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Opening the Market, Closing the Mind: Analysing India's Space Policy 2023 from an Intellectual Property Perspective

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ABSTRACT

The Indian Space Policy, 2023, approved by the Cabinet Committee on Security on 6 April 2023, seeks to liberalise India's space sector by transforming a state-controlled model into one led by private enterprise, permitting Non-Governmental Entities to participate across the entire space value chain, from satellite manufacturing, rocket launches and ground stations to downstream data services. The declared ambition is to capture a larger share of the global space economy by 2033 and to reach a market valuation of forty-four billion United States dollars. These ambitions, however, are undercut by the near-total absence of intellectual property considerations in the policy. The policy remains silent on the ownership of inventions arising from public-private collaboration, on the protection of space-borne inventions and on the trade secret crisis threatening commercially valuable space know-how. This article contends that the Indian Space Policy, 2023, while opening the market, has simultaneously neglected the legal framework necessary to make private investment in the sector viable, sustainable and globally competitive. Drawing on a critical reading of the policy, empirical data on the growing space startup ecosystem and a comparative examination of the space intellectual property frameworks of the United States and the European Union, the article identifies structural intellectual property deficits in the policy and proposes a model legislative framework comprising a Space Activities Act with a dedicated intellectual property chapter.

Keywords: Indian Space Policy 2023, intellectual property, IN-SPACe, private space economy, space startups.

I. INTRODUCTION

Space presents opportunities ranging from space tourism and commercial satellite constellations to space mining and manufacturing. It is regarded as a strategic asset. Recognising the growing importance of space to both the economy and national security, the Cabinet Committee on Security, under the Government of India, rolled out the Indian Space Policy, 2023, on 6 April

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2023, permitting Non-Governmental Entities to enter the sector. This may be regarded as the second significant milestone in the Indian space industry since the inception of the Indian Space Research Organisation on 15 August 1969.¹ The Indian space sector, like the space industry in other nations during the twentieth century, began as a state monopoly and is being liberalised in the twenty-first century. The policy, which is India's sixth and most recent space policy, seeks to achieve this liberalisation objective.² It continues the space sector reforms commenced in June 2020 that established the Indian National Space Promotion and Authorisation Centre (IN-SPACe) as a single-window institution to promote and expedite private participation across the entire space value chain.³

A major driver of the policy is economic. The world space economy was valued at 630 billion United States dollars in 2023 and is expected to grow nearly threefold, to approximately 1.8 trillion United States dollars, by 2035.⁴ Private enterprises are expected to play a major role in this development, alongside state-led initiatives. In 2022, the Indian space industry was estimated at approximately two per cent of the global space industry, accounting for around 8.4 billion United States dollars.⁵ It is expected to record a fivefold increase by 2033. The space technology market in India is also expected to show a compound annual growth rate of about twenty-six per cent through 2026 to 2030.⁶ The effect of the reforms is visible in the response of the private sector: the number of private companies in the space sector grew from eleven in 2019 to over four hundred entities by 2024, and the number of active startups rose to 229, employing around twenty-two thousand people.⁷

This institutional and commercial transformation has, however, taken place in the near-absence of intellectual property considerations. Although space activities may give rise to significant intellectual property questions, the Indian Space Policy, 2023, is silent on critical issues, including the ownership of inventions made in space or aboard Indian-registered space objects;

¹ Dep't of Space, Gov't of India, INDIAN SPACE POLICY 2023 (2023), https://www.isro.gov.in/media_isro/pdf/IndianSpacePolicy2023.pdf (last visited Apr. 26, 2026).

² Indian Inst. of Pub. Admin., *India's New Space Policy* 4 (Research Paper, 2023), <https://www.iipa.org.in/cms/public/uploads/366111692781998.pdf> (last visited Apr. 26, 2026).

³ India Brand Equity Found., *India's Private Spacetechnology Boom: A New Era Unfolds* (Sept. 2025), <https://www.ibef.org/blogs/india-s-private-spacetechnology-boom-a-new-era-unfolds> (last visited Apr. 26, 2026).

⁴ World Econ. F., *Space: The \$1.8 Trillion Opportunity for Global Economic Growth* (Apr. 8, 2024), <https://www.weforum.org/publications/space-the-1-8-trillion-opportunity-for-global-economic-growth/> (last visited Apr. 26, 2026).

⁵ Tracxn, *Space Tech Startups in India: 2025 Market and Investment Trends* (2025), <https://tracxn.com/d/explore/space-tech-startups-in-india> (last visited Apr. 26, 2026).

⁶ Sunil Mani et al., *Space Economy of India: Its Impact on the Rest of the Economy*, 71 *Space Pol'y* art. 101628 (2025); *India's Expanding Space Economy Generates Jobs, Drives Innovation and Bolsters Inclusion*, SpaceInsider (May 12, 2025), <https://spaceinsider.tech/2025/05/12/indias-expanding-space-economy-generates-jobs-drives-innovation-and-bolsters-inclusion-study-finds/> (last visited Apr. 26, 2026).

⁷ *Id.*

the ownership of satellite-generated remote sensing data; intellectual property protection for spacecraft under Indian control in outer space, unlike the position under 35 U.S.C. § 105 enacted in 1990; and the protection of trade secrets in the space sector.⁸

This lacuna cannot be overlooked, as intellectual property rights constitute the foundational legal framework of the knowledge economy. Strong protection for intellectual property encourages the long-term, high-investment cycles that space exploration demands.⁹ An omission of this kind, in a policy that opens every segment of an industry to private investment yet fails to provide the intellectual property framework that makes such investment recoverable, is not merely incomplete but self-limiting by design.

This article analyses the Indian Space Policy, 2023, from an intellectual property perspective. Part two outlines the evolution of India's space policies, identifying the gradual but incomplete attention given to intellectual property in successive frameworks. Part three undertakes a critical examination of the policy and identifies its structural deficits. Part four examines empirical data on India's emerging space startup ecosystem and patent-filing trends after 2023. Part five conducts a comparative analysis of the space intellectual property provisions of the United States and the European Union. Part six proposes a model legislative framework, and part seven concludes.

II. EVOLUTION OF INDIA'S SPACE POLICIES: A HISTORICAL AND CRITICAL TRAJECTORY

A. From centralisation to commercialisation, 1969 to 2019

The Indian space programme owes its origin to the vision of Dr Vikram Sarabhai and was conceived as an enterprise committed to the public good. From its inception it was a state-operated scientific endeavour dedicated to national developmental goals rather than commercial profit.¹⁰ This state of affairs continued for over five decades. During this period, the Indian Space Research Organisation was at the helm of national space initiatives, and the operational model was primarily a state-run monopoly. The state dominated satellite and rocket manufacturing, while the private sector's role was limited to that of contractor or vendor, supplying manufactured structural components, propellant tanks and electronic subsystems and

⁸ IIPRD, *Patents in Orbit: Reimagining Intellectual Property for India's Space Future* (Jan. 8, 2026), <https://www.iiprd.com/patents-in-orbit-reimagining-intellectual-property-for-indias-space-future/> (last visited Apr. 26, 2026).

⁹ *Role of Intellectual Property Rights in Space Law*, India Legal (Apr. 8, 2023), <https://indialegalive.com/laws-research-indepth/role-of-intellectual-property-rights-in-space-law/> (last visited Apr. 26, 2026).

¹⁰ *ISRO Statistics by Patents and Facts*, ElectroIQ (2025), <https://electroi.com/stats/isro-statistics/> (last visited Apr. 26, 2026).

assisting in supply chains.¹¹ The creation and ownership of intellectual property in space technologies remained the domain of the state. The state thus adopted a core-periphery model, whereby it retained authority over intellectual-property-linked production while outsourcing non-intellectual-property-related work to the private sector.¹² This model had far-reaching consequences for intellectual property governance in India. Because all space-technology-related intellectual property rights were owned by the state, and private-sector involvement was relegated to non-intellectual-property manufacturing contracts, the state never faced political or legal pressure to enact legislative provisions for the space industry. Intellectual property was treated as a government concern, managed administratively through the internal procedures of the Indian Space Research Organisation. This may be called the centralised phase of Indian space policy.

B. The space sector reforms of 2020 and the creation of IN-SPACe

India's low contribution to the global space economy, and the prominent role played by the private sector in other countries in transforming the space industry by reducing costs and delays, prompted the Indian government to open the space sector to private enterprise. The liberalisation of the Indian space sector was set in motion as part of the post-pandemic economic recovery agenda, through the structural changes brought about by the space sector reforms of June 2020. The central element of these reforms was the creation of the Indian National Space Promotion and Authorisation Centre (IN-SPACe), established as an independent single-window nodal agency to facilitate public-private partnership in fields such as remote sensing, satellite communication and launch services. It aims to provide a stable regulatory and policy environment for space-based services and the building of launch vehicles and satellites. It was institutionalised with the objectives of facilitating, promoting and authorising space activities by non-governmental entities, functioning under the control of the Department of Space and acting as an interface between the Indian Space Research Organisation and private-sector space initiatives.¹³

A critical examination shows, however, that the 2020 reforms involved no legislative action. They neither amended the Patents Act, 1970, the Copyright Act, 1957, or any other intellectual property statute, nor introduced new rules or regulations incorporating intellectual property into space activities. This vacuum had serious implications, since although the reforms permitted

¹¹ Inst. of Strategic Stud. Islamabad, *Indian Space Policy 2023: An Appraisal* (Issue Brief, Aug. 9, 2023), <https://issi.org.pk/issue-brief-on-indian-space-policy-2023-an-appraisal/> (last visited Apr. 26, 2026).

¹² IMPRI, *India's Space Economy: Policy Directions in a New Frontier* (Jan. 2, 2025), <https://www.impriindia.com/insights/indias-space-economy-policies/> (last visited Apr. 26, 2026).

¹³ *Id.*

the use of the infrastructure and technology of the Indian Space Research Organisation by private entities, they did not specify the ownership of any resulting intellectual property. The 2020 reforms may therefore be understood as opening the door to private enterprise while leaving the question of who owns what, the most pressing concern for any investor, entirely unanswered.

C. The Draft Space Activities Bill, 2017: a cautionary legislative tale

The Draft Space Activities Bill, 2017, represents the most notable initiative towards a statutory arrangement for the Indian space sector before the Indian Space Policy, 2023. It is therefore appropriate to review the failed legislative history of the Bill before engaging in a critical analysis of the policy.

The Bill was intended to encourage and oversee space-related activities in India. It sought to lay down a legislative framework under the Department of Space for the accreditation and governance of space endeavours by Indian entities, and to strike a balance between promoting private commercial space activity and preserving the safe, secure and peaceful use of outer space.¹⁴

Clause 25 of the Bill, which addressed the intellectual property ownership of any invention or discovery made in outer space, proved to be a vexed provision. It provided that intellectual property rights in any invention developed in outer space as a consequence of an Indian space mission or activity would vest in the Government of India rather than in the inventor. This clause proved fatal to the Bill and drew heavy criticism for undermining private investment by divesting intellectual property generated in space activities to the government and foreclosing possible returns to private investors.¹⁵ It is accepted that limited government ownership on security grounds may be justified, but total control may prompt an exodus of startups to foreign jurisdictions and a diminution of foreign investment.¹⁶ As a consequence of the ensuing opposition, the Bill was allowed to lapse without being presented to Parliament. Legislative forbearance has continued, despite the recognition by the Law Commission of India, in its 229th Report of 2009, of a pressing need for space legislation.¹⁷

D. Other pre-2023 policies and their intellectual property treatment

The Satellite Communication Policy, 2000, laid down guidelines for the privatisation of space operations for the first time. It permitted Non-Governmental Entities to lease INSAT capacity,

¹⁴ Indian Inst. of Pub. Admin., *supra* note 2, at 6.

¹⁵ IIPRD, *supra* note 8.

¹⁶ *Id.*

¹⁷ Law Comm'n of India, Report No. 229, *Need for Legislation to Regulate Outer Space Activities* (Aug. 2009).

allowed private television uplinking through Indian satellites and laid the foundation for the operation of private satellite systems. The policy governed the commercial use of satellite communication infrastructure but was silent on the systematic treatment of intellectual property arising from satellite communication technologies developed by private operators.

Under the Remote Sensing Data Policy, 2011, ownership of satellite remote sensing data obtained through the Indian remote sensing satellite programme vested in the Department of Space. The policy defined the ownership of raw satellite data at the government level but made no provision for the downstream commercialisation of processed or value-added data products by private entities.

III. CRITICAL ANALYSIS OF THE INDIAN SPACE POLICY, 2023

A. Structure and objectives of the policy

The Indian Space Policy, 2023, is an eleven-page document structured around five institutional pillars: the Indian Space Research Organisation, IN-SPACe, the Department of Space, New Space India Limited and Non-Governmental Entities. The policy has been formalised with the objectives of encouraging commercial participation, enhancing Indian space competencies, utilising space for national defence, socio-economic growth, cooperative space exploration and environmental preservation.¹⁸

The policy was released on 6 April 2023.¹⁹ It authorises non-governmental entities to perform the entire range of end-to-end activities, from launching satellites and rockets into space and operating earth stations, such as telemetry, tracking and command facilities, to providing space-based communication services and engaging in commercial asteroid mining. It permits up to one hundred per cent foreign direct investment in satellite manufacturing and thereby enables a complete private space ecosystem. These objectives are to be achieved under the general supervision of IN-SPACe, the single-window regulatory and promotional body.²⁰

The relaxations provided by the policy send three important signals to private investors: first, that the government is open to private capital; second, that regulatory clearances may be navigated with ease through streamlined IN-SPACe procedures; and third, that the sector is accessible to foreign investment. These are clear market-opening signals. For a willing private investor, however, a critical fourth signal is notably missing: the policy is silent on who owns what is invented.

¹⁸ *Indian Space Policy 2023*, Lukmaan IAS (Jan. 14, 2025), <https://blog.lukmaanias.com/2025/01/14/indian-space-policy-2023/> (last visited Apr. 26, 2026).

¹⁹ *Id.*

²⁰ India Brand Equity Found., *supra* note 3.

B. The structural intellectual property deficits of the policy

Deficit one: no extraterritorial application of patent law in outer space. The most significant limitation on the effectiveness of the policy is the absence of any provision extending Indian patent law to inventions created aboard Indian-registered space objects. Historically, this is the foremost legislative measure that a spacefaring nation engaged in commercial space exploitation adopts. The United States addressed this problem in 1990 through the Patents in Space Act (35 U.S.C. § 105), which provides that any invention made, used or sold in outer space on board a spacecraft under the jurisdiction or control of the United States is considered to be made, used or sold within the United States, except where an international agreement provides otherwise.²¹ The effect of this extension of national jurisdiction is that United States inventors working aboard United States-registered spacecraft may file for and enforce patents under United States law in the same manner as for an invention made on United States soil.

India, despite its aspiration towards commercial space exploitation, has no comparable provision in its patent regime. The Patents Act, 1970, contains no extraterritorial provision in *pari materia* with 35 U.S.C. § 105, and the Indian Space Policy, 2023, does not even contemplate such an amendment. This creates a juridical lacuna in the governance of space-based inventions. Although India, under Article VIII of the Outer Space Treaty, retains jurisdiction over its registered space objects, that jurisdiction does not by itself translate into patent protection or enforcement rights. This absence of legislative clarity generates reasonable apprehension about the enforcement of patents against infringement aboard Indian spacecraft, which may discourage investor confidence and private-sector research and development and prompt the relocation of startups to foreign jurisdictions, contrary to the objectives of the policy.

It is worth noting that a discussion paper of the World Intellectual Property Organization (1997) recommended that other countries adopt a provision similar to 35 U.S.C. § 105, as it would provide patent coverage for many space activities.²² The failure of the policy to do so is a missed opportunity.

Deficit two: the technology transfer opacity problem. Clause 6(2) of the policy obliges the Indian Space Research Organisation to assess and transfer commercially viable technologies to non-governmental entities and thus expressly contemplates technology transfer programmes. It

²¹ *Patents and Space-Related Inventions*, Eur. Space Agency, https://www.esa.int/About_Us/Law_at_ESA/Intellectual_Property_Rights/Patents_and_space-related_inventions (last visited Apr. 26, 2026).

²² World Intell. Prop. Org., *Intellectual Property in Space* (Discussion Paper, 1997); Dep't of Space, Gov't of India, *supra* note 1, cl. 4.3(b).

also enables private startups to access the infrastructure and testing facilities of the Indian Space Research Organisation and to obtain launch support.²³

The policy is, however, silent on the terms of such transfers, particularly on intellectual property ownership. It does not address what happens when a private entity that receives technology from the Indian Space Research Organisation improves upon it and creates a new invention, nor does it identify who owns such follow-on inventions. It does not clarify whether a startup that licenses know-how from the Indian Space Research Organisation and commercialises it retains the copyright in the resulting software. This silence is particularly critical given that many startups face hurdles in accessing crucial technologies owing to obscure licensing arrangements, high costs and restrictive conditions, which slow innovation and prevent private players from achieving global competitiveness.²⁴ The difficulty with the policy is therefore that it mandates technology transfer in principle but creates no legal framework for the intellectual property consequences of that transfer.

The position in the United States is instructive. The Bayh-Dole Act (35 U.S.C. §§ 200-212), enacted in 1980, vests intellectual property generated through government-funded research in private entities and startups, subject to compliance with prescribed disclosure and commercialisation obligations. This approach produced a progressive increase in technology transfer from United States government research institutions to the private sector.

Deficit three: the remote sensing data ownership ambiguity. The ambiguity of the policy concerning the ownership of earth observation data presents another legal lacuna. Clause 5(1) (g) mandates IN-SPACe to authorise the dissemination of high-resolution remote sensing data to non-governmental entities, and clauses 6(3) and 6(4) collectively require the Indian Space Research Organisation to provide an open-data regime for current and archived satellite datasets. The policy distinguishes between high-resolution data (below five metres ground sampling distance) and low-resolution data. While the latter remains freely available, the former is available at fair and transparent pricing. For research, development and value-added applications, the policy provides access to archived satellite data and thematic datasets.

These provisions serve the appreciable goal of open data access but leave intellectual property ownership issues for the private sector unclarified. Such issues may arise in various forms. When a private company uses the raw satellite data of the Indian Space Research Organisation and processes it using proprietary algorithms to create a value-added product, such as a

²³ *Top SpaceTech Startups in India 2026*, UpForge (Mar. 2026), <https://www.upforge.in/spacetechn-startups> (last visited Apr. 26, 2026).

²⁴ IMPRI, *supra* note 12.

precision-agriculture analytics platform or a flood-prediction model, who owns the resulting data product? Is it the private company, whose algorithms created the value, the Indian Space Research Organisation, whose raw data provided the foundational input, or the Department of Space, as the ultimate owner of satellite data under the Remote Sensing Data Policy, 2011? Remote sensing and geospatial data are categorised as non-creative databases; introducing an appropriate legal framework to protect them against unauthorised copying and use therefore becomes important.²⁵ The policy engages with none of these concerns. The Indian position contrasts with that of the European Union, where the Database Directive (96/9/EC) creates a sui generis database right for satellite-derived data products. In sum, the downstream commercial uses of the data of the Indian Space Research Organisation by private actors create intellectual property ownership ambiguities that remain unanswered in legislative or regulatory terms under the 2023 policy.

Deficit four: the trade secret enforcement vacuum. The absence of any discussion of trade secrets in the policy is a further matter of concern. In the space sector, as in other advanced technologies, much of the most commercially valuable technology exists not as patents but as undisclosed know-how: proprietary manufacturing processes, material compositions, software algorithms and operational procedures that represent accumulated engineering expertise. Trade secret protection and enforcement in India are particularly problematic owing to the absence of specific civil and criminal provisions.²⁶ In India, trade secrets are safeguarded mainly through contract law remedies, which require formal contractual arrangements between the trade secret owner and the party accused of misappropriation. The Law Commission of India, in its Report No. 289 on Trade Secrets and Economic Espionage (2024), recommended the enactment of sui generis legislation to protect trade secrets, but no further progress has been made to date.²⁷

Trade secret protection is of critical importance to a space startup that has spent years developing a proprietary propulsion technology or satellite imaging algorithm. The inability to enforce such rights leaves the investment vulnerable to misappropriation by competitors. The Indian Space Policy, 2023, neither acknowledges this problem nor proposes any remedy.

²⁵ India Legal, *supra* note 9.

²⁶ *Space Law Protection: The New Focus of IPR*, Khurana & Khurana (Nov. 19, 2021), <https://www.khuranaandkhurana.com/2021/11/19/space-law-protection-the-new-focus-of-ipr/> (last visited Apr. 26, 2026).

²⁷ Law Comm'n of India, Report No. 289, *Trade Secrets and Economic Espionage* (Mar. 2024).

IV. EMPIRICAL EVIDENCE: THE INTELLECTUAL PROPERTY CRISIS IN INDIA'S EMERGING SPACE ECONOMY

A. The startup explosion: growth without a legal foundation

Despite the intellectual property lacuna in the policy, the Indian space startup ecosystem has shown notable growth. From just eleven private space companies in 2019, the sector grew to over four hundred entities by 2024, of which 229 were active startups.²⁸ The Economic Survey highlights the rapid expansion of India's space sector, with over three hundred startups actively contributing to its development.²⁹

As of March 2026, IN-SPACe had received over 1,177 applications in fields such as launch vehicles, ground systems and technology transfer from various stakeholders, including startups, micro, small and medium enterprises and industry.³⁰ It has 12,264 registered users on its digital platform, with 118 technology transfer agreements signed and 133 authorisations issued. The space technology sector in India attracted total funding of more than 467 million United States dollars over the preceding decade, of which more than 138 million United States dollars was raised in 2023 alone, coinciding with the adoption of the policy.³¹³²

Landmark achievements following the reforms include Skyroot Aerospace's launch of India's first privately developed rocket, Vikram-S, and Agnikul Cosmos's successful launch of Agnibaan SOrTeD in May 2024, featuring the world's first 3D-printed, single-piece, semi-cryogenic rocket engine.

Table 1: Growth of India's private space sector (2019 to 2025).

Year	Private Space Companies	Notable Milestone	Total Sector Funding
2019	11	/	/
2020	35 (startups)	IN-SPACe created	/
2021	40+	ISpA launched	/
2022	,	USD 8.4B sector valuation	/

²⁸ Mani et al., *supra* note 6.

²⁹ *India's Space Sector Explodes: 300+ Startups Fuel Growth*, Whalesbook (Jan. 30, 2026), <https://www.whalesbook.com/news/English/Science-and-Space/Indias-Space-Sector-Explodes-300-Startups-Fuel-Growth> (last visited Apr. 26, 2026).

³⁰ Indian Nat'l Space Promotion & Authorisation Ctr., *Status of Applications Submitted by Organizations*, https://www.inspace.gov.in/inspace?id=inspace_nge_dashboard (last visited Apr. 26, 2026).

³¹ Tracxn, *supra* note 5.

³² *Govt Push, Public-Private Partnership Drove Indian Space Sector Growth in 2025*, New Kerala (Dec. 30, 2025), <https://www.newkerala.com/news/o/govt-push-public-private-partnership-drove-indian-space-sector-377> (last visited Apr. 26, 2026).

Year	Private Space Companies	Notable Milestone	Total Sector Funding
Year	Private Space Companies	Notable Milestone	Total Sector Funding
2023	,	ISP 2023 adopted	USD 138M (peak year)
2024	400+ (incl. 229 startups)	Agnibaan SOrTeD launch	,
2025	300+ active startups	SpaDeX mission (autonomous docking)	USD 150M (FY25 alone)

Sources: Economic Survey; Tracxn Space Tech India Report 2025; Press Information Bureau; Indian Space Association.

B. Investment deterrence: the capital flight risk

The intellectual property silence of the policy creates a measurable investment-deterrence effect. Space technology startups registered a decrease in funding of thirty-five per cent year on year in value terms in 2024, even as overall Indian startup funding increased by twenty per cent, and intellectual property uncertainty is a key factor.³³ An emerging trend since 2025 has been the relocation and expansion of Indian private space enterprises into the United States, in an effort to secure market access.³⁴ This jurisdictional migration is concrete empirical evidence of the intellectual property chilling effect: Indian space startups are establishing United States subsidiaries in part to access the clarity and enforceability of 35 U.S.C. § 105, a provision that India itself lacks despite the 2023 policy.

V. COMPARATIVE ANALYSIS

A. The United States: statutory clarity in space-based inventions

The United States is a precursor not only in space exploration but also in establishing the most comprehensive national intellectual property regime for outer space operations. Its architecture rests on four statutory pillars.

³³ India Brand Equity Found., *supra* note 3.

³⁴ *Space Industry of India*, Wikipedia, https://en.wikipedia.org/wiki/Space_industry_of_India (last visited Apr. 26, 2026).

35 U.S.C. § 105, the Patents in Space Act, 1990. The Patents in Space Act, 1990 (35 U.S.C. § 105), was the first legislation of its kind, amending the federal patent law of the United States to extend intellectual property protection to inventions conceived, used or commercialised in outer space. It resolved the legal grey area concerning patent enforcement in outer space that arose from the principle, embodied in the Outer Space Treaty, that outer space is not subject to the territorial sovereignty of any nation.³⁵³⁶ The statute provides that any invention made, used or sold in outer space on a space object or component thereof under the jurisdiction or control of the United States shall be considered to be made, used or sold within the United States. It was designed to incentivise private investment in space exploration and orbital projects.³⁷ By providing a clear legal framework to prevent competitors from misappropriating patented technology, the United States remains one of the few nations to have adapted its national laws to extraterrestrial activities.

This arrangement has three material implications. First, it provides certainty: United States inventors and investors have the assurance that inventions conceived aboard United States-registered spacecraft are protectable under United States patent law. Second, it reflects the jurisdictional principle embodied in Article VIII of the Outer Space Treaty, which vests continuing jurisdiction and control over a space object in the state of registry. Third, it confers a private right of action: a patent holder may sue an infringer in a United States federal court for infringement of an invention made or used in space.

The Bayh-Dole Act, 1980 (35 U.S.C. §§ 200-212). The Bayh-Dole Act was designed to resolve the problem of dormant patents. Before its enactment, the United States government owned almost all inventions developed with federal funds, and because the government lacked a uniform commercialisation strategy, a large number of patents lay unused.³⁸ The Act changed this by permitting universities, non-profit organisations and small enterprises to retain ownership of inventions developed through federally funded research.³⁹ This entitlement is contingent upon fulfilling certain conditions, including commercialisation of the technology, reporting obligations, march-in rights and a royalty-free government right to use the invention

³⁵ Jonathan Goodwill, *Outer Space, Landslide Extra* (Am. Bar Ass'n, June 2021), https://www.americanbar.org/groups/intellectual_property_law/publications/landslide-extra/outer-space/ (last visited Apr. 26, 2026).

³⁶ Patents in Space Act, 35 U.S.C. § 105 (1990).

³⁷ *Patents and Space-Related Inventions*, Eur. Space Agency, https://www.esa.int/About_Us/Law_at_ESA/Intellectual_Property_Rights/Patents_and_space-related_inventions (last visited Apr. 26, 2026).

³⁸ Megan Van Etten, *Setting the Record Straight on the Bayh-Dole Act and March-In*, PhRMA (May 10, 2023), <https://phrma.org/blog/setting-the-record-straight-on-the-bayh-dole-act-and-march-in> (last visited Apr. 26, 2026).

³⁹ *Bayh-Dole Act*, Drexel Univ. Office of Rsch. & Innovation, <https://drexel.edu/research/innovation/bayh-dole-act> (last visited Apr. 26, 2026).

for federal purposes.⁴⁰ In the space context, this implies that a startup receiving a grant or contract from the National Aeronautics and Space Administration may retain the patents generated from federally funded research, which provides the legal certainty that the technology transfer programme of the Indian Space Research Organisation lacks.

The United States Commercial Space Launch Competitiveness Act, 2015. This Act seeks to catalyse the commercial space sector and comprises four principal titles aimed at removing regulatory barriers, streamlining licensing, strengthening institutional advocacy and establishing legal certainty for emerging space industries.⁴¹ It grants United States nationals and enterprises the legal entitlement to possess, exploit and commercialise extraterrestrial resources, such as water and minerals from asteroids.⁴² It further clarifies the rights of United States citizens in outer space, providing complementary intellectual-property-related clarity for commercial space enterprises.⁴³

The technology transfer programme of the National Aeronautics and Space Administration. The National Aeronautics and Space Administration operates a structured technology transfer programme under the Stevenson-Wydler Technology Innovation Act, which provides for patent licensing, software release and technology-spinoff programmes. That Act establishes technology transfer as a formal mission for federal laboratories and requires federal agencies and laboratories to disseminate their research, partner with the private sector and commercialise government-developed innovations.⁴⁴ It is closely related to the Bayh-Dole Act. This approach offers Indian policymakers an example of how a government space agency can remain committed to its core mission while consistently licensing intellectual property to the private sector on commercially viable terms.

B. The European Union: treaty-based intellectual property governance

The intellectual property strategy of the European Union for space operations operates through two primary mechanisms: the framework of the European Space Agency and the Intergovernmental Agreement on the International Space Station of 1998.

⁴⁰ 35 U.S.C. §§ 200-212 (1980).

⁴¹ Frans von der Dunk, *The US Space Launch Competitiveness Act of 2015*, Space, Cyber & Telecomm. L. Program Fac. Publ'ns (2015).

⁴² U.S. Commercial Space Launch Competitiveness Act, Pub. L. No. 114-90, 129 Stat. 704 (2015), <https://www.congress.gov/114/plaws/publ90/PLAW-114publ90.pdf> (last visited Apr. 26, 2026).

⁴³ U.S. Commercial Space Launch Competitiveness Act, Pub. L. No. 114-90, 129 Stat. 704 (2015).

⁴⁴ Stevenson-Wydler Technology Innovation Act of 1980, WIPO Lex, <https://www.wipo.int/wipolex/en/text/500438> (last visited Apr. 26, 2026).

The intellectual property framework of the European Space Agency. In relation to intellectual property rights on the International Space Station, the partners have adopted a territorial division whereby activities conducted aboard are generally governed by the law of the partner state in whose module the activity takes place.⁴⁵ Under Article 21 of the Intergovernmental Agreement, any activity conducted on a European Space Agency-registered element may be deemed to have occurred within the territorial jurisdiction of the relevant European partner state for intellectual property purposes.⁴⁶

India precisely lacks this approach of fictional territoriality, that is, the treatment of an activity on board a state-registered spacecraft as falling within the territory of the state of registration for intellectual property purposes, and it would be advisable to adopt it through legislation.

Germany's patent law amendment. Apart from the United States, Germany is the only state to have amended its patent legislation before the conclusion of the Intergovernmental Agreement, thereby enabling the application of its patent law to inventions developed on a space module registered by the European Space Agency.⁴⁷ This is an illuminating lesson that the fictional-territoriality approach does not require a new international treaty and may be achieved through domestic legislative amendment. India could do so by amending Section 2 or Section 48 of the Patents Act, 1970, to include a provision similar to 35 U.S.C. § 105.

The European Union Space Programme and intellectual property governance. The European Union Space Programme Regulation (Regulation (EU) 2021/696) establishes a policy framework for European Union space undertakings such as GOVSATCOM and Copernicus. It contains provisions on the ownership and licensing of intellectual property generated by programme activities. This form of statutory clarity on intellectual property ownership in government-private collaborations is entirely absent from the Indian Space Policy, 2023.

Table 2: Comparative space intellectual property framework.

Element	United States	European Union	India (ISP 2023)
Extension of patent law to space objects	Yes (35 USC Sec.105,1990)	Yes (IGA Art. 21; Germany national law)	No
Technology transfer IP framework	Yes (Bayh-Dole Act, 1980)	Yes (ESA Framework)	No
Trade secret legislation	Yes (DTSA, 2016)	Yes (EU Trade Secrets Directive 2016/943)	No

⁴⁵ Taylor Wessing, *Intellectual Property Rights and Outer Space: The New Frontier* (Oct. 6, 2025), <https://www.taylorwessing.com/en/interface/2025/space-legal-and-industry-frontiers/intellectual-property-rights-and-outer-space-the-new-frontier> (last visited Apr. 26, 2026).

⁴⁶ ISS Intergovernmental Agreement art. 21(2) (1998).

⁴⁷ Eur. Space Agency, *supra* note 26.

Element	United States	European Union	India (ISP 2023)
Remote sensing data ownership	Partially addressed (NOAA regulations)	Copernicus Open Data Policy + Database Directive	Undefined
Commercial space resource rights	Yes (CSLCA, 2015)	Under development	No

VI. TOWARDS A MODEL LEGISLATIVE FRAMEWORK: A PROPOSED SPACE INTELLECTUAL PROPERTY ACT

A. The core argument for parliamentary legislation

The Indian Space Policy, 2023, is the most recent policy document and an appreciable step towards commercialising the space industry, but without a dedicated national space law its enforcement lacks a firm legal basis.⁴⁸ As the Indian space ecosystem expands, with over three hundred active startups, it would be advisable to enact comprehensive space legislation.⁴⁹ Responsibility for operationalising the policy has been transferred to IN-SPACe as an autonomous regulatory authority without the guidance of any legislative framework.⁵⁰ This creates a constitutional infirmity: the delegation of intellectual-property norm-making power to an executive body without parliamentary authorisation is constitutionally questionable under the non-delegation doctrine as developed by the Supreme Court of India in *In re Delhi Laws Act*⁵¹ and *Harishankar Bagla v. State of Madhya Pradesh*.⁵²

This discussion reveals the necessity of a comprehensive Space Activities Act.⁵³ The Indian Space Policy, 2023, and subsequent frameworks should be elevated from administrative measures to enforceable statutes.⁵⁴

B. Proposed framework: key provisions of a Space Intellectual Property Act

Chapter 1: Extension of patent law. Proposed section 1(1): Any invention made, used or sold in outer space aboard a space object or component thereof registered in India, or aboard a space object under the jurisdiction or control of the Government of India, shall be deemed to have been made, used or sold in India for the purposes of the Patents Act, 1970, except where an international agreement to which India is a party provides otherwise. This provision mirrors 35

⁴⁸ IMPRI, *supra* note 12.

⁴⁹ *Id.*

⁵⁰ IIPRD, *supra* note 8.

⁵¹ *In re Delhi Laws Act*, AIR 1951 SC 332.

⁵² *Harishankar Bagla v. State of Madhya Pradesh*, AIR 1954 SC 465.

⁵³ IIPRD, *supra* note 8.

⁵⁴ *Id.*

U.S.C. § 105, adapted to the Indian constitutional context. It would give Indian space startups the same certainty that United States law gives their American counterparts.

Chapter 2: Technology transfer and intellectual property ownership. Proposed section 2(1): Where a Non-Governmental Entity develops an invention using technology transferred from the Indian Space Research Organisation or any other government space entity, the entity shall own the resulting invention, subject to a government march-in right exercisable only where national security requires it. Proposed section 2(2): Licensing agreements between the Indian Space Research Organisation and Non-Governmental Entities for technology transfer shall be published in the Official Gazette and shall specify the intellectual property ownership terms of any improvements made by the licensee. This provision draws on the Bayh-Dole framework, balancing private innovation incentives with government accountability.

Chapter 3: Trade secret protection. Proposed section 3(1): A trade secret in the space sector includes any technical information, formula, process, design or programme that derives independent economic value from not being generally known or readily ascertainable and for which reasonable steps are taken to maintain its secrecy. Proposed section 3(2): Misappropriation of a space-sector trade secret shall be actionable as a civil wrong, entitling the trade secret owner to injunctive relief, compensatory damages and exemplary damages in cases of wilful misappropriation. This provision implements the recommendation of the Law Commission of India for sui generis trade secret legislation, contextualised for the space sector.

Chapter 4: Satellite data ownership. Proposed section 4(1): Raw satellite data acquired by the Indian Space Research Organisation shall remain the property of the Department of Space. Value-added data products derived from raw satellite data by Non-Governmental Entities using proprietary processing algorithms shall be owned by the entity, subject to revenue sharing with the Department of Space as specified in a licensing agreement. Proposed section 4(2): A database of satellite-derived geospatial data compiled by a Non-Governmental Entity through substantial investment shall be protected against extraction and re-utilisation without authorisation for a period of fifteen years from the date of completion. This provision creates a sui generis database right analogous to the European Union Database Directive 96/9/EC, contextualised for India's satellite data ecosystem.

Chapter 5: Dispute resolution. Proposed section 5(1): The competent intellectual property tribunal shall have jurisdiction over intellectual property disputes arising from space activities, including disputes between Non-Governmental Entities, between such entities and the Indian Space Research Organisation, and between such entities and IN-SPACe. Proposed section 5(2):

Parties to a space activity contract may agree to submit intellectual property disputes to international arbitration.

VII. CONCLUSION

The Indian Space Policy, 2023, represents a significant step towards operationalising the country's commercial space ambitions, but it remains marked by substantial legal incompleteness. While the policy has opened the space sector to private participation with visible results, including more than three hundred active startups, cumulative investments exceeding 467 million United States dollars and an ambitious target of a 44 billion United States dollar space economy by 2033, it has simultaneously failed to establish the intellectual property framework necessary to sustain private investment in a high-technology, innovation-driven sector. From an intellectual property perspective, the policy leaves several critical issues unresolved, including the non-extension of patent law to space objects, the absence of a structured intellectual property regime for technology transfer, the non-delineation of ownership over satellite-generated data and the omission of trade secret protection for space-sector know-how.

A comparative analysis further exposes the structural limitations of the policy. The United States enacted 35 U.S.C. § 105 in 1990, some thirty-three years before the Indian Space Policy, 2023, demonstrating an early legislative recognition that private commercial space activity requires patent certainty. In the context of technology transfer and intellectual property ownership, the Bayh-Dole Act established a statutory framework enabling private entities and research institutions to retain and commercialise inventions arising from federally funded research. Similarly, Article 21 of the Intergovernmental Agreement governing the International Space Station provides partner states with jurisdictional clarity over inventions made aboard their registered modules. India, by contrast, has no equivalent statutory instruments.

The consequence is an evident intellectual property governance deficit that creates measurable investment deterrence, incentivises the jurisdictional migration of Indian space startups to the United States and leaves some of India's most commercially valuable space-sector innovations legally vulnerable. This gap was identified as early as 2009 by the Law Commission of India. Although the Draft Space Activities Bill, 2017, attempted to address aspects of the problem, it did so inadequately by vesting all intellectual property in the state, and the Indian Space Policy, 2023, in turn, remained entirely silent on the matter.

The remedy is both clear and well-precedented: the enactment of a comprehensive Space Activities Act containing a dedicated intellectual property chapter implementing the provisions

set out in part six of this article. Such a framework must take the form of parliamentary legislation, rather than executive policy, in order to provide statutory certainty to investors and to create enforceable private rights. India's space sector requires a legal architecture as ambitious as its commercial aspirations. Opening the market without closing these legal gaps is not reform; it is an invitation to the very disputes, investment failures and governance crises that the Indian Space Policy, 2023, was intended to prevent.

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