"> - <i>Invest in advanced research for futuristic space technologies.</i> - <i>Develop infrastructure to support space tourism, fostering a new industry.</i> - <i>Explore and invest in resource exploration missions, such as asteroid mining, for long-term sustainability.</i> 	
<p>B.3 Measuring the Space Economy and</p>	<p>Lack of Comprehensive Data would hinder effective policymaking and strategic planning</p>	<p><i>Conduct a detailed quantitative analysis, define space economy sectors, and adopt a satellite account aligned with the US BEA framework</i></p>	<p>The lack of comprehensive data hinders a connected framework with central accounts for the Indian space economy. Conducting a detailed quantitative analysis and adopting a satellite account aligned</p>

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<p>Implementing a Satellite Account</p>	<p>for the Indian space economy.</p>		<p>with global standards ensures accurate measurement, prevents double counting, and boosts funding while evaluating both direct and indirect impacts on the space economy.</p> <p>Several economies have measured their space economy using satellite accounts and frameworks aligned with global standards. The United States, for instance, has a well-established system through the Bureau of Economic Analysis (BEA), providing comprehensive data on the economic contributions of the space sector. In the European Union, Eurostat has been involved in efforts to measure the space economy, emphasizing its importance for policy development and economic planning.</p> <p>Canada has also implemented a satellite account for the space sector, contributing to a better understanding of its economic impact.</p>

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<p>B.4 Comprehensive Space Activities Bill</p>	<p>The absence of a comprehensive space law poses legal uncertainties and challenges, especially in determining responsibility and compensation for incidents like the 2007 Chinese anti-satellite missile test.</p>	<p><i>A Comprehensive Space Act is essential to provide a clear legal framework for India's space activities, covering various aspects, such as international obligations, private sector participation, liability frameworks, and ethical considerations.</i></p>	<p>A space Bill shall ensure compliance with international space law, treaties, and agreements.</p> <p>Foster fair competition, encourage private sector involvement in contributing to national development. Achieve equilibrium between national development goals and public interests, addressing societal needs through space-based applications. The bill would define clear liability frameworks and insurance requirements, mitigating risks associated with space activities and safeguarding public and commercial interests.</p> <p>Establish guidelines for responsible and sustainable resource utilization, promoting ethical practices in outer space activities.</p> <p>Provide robust provisions for protecting intellectual property and data, stimulating innovation in the space sector.</p>

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			Facilitate collaboration with international partners, encouraging joint efforts in space exploration and technology development.
B.5 Regulatory Framework for Space Traffic Management	The overarching concern is the absence of a strategic vision for the country's space sector, highlighting the need for a regulatory framework that prioritizes sustainability, safety, and international cooperation.	<ul style="list-style-type: none"> → <i>Establish a regulatory framework that addresses the challenges of space traffic management, including the proliferation of satellites and cubesats.</i> → <i>Enforce regulations that promote a cautious approach to the launch of educational and scientific cubesats, considering their potential impact on crowded orbits.</i> → <i>Develop a strategic vision for the country's space sector, emphasizing sustainability, safety, and international cooperation.</i> 	A strategic vision for the country's space sector becomes crucial to address these challenges systematically, emphasizing sustainability, safety, and international cooperation.

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<p>B.6 Policy Framework and Technological Self-Reliance in Space Tech Application</p>	<p>Lack of comprehensive policy for integrating satellite-based early warning systems into disaster-resilient development planning and disaster mitigation using satellite technology.</p>	<p><i>Develop Comprehensive Satellite-Based Framework: Integrate satellite-based early warning systems into disaster-resilient development planning.</i></p> <p><i>Regulations and Incentives: Establish regulations and incentives to promote widespread satellite technology use for disaster mitigation and infrastructure planning.</i></p> <p><i>Satellite-Drone Collaboration: Streamline collaboration between satellite and drone technologies for more effective disaster management.</i></p> <p><i>Support Defense Forces: Support defense forces in achieving self-reliance in navigation and timing technology, reducing dependence on foreign systems.</i></p> <p><i>Broad Space Technology Application: Strengthen policies to facilitate broad space technology</i></p>	<p>India, a region vulnerable to natural disasters, the lack of a unified satellite-based early warning system could impede timely evacuation efforts. A comprehensive policy framework could facilitate system integration, offering crucial alerts for disaster-resilient development planning and real-time monitoring. The imperative for enhanced coordination in disaster management highlights the significance of a well-integrated policy approach to strengthen India's disaster resilience.</p>

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		<p><i>application in diverse sectors for comprehensive disaster resilience and development planning.</i></p> <p><i>Prompt Implementation of Earth Observation Guidelines: Ensure the prompt implementation of Earth observation guidelines and technology transfer policies to harness the full potential of space-based technologies.</i></p>	
<p>B.7 Space Frequency allotment and Co-ordination</p>	<p>Satellite Spectrum policy should be based on international best practices.</p>	<p><i>Preserve Key Satellite Bands: Safeguard crucial satellite bands to support diverse applications and prevent interference with existing services.</i></p> <p><i>The government should incentivize experimentation for startups and academia by ensuring the availability of satellite spectrum.</i></p> <p><i>Assign satellite spectrum transparently through an administrative process to ensure fair access.</i></p>	<p>Global Harmonization: Aligning with ITU guidelines ensures a standardized approach, promoting global harmonization in spectrum usage.</p> <p>Protection from Interference: Shielding existing investments from interference ensures the uninterrupted functioning of satellite services.</p> <p>Collaboration and Coordination: Harmonizing spectrum policies and facilitating coordination support collaboration among domestic and foreign players, encouraging resource-sharing.</p>

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		<p><i>Implement measures to protect existing satellite investments from harmful radio frequency interference, ensuring uninterrupted services.</i></p> <p><i>Harmonize spectrum policies to provide Indian and foreign players easy access to each other's resources, fostering collaboration.</i></p> <p><i>Make the right spectrum band and required bandwidth accessible to facilitate the growth of satellite services.</i></p>	<p>Local Capacity Building: Facilitating access to satellite capacity within India supports local companies and enhances the nation's capacity in space activities.</p>
<p>B.8 Satellite Prominent Role in Bridging Digital Divide</p>	<p>The BBNL Project is to connect 650000 Villages in the country and so far only 1/3 of the villages have been connected on Fiber</p>	<p><i>Under the BharatNet project, the Satellite-based digital/broadband connectivity has already been provided at about 4351 sites out of the planned 7000 sites. Remaining about 33,000 sites can also be considered for Satellite-based connectivity.</i></p>	<p>For many rural and remote communities in India satellites are the only connectivity option.</p> <p>As per market report: Satellite Broadband in India would contribute Significantly to GDP growth by up to \$185 B by 2030</p>

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	<p>The focus has remained limited to the laying of fiber route kilometers only rather than an optimal mix of media (OFC/ Radio/ Satellite)</p> <p>Fixed broadband penetration in India is among the lowest in the world at only 1.69 per hundred inhabitants.</p> <p>>50% of rural India is still not digitally connected.</p> <p>>70% of rural India lack Broadband penetration.</p>		<p>Satellite capacity will also be key for extending 4G backhauling into remote areas, hilly and difficult-to-access area.</p> <p>Satellite provides high bandwidth, ubiquitous service beyond cities and unreachable areas, supporting data delivery at the edge and enabling network availability for communications on moving platforms.</p> <p>Lower cost of implementation for larger geographical coverage and lower population density, as compared to technologies such as optical fiber cable</p>

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	<p>70% of students lacked access to online education in India during COVID due to poor internet signal ICRIER.</p> <p>India ranks very low at 131 out of 140 nations on Global Index in Speed and Quality.</p>		
<p>B.9 Revising Procurement Policies</p>	<p>Deep tech startups encounter difficulties accessing benefits from public procurements.</p>	<p><i>Revise procurement policies to incorporate partial payments at initial project stages.</i></p> <p><i>Adoption of Value-Based Procurement principles, integration of paid pilot programs to demonstrate practical value, implementation of flexible payment terms aligned with project milestones, promotion of Agile Request for Proposal processes, and the establishment of a comprehensive policy framework.</i></p>	<p>Revising procurement policies for deep tech startups is crucial due to their struggles in gaining benefits from public procurements. Introducing partial payments at the project's outset addresses financial challenges. Embracing Value-Based Procurement principles prioritizes potential value, while paid pilot programs, flexible payment terms, and Agile Request for Proposal processes expedite innovation. A comprehensive policy framework, incentivizing</p>

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		<p><i>Additionally, incentivizing higher fixed payouts, cultivating a supportive startup ecosystem, providing specialized training for procurement officials, and initiating pilot programs with continuous evaluation is crucial.</i></p>	<p>fixed payouts, supportive ecosystems, specialized training, and pilot programs collectively streamline procurement, encouraging a fair, transparent, and beneficial environment for startups and public procurement.</p> <p>The Canadian government has introduced measures to increase opportunities for Indigenous businesses in federal procurement. They have mandated a minimum of 5% of the total value of contracts to be held by Indigenous businesses, with phased implementation over three years.</p> <p>Singapore has implemented flexible payment terms in public procurements, particularly beneficial for startups. This approach aims to boost startup participation by offering more adaptable financial arrangements aligned with project milestones.</p>

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B.10 Relax ITAR restrictions	ITAR imposes stringent regulations on the export of dual use space and defence-related articles and services, hindering global operations.	<i>Advocate for comprehensive reforms in ITAR to simplify regulations.</i> <i>Engage in diplomatic efforts to address international concerns related to ITAR.</i>	Streamlining ITAR regulations alleviate operational challenges for space startups, fostering global operations and collaboration.
B.11 Introduction of Production Linked Incentive Scheme (PLI) / Phased Manufacturing Incentive Plan (PMP)	Boosting Domestic Manufacturing	<i>Introduce PLI/PMP in the space sector as a part of the 'AtmaNirbhar' Bharat programme</i>	Introducing a Production Linked Incentive Scheme (PLI) or Phased Manufacturing Incentive Plan (PMP) supports the 'AtmaNirbhar' Bharat initiative, promoting domestic satellite manufacturing and fostering growth in the space industry.
B.12 Extension of Startup Validity Period	Short Validity Period for Deep Tech Startups	<i>Extend the startup validity period for deep tech startups for another 4 years</i>	Deep tech startups have longer gestation periods. Extending the startup validity period provides startups with a better chance to validate their technology in the market, refine their strategies, and foster sustained innovation.

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			<p>Extending the startup validity period by four years accommodates extended research cycles, facilitates market validation, ensures regulatory compliance, supports gradual scaling, enhances investor attractiveness, encourages international collaboration, aids talent acquisition, and fosters a sustainable innovation ecosystem.</p>
<p>B.13 Relaxing Financial Qualification Criteria (QC) and EMD Requirements</p>	<p>Barriers in Government Projects</p>	<p><i>Relax financial qualification criteria and EMD requirements for government projects</i></p>	<p>Barriers in financial qualification criteria and EMD requirements hinder startup participation in government projects. Relaxing these criteria creates an equitable and innovative procurement landscape, promoting startup involvement.</p>
<p>B.14 Launch Risk Mitigation Programs</p>	<p>Mitigating Financial Risks for Project Failures</p>	<p><i>Implement programs providing insurance or financial support in case of project failures</i></p>	<p>Financial risks associated with project failures or unforeseen challenges can deter investment in the space sector. Implementing launch risk mitigation programs provides insurance or financial support,</p>

Subject/Section	Issue	SIA-India Recommendations	Rationale for Recommendation
			<p>fostering investor confidence and encouraging participation in space projects.</p> <p>Several countries have implemented policies and mechanisms to mitigate launch and project risks in the space sector.</p>
<p>B.15 Distinct Regulations within EODB Framework</p>	<p>Necessity for Distinct Startup Regulations</p>	<p><i>Implement distinct regulations for startups within the Ease of Doing Business (EODB) framework</i></p>	<p>Recognizing the unique needs of startups within the EODB framework is essential. Implementing distinct regulations ensures a conducive business environment, fostering the growth and development of startups in the space sector.</p>
<p>B.16 Leveraging USOF for Space Connectivity</p>	<p>Insufficient Investment in Satellite and Mobile Convergence Projects</p>	<p><i>Adopt a strategy inspired by the USO fund for space projects, allowing licensed VSAT operators to bid for USOF in underserved areas. Extend USOF Gap Funding availability to more than 2 years, allocating unutilized funds for satellite services in remote regions.</i></p>	<p>Drawing from successful models like India's Universal Service Obligation (USO) fund, this strategy encourages investment in satellite and mobile convergence projects. By providing subsidies, tax incentives, and technology innovation grants, operators are incentivized to invest in areas where traditional connectivity is infeasible. Allowing licensed VSAT operators to bid for USOF</p>

Subject/Section	Issue	SIA-India Recommendations	Rationale for Recommendation
			<p>and extending the funding availability supports the goal of bridging the digital divide, ensuring equitable access to communication services, and utilizing unutilized funds for critical satellite services in remote regions.</p> <p>The European Commission's Connecting Europe Broadband Fund aims to invest in broadband network projects, including satellite solutions, to promote high-speed internet access across the EU, with a particular focus on rural and remote areas.</p>
<p>B.17 Collaborative Export Promotion</p>		<p><i>Implement effective export promotion policies. - Promote collaboration with foreign OEMs, startups, and India's unique advantages.</i></p>	<p>- Aspire to increase India's space exports from \$400 million to \$10 billion by 2033-34. - Promote collaboration between startups, private industry, and the government.</p>

C. Infrastructural

D. Subject/Section	Issue	SIA-India Recommendations	Rationale for Recommendation
C.1 Certification Facilities within India	Avoidance of Certification Expenses	<i>Establish certification facilities within India</i>	Local certification facilities can help avoid certification expenses, reducing the financial burden on businesses. For deep tech startups in fields space technology, local facilities expedite product development cycles, enhancing global competitiveness and positioning India as a hub for innovation.
C.2 Streamlined Visa Programs for Foreign Entrepreneurs	Encouraging Foreign Contribution	<i>Create streamlined visa programs for foreign entrepreneurs and investors</i>	Streamlined visa programs attract foreign entrepreneurs and investors, contributing to India's startup ecosystem. This encourages international collaboration, knowledge exchange, and investment, fostering growth in the country's startup landscape.
C.3 Space Industry Testing Infrastructure Scheme (SITIS) for Space-related Technologies	- The space industry lacks a dedicated testing infrastructure scheme.	<i>- Implement SITIS modeled after the successful DTIS with an initial budget of Rs 400 crore over five years</i> <i>Invest in advanced testing facilities for space-related technologies</i> .	Establishing SITIS fosters a thriving and self-reliant space industry by reducing reliance on foreign providers and nurturing indigenous satellite projects. Accessible and well-equipped testing infrastructure significantly reduces development time and costs for startups in the space sector. This accelerates the pace of

D. Subject/Section	Issue	<i>SIA-India Recommendations</i>	Rationale for Recommendation
			innovation and ensures the reliability of space-related technologies.
C.4 Data Centers for Space Industry	Handling Massive Data from Space-related Activities	Establish specialized data centers for handling data generated by space-related activities	Specialized data centers are essential for processing, analyzing, and storing the massive amounts of data generated by space-related activities. This infrastructure is critical for managing and utilizing the data from satellites and other space assets efficiently.

<p>C.5 Quantum Technologies</p>	<p>India's inadequate infrastructural support for quantum technology in satellite communication poses a challenge, potentially impeding timely advancements and limiting the impact on secure data transfer.</p>	<p>Collaborative Acceleration: Foster collaboration for quantum technology development among government agencies, research institutions, and private enterprises.</p> <p>Resource Allocation: Allocate funds for quantum technology research, with a focus on quantum communication and spectrography for satellites.</p> <p>Supporting Initiatives: Back projects related to satellite-based Quantum Key Distribution (QKD) and quantum communication for secure and efficient data transfer.</p> <p>Financial and Infrastructural Support: Provide support, both financially and infrastructurally, for initiatives like India's Quantum</p>	<p>The United States and Europe are actively engaged in advancing quantum technologies, with a focus on applications in secure satellite communication. Initiatives such as the National Quantum Initiative Act in the U.S. and the Quantum Flagship Program in Europe underscore their commitment to quantum research and development. The National Quantum Initiative Act provides for the continued leadership of the United States in QIS and its technology applications. Europe's collaboration through the European Space Agency (ESA) and national programs further emphasizes the exploration of quantum communication in space.</p> <p>India should also prioritize quantum technology for satellite communication and strengthen its position in the evolving landscape of secure satellite communication.</p>
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		<p>Experiments with Satellite Technology (Quest) to establish secure quantum communication.</p> <p>Ecosystem Advocacy: Recognize and support organizations like the Quantum Ecosystem and Technology Council of India (QE TCI) advocating for the quantum technology ecosystem.</p>	
C.6 Research and Development Hubs	- Specialized Support for Deep Tech Startups.	- <i>Establish specialized research and development hubs for deep tech startups, focusing on AI and space technology.</i>	- Specialized hubs provide state-of-the-art facilities, mentorship, and collaboration opportunities, supporting the unique needs of deep tech startups in fields like artificial intelligence and space technology.

Chapter 2: Impact Analysis

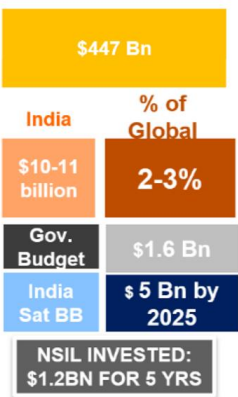
The space and satellite market in India is undergoing significant transformations with promising developments on the horizon. Current Market Share and Future Ambitions:

Constituting 2-3% of the global space economy, India aspires to enhance its share to over 8% by 2033. As per IN-SPACe’s projection, India’s space economy has the potential to reach ₹35,200 crore (\$44 billion) by 2033. This ambition reflects the nation's commitment to furthering its space capabilities and becoming a significant player in the evolving space industry. India's space sector is experiencing a transformative surge with over 400 firms, 200 startups, and a substantial funding influx of \$119 million in 2022, projected to exceed \$300 million in 2023-24.



Indian Space Economy, Projections & Targets

Global Space Mkt



> 400 FIRMS & SMES



> 100 STARTUPS



STARTUP PVT FUNDINGS: \$119 MN ['22]
EXPECTED: >\$300MN [2023]

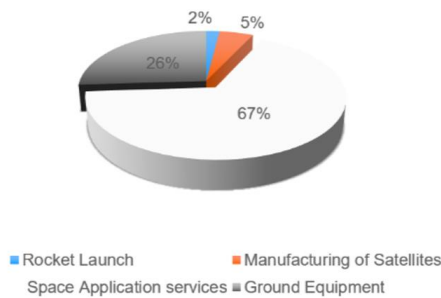


86% ↑ in Space Govt Budget in Six Years



\$50 Bn Market Opportunity For Space Tech Companies In India By 2030

Space Industry Segments



India targets to garner a 10% market share at \$50 Bn by 2030

6

India's space budget of the govt is approximately \$1.4 billion and is much low in comparison to the global leaders in space expenditure. The United States leads with an astronomical \$62 billion, followed by China, Russia, Japan, France, and Germany, all significantly outpacing India. To support its growing space endeavors, encourage private sector involvement, align with global space race ambitions, drive technological advancements, and strategically position itself, India must substantially increase its space budget to align with India's strategic vision, reinforcing the nation's role as a key player in the rapidly evolving landscape of space ecosystem. It will provide the necessary funding for ambitious projects, R&D initiatives, and infrastructure development, positively impacting satellite manufacturing, launch services, applications, and emerging space technologies. The financial boost will contribute to achieving the goal of over 8% market share by 2033 and further solidify India's position in the global space economy.

Anticipating a more than \$40 billion market opportunity by 2033, the dynamic space tech industry underscores India's growing prominence globally. This rise is fueled by a convergence of private entrepreneurship, government support, and a burgeoning market landscape, with foreign investments playing a crucial role in driving the economy and facilitating Transfer of Technology (ToT). Liberalizing domestic investment regulations will attract increased funding, especially from venture capitalists, fostering innovation, entrepreneurship, and the growth of startups and private players in the space sector. This financial influx is expected to have a cascading effect on satellite manufacturing, launch services, and applications, ultimately cultivating a more dynamic and competitive space ecosystem.

Satellite Manufacturing:

Satellite manufacturing is projected to reach almost \$3 billion, with services accounting for around \$1 billion, and the ground segment contributing nearly \$4 billion. Satellite services are expected to dominate at \$4.5 billion, making it the primary sector of interest. Given this, aerospace and defense take precedence. To foster collaboration between Indian and global space entities, introduce targeted incentives such as tax benefits, research grants, and subsidies. This approach aims to stimulate joint ventures, knowledge exchange, and reduce import dependency in the space industry.

Satellite Launch Services and Infrastructure:

India is positioning itself as a cost-effective hub for Small Satellite (SmSat) development and launches, with a projected market value of \$38 billion by 2027. India's commendable track record includes successfully launching 381 foreign satellites for 34 countries, showcasing its capability in providing reliable commercial launch services. However, a notable challenge is the regular use of foreign rockets for launching India's largest satellites, highlighting a gap between the spacecraft's increasing mass and the growth of its launch vehicles. This reliance has led entities like NSIL to seek alternative launch options, such as partnering with SpaceX, indicating a need for more available near-term launch solutions in India's space capabilities.

To enhance India's space capabilities and reduce reliance on foreign launch services, it is crucial to prioritize investment in the development of indigenous launch vehicles with increased payload capacity. Collaborative initiatives between public and private entities, incentivizing private space companies through tax breaks and subsidies, and expediting the development of indigenous launch platforms are essential measures. Government support for entities like NewSpace India Limited (NSIL), comprehensive long-term strategic planning addressing technological advancements, and international collaboration with space-faring nations should be emphasized. Additionally, a focus on training and skill development, regular reviews, and fostering an environment of innovation will contribute to India's competitiveness in the dynamic global space industry.

Satellite Applications and Commercialization:

The geospatial market in India stands at the forefront of transformative growth, poised to unfold into a dynamic landscape by the year 2025. Projections indicate a meteoric rise, with the market expected to burgeon to an impressive INR 36,000 crore, equivalent to \$4.5 billion. This substantial surge underscores the pivotal role that geospatial technology is set to play in shaping India's socio-economic and

technological trajectory. The integration of geospatial data with technologies like artificial intelligence, machine learning, and the Internet of Things (IoT) further amplifies its potential, creating a synergistic effect that propels India into the vanguard of the global geospatial revolution.

To advance India's space technology applications and achieve technological self-reliance, there is a critical need to fortify policies that facilitate widespread utilization of space technology across diverse sectors, particularly in disaster resilience and development planning. The urgency stems from the expansive market for satellite imagery services in India, encompassing applications such as geospatial data acquisition, mapping, natural resource management, surveillance, security, conservation, research, disaster management, and intelligence. IN-SPACE's advocacy plays a pivotal role in integrating cutting-edge mapping technologies, contributing significantly to India's technological progress and strategic capabilities. The India Satellite Imagery Services Market is currently valued at USD 0.24 billion, with a projected CAGR of 17.43% over the forecast period, reaching USD 0.54 billion in the next five years, underscoring the growing importance and potential of this sector

Satellite Broadband

In alignment with India's Digital India vision, IN-SPACE's approval for satellite commercial broadband services ensures widespread internet connectivity across the nation. The Telecommunication Engineering Centre (TEC) actively engages in consultations to establish NGSO-based communication networks, showcasing India's commitment to satellite communication innovation.

Projections indicate that India's satellite broadband market will reach \$1.9 billion by 2030, solidifying a 3% global market share. Phase-II of the BharatNet project has provided satellite-based digital/broadband connectivity at 4,351 sites out of the planned 7,000, with potential satellite addressable sites surpassing this number.

India, prone to disasters, faces telecom network damage, prompting the suggestion to allocate the unutilized USOF fund of Rs. 58,000 crore [\$7.4 Billion] for satellite services in critical, remote regions where laying optical fiber cables is impractical. Supported by Plum Consulting report UK, satellite bb is projected to contribute an additional USD 72.0-184.6 billion to GDP per annum by 2030 through increased broadband adoption in unserved and underserved regions.

India's satellite capabilities have a broad impact, delivering over 900 TV channels and empowering approximately 40,000 villages through e-governance. The integration of satellite navigation (Gagan) into 6,500 locomotives highlights diverse applications and extensive market reach. To address connectivity gaps, especially in remote areas, it is crucial to ensure spectrum allocation decisions recognize the shared nature of satellite spectrum. Establishing a transparent, tech-specific spectrum assignment mechanism is essential, considering the impact of large Leo constellations, integration into 5G/6G networks, and the rising demand for edge connectivity. Efficient management in higher frequency bands (KU and KA) is emphasized, addressing global concerns about interference in satellite communication on the move through standardized procedures. A balanced approach to spectrum assignment, considering digital inclusion, affordability, and rural challenges, is crucial, and a comprehensive feasibility study, inclusive of stakeholder consultation and risk assessment, is imperative for well-informed choices that align with industry needs and foster the sustainable growth of satellite communication services in India.

Future Aspirations and Global Recognition: India's ambitious goals include targeting a 8-10% market share at \$45-50 billion by 2033, underlining its commitment to becoming a dominant player in the global space tech landscape. The country has already secured the second position in the Asia-Pacific region for the most SpaceTech companies. The country boasts a significant presence in the Asia-Pacific region, ranking second in terms of the number of SpaceTech firms. The ecosystem is vibrant, with close to 500 Micro, Small, and Medium-sized Enterprises (MSMEs) and 150 startups actively contributing to the sector's dynamism. Notably, many of these notable players are startups rapidly evolving into full-fledged companies, contributing to the vibrancy and innovation of India's space sector.'

In conclusion, India's space and satellite market is undergoing transformative growth, aiming to increase its global space economy share from 2-3% to over 8% by 2033. While facing challenges like a comparatively low government space budget, strategic investments are crucial to align with India's vision and secure a significant role in the evolving global space ecosystem. The dynamic space tech industry, with a projected \$40 billion market opportunity by 2033, showcases India's growing prominence globally, driven by public-private collaboration, government support, and foreign investments. The vibrant space sector, including satellite manufacturing, launch services, applications, and emerging technologies, positions India as a key player in the global space economy. The integration of satellite capabilities across diverse sectors underscores India's commitment to technological self-reliance and innovation. Focused policies, efficient spectrum management, and collaboration will contribute to India's significant role in the global space industry's growth.

