LEX LOCALIS-JOURNAL OF LOCAL SELF-GOVERNMENT
ISSN:1581-5374 E-ISSN:1855-363X
VOL. 22, NO. S4 (2024)

COMMERCIALIZATION OF SPACE ACTIVITIES AND IPR ISSUES IN INDIA: CHALLENGES AND SOLUTIONS

Jayashree Baliarsingh[1], Dr. Narendra Kumar Singh[2]

[1]Research Scholar, [2]Associate Professor
[1,2]Department of Law, Kalinga University, Naya Raipur, [C.G.], India
Mail id: Jayashreepdhakar@gmail.com

Abstract
The Indian Space Policy 2023 has brought about a structural change in India's space ecosystem by bringing to an end the previous system in which the state had a monopoly, leading to an increase from a single startup in 2014 to about 440 registered space technology firms supported by a total of USD 618.5 million in private equity. Nevertheless, this drive towards commercialization is encountering a fundamental regulatory obstacle: the conflict between national intellectual property rights (IPR) systems, which are based on territoriality, and the borderless, non-appropriable nature of outer space as defined by the 1967 Outer Space Treaty. By means of a data-driven analysis, this paper points out a significant gap in the market: even though private non-governmental entities (NGEs) constitute the majority of new companies entering the sector, they account for less than 5% of all active domestic space-tech patents (IPC: B64G), causing them to depend heavily on technology transfers from the public sector, which do not offer clear exclusivity or protection in orbit. Moreover, fast-growing downstream sectors such as Earth Observation (EO) analytics operate in a legal grey area under the Indian Patents Act, 1970, and the Copyright Act, 1957, making proprietary hardware upgrades and structured satellite telemetry particularly prone to cross-border infringement and unauthorized data scraping. To address this regulatory gap, the paper proposes specific, practical legislative measures.

Keywords: NewSpace India, Space-Tech Commercialization, Extraterritorial Patent Jurisdiction, Non-Government Entities (NGEs), Satellite Telemetry Analytics.

1. Introduction

For more than fifty years, India's space sector operated under a system in which the state held a complete monopoly, with the Indian Space Research Organization (ISRO) in charge of all aspects of research and development, vehicle design, manufacturing, and launches operations. The rise of "NewSpace" on a global scale marked by private investment, quick-moving space technology start-ups, and constellations of small satellites made it necessary to bring about a fundamental change in the structure. India began this transition by introducing a number of wide-ranging systemic reforms in June 2020, culminating in the publication of the landmark Indian Space Policy 2023. This policy successfully ended ISRO's monopoly, shifting its role to conducting fundamental scientific research and, at the same time, opening the entire space value chain to private companies, which are now classified as Non-Government Entities (NGEs). In order to put this change into effect, the government set up two main pillars.

The Indian National Space Promotion and Authorization Center (IN-SPACe) functions as an independent, single-window regulatory body responsible for clearing and authorizing private commercial activities. NewSpace India Limited (NSIL), which acts as the commercial wing of ISRO and is responsible for bringing in revenue from the organization's public-sector assets, carrying out technology transfers, and promoting production via Public-Private Partnerships (PPPs). How clear the actual speed of these reforms is! In 2014, there was just one registered space-tech startup in the country, and by then, there were about 440 registered firms. The rapid growth of this ecosystem is supported by a significant increase in private equity. Total private investment in domestic space startups rose from USD 100.5 million in the financial year 2021–22 to USD 618.5 million. At the same time, NSIL's commercial activities saw revenue increase from ₹2,116.12 crore in FY24 to

₹3,026.09 crore. This rapid economic expansion has repositioned India's deep-tech market, raising its valuation to an estimated USD 9 billion and setting ambitious projections to reach USD 40–45 billion in the next ten years.

1.2 Research Question

Even though there has been a huge flow of growth capital and a great deal of structural formalization, a fundamental legal conflict threatens the long-term survival of India's private space industry: the inherent contradiction between the territorial nature of intellectual property rights (IPR) systems and the borderless character of outer space. The intellectual property protections set out in national laws such as the Indian Patents Act, 1970, and in international agreements such as the TRIPS Agreement are strictly based on the principle of territoriality. On the other hand, Articles I and II of the 1967 Outer Space Treaty (OST) describe outer space as belonging to all of mankind and make it explicitly free from any claim of national sovereignty or territorial control. Although Article VIII of the OST introduces a basic 'quasi-territorial' assumption by giving the State of Registry jurisdiction and control over the objects it has launched, the international IPR treaties (such as the Paris Convention or the Berne Convention) do not include spatial coordinates among the areas over which they can enforce their provisions. In the case of an Indian private company designing an innovative payload that is then incorporated into a vehicle launched from international waters, or copied while in orbit, the legal procedures for establishing infringement are entirely absent from domestic law.

The existence of this regulatory delay presents a significant risk to intellectual assets. Although Indian Non-Government Entities (NGEs) are expanding rapidly through 118 technology transfer agreements with NSIL, the proprietary improvements, variations, and downstream data products they produce remain at risk. Since the long-delayed Space Activities Bill remains only in draft form, there is currently a legal gap regarding the enforcement of intellectual property rights in the space sector. For this reason, the present paper sets out to answer an important research question: What effect does the lack of specific domestic intellectual property rights legislation for space have on investor confidence and on the technological scaling of Indian Non-Government Entities (NGEs), and what legislative measures must India adopt in order to protect its upstream and downstream intellectual assets?

2. The Growth of India's Space Economy Based on Data

2.1 Metrics relating to investment, revenue, and institutional scaling

The shift in India's space sector from a centrally planned system to a commercial market is backed by clear empirical evidence. The growth of the institutional sector can be seen using three key indicators: the increase in the number of private market participants, the flow of private equity funds, and the rise in commercial revenue earned by state-owned intermediaries. According to the Press Information Bureau (PIB), the total number of registered space technology start-ups in India has increased from one in 2014 to about 440 now. This level of operational growth is in line with a sharp rise in private capital investment. Private equity investment in India's non-government space entities (NGEs) has nearly doubled, rising from USD 100.5 million in fiscal year 2021–22 to USD 618.5 million. This trend has carried over into the current fiscal period, with USD 187 million in venture capital being invested in the first quarter alone. At the same time, the commercial utilization of public assets via NewSpace India Limited (NSIL) shows a marked increase in market demand. Figures from the Union Government's Economic Survey indicate that NSIL's annual revenue has gone up from ₹321.77 crore in FY 2021–22 to ₹3,246.09 crore. This performance in the current fiscal year is due to the execution of commercial launch contracts, the integrated leasing of transponder capacity, and private satellite operations.

Table 1: Macro-Economic and Operational Metrics of India's Commercial Space Sector

Operational Metric	Base Year (FY20 / FY22)	Current Value	Growth Percentage / Factor	Primary Data Source

Registered Space Startups	1 (2014)	440	44,000% increase	Ministry of Commerce / Startup India Portal
Cumulative Private Equity	USD 100.5 Million (FY22)	USD 618.5 Million	515.42% increase	IN-SPACe / Parliamentary Factsheets
Annual Commercial Revenue (NSIL)	₹321.77 Crore (FY22)	₹3,246.09 Crore	908.82% increase	Union Economic Survey
Total Regulatory Authorisations	0 (Pre-Reform)	113 Authorisations	N/A	IN-SPACe Central Nodal Registry
Private Satellites Launched	0 (Pre-Reform)	18 Satellites	N/A	ISRO Launch Logs via PIB

2.2 Trends in technology transfer and the concentration of capital

Even though the broad growth figures suggest a flourishing ecosystem, a detailed analysis shows that the system depends on technology transfers from the public sector and is characterized by high levels of capital concentration. To build up the private sector's capabilities, IN-SPACe and NSIL have established formal technology off-ramps. They have approved and helped carry out 71 separate technology transfers from ISRO to private companies and startups. These transfers involve important upstream intellectual property, including advanced chemical propellant formulas and the complete handover of the Small Satellite Launch Vehicle (SSLV) design to private groups. Yet, even though 440 companies have entered the market, the investment data reveal a sharp capital bottleneck. According to tracking data compiled by Tracxn, among the many registered space startups, only 72 NGEs have completed an equity funding round. As a result, almost 83 percent of the registered startups are not receiving institutional venture financing. Moreover, the capital is highly concentrated geographically. Bengaluru holds the majority of the amount, with USD 495 million raised across 106 investment rounds (57 percent of the total sector capital); Hyderabad comes next with USD 205 million, and Chennai has USD 80 million.

Table 2: Regional Distribution and Concentration of Private Space-Tech Funding

Geographic Cluster Hub	Institutional Funding Raised	Capital Share (%)	Key Institutional Sub-Sectors	Primary Data Source
Bengaluru Cluster	USD 495 Million	57.0%	Hyperspectral Satellites, EO Analytics	Tracxn Spacetech Financial Report
Hyderabad Cluster	USD 205 Million	23.5%	Cryogenic Launch Vehicles, Pod Platforms	Department of Space Industry Review
Chennai Cluster	USD 80 Million	9.2%	3D-Printed Semi-Cryogenic Engines	ISRO-Industry Incubation Database
Rest of India	USD 91 Million	10.3%	Ground Station Components, Downstream Software	Startup India Tracker

This skewed concentration of research highlights the central research issue. The government has successfully transferred base technology (71 agreements), but private financing remains somewhat reserved. It is tightly concentrated in a few well-known hubs and a few firms (72 out of 440 firms). The difference indicates that institutional fund managers are reluctant to invest in scaling wider across deep tech. often, the hesitation stems from the lack of clear domestic legal protection for the IP rights built on top of the base IP transfers that startups receive from the base technology.

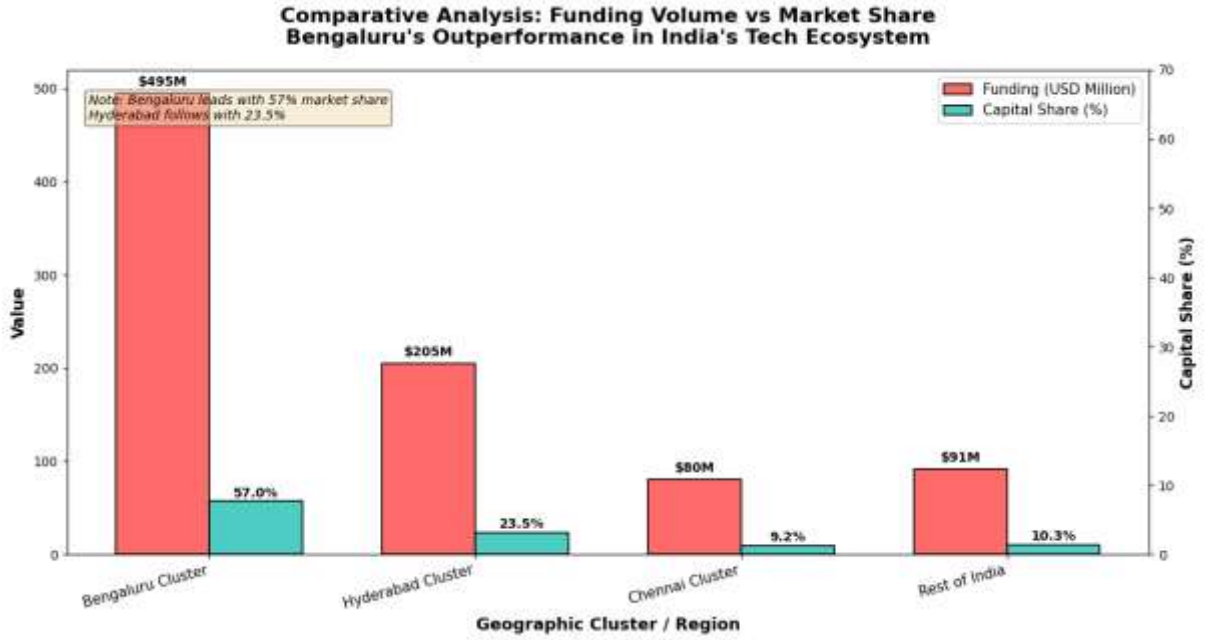

Figure 1: Geographic Distribution of Institutional Startup Funding Across India's Major Tech Hubs

The figure 1 presents the institutional funding raised by India's key geographic startup clusters, highlighting the significant concentration of capital in Bengaluru. The data reveals a stark disparity in funding distribution, with Bengaluru alone capturing 57.0% ($495M) of the total institutional funding, followed by Hyderabad at 23.5% ($205M). Chennai accounts for 9.2% ($80M), while the rest of India collectively represents 10.3% ($91M) of the total funding pool.

3. The crux of the issue: the IPR-Space Law Clash

3.1 Territoriality vs. Quasi-Territoriality

The primary legal hurdle that is blocking the commercialization of India's space ecosystem is the incompatibility between the territoriality of Intellectual Property Rights (IPR) and the borderless nature of outer space. The laws of intellectual property are, by their nature, sovereign, as, for example, Section 1(2) of the Indian Patents Act, 1970, makes it clear that they apply only within the territory of India. The TRIPS Agreement and the Paris Convention for the Protection of Industrial Property, both of which are international treaties, are based on national boundaries in defining and enforcing patent rights and are supported by this domestic framework. In contrast, outer space is free from the principle of appropriation. The Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (Outer Space Treaty or OST) 1967 provides, explicitly.

Outer space, the moon, and other celestial bodies are not appropriated by any state by means of use, occupation, or otherwise, or by claim of sovereignty. This produces a legal paradox from the get-go. Where an invention is used, replicated, or infringed in an environment where the sovereign is immune from any claims, a national court has limited ability to assert jurisdiction to enforce patent protection. To mediate this, international space law builds on a "quasi-territorial" legal fiction developed in the OST under Article VIII. This states that the State of Registry shall have jurisdiction and control over any object placed in outer space. In the same way, the physical space object is also linked to the domestic law of the launching state by Article 12 of the Registration Convention 1975. But jurisdiction is essentially political and administrative, and it does not automatically extend to a country's private domestic civil laws, including patent, copyright, or trade secret protections, in orbit unless the state has specific laws for space.

3.2 Patent Analysis Section

Private space start-ups in India face structural disadvantages when entering commercial markets due to the absence of space-specific patent legislation. Under the existing regime of the Indian Patents Act, 1970, to establish that the infringing technology has been manufactured, used, or sold in India, it is necessary to prove that the act of infringement took place within the country's geographical limits. The protection remains firmly on the ground if an Indian Non-Government Entity (NGE) builds its own satellite part and registers the patent with the Indian Patent Office (IPAIR). The Indian patent owner has no clear way to assert infringement if a foreign competitor copies the design and operates it on a payload launched from international waters, or on a spacecraft registered in a foreign jurisdiction. Moreover, this legal weakness is underscored by the significant imbalance in the distribution of aerospace IP. The Indian Patent Office database reveals a significant level of public IP ownership in the aerospace tech (B64G: Cosmonautics; Vehicles or Equipment therefor) segment.

Table 3: Concentration of Active Space-Tech Patents in India (IPC: B64G)

Patent Holder Segment	**Share of Active Patents (%)**	**Core Technological Domains**	**Enforcement & Licensing Framework**
Public Sector (ISRO / DOS)	84.5%	Liquid propulsion, cryogenic engines, structural alloys, telemetry systems.	Transferred to private players via NSIL technology off-ramps; statutory limits remain earthbound.
Foreign Transnational Corps	11.0%	Satellite communication transponders, GPS/GNSS receiver modules, sensor arrays.	Enforced in India via PCT national phase entries; protected under cross-border corporate frameworks.
Indian Private NGEs / Startups	4.5%	3D-printed engine components, carbon-composite pods, hyperspectral analytical software.	Highly vulnerable; unprotected in orbit due to the lack of space-specific domestic patent extensions.

This data shows that one of the biggest hurdles to the growth of India's space economy is this. Although private startups account for more than 80% of new market entrants, they hold less than 5% of active domestic space patents. Any proprietary upgrades or modifications developed by these start-ups, based on the 71 technology transfers provided by ISRO, become vulnerable to legal protection in orbit when they use ISRO's technology to create their own systems. The fundamental issue for an investor in patent enforcement is the inability to use an Indian-registered spacecraft within Indian territory to enforce the underlying patent, due to the lack of an explicit statutory provision to that effect.

4. Challenges for Indian Commercial Actors

One of the biggest operational issues faced by Indian Non-Government Entities (NGEs) is the threat of cross-border infringement in multi-national supply chains. The production of space technology is seldom confined to a single country. An Indian startup could create a component in Bengaluru, assemble it using parts from Taiwan, package it into a payload in Europe, and send it into space from a U.S.-registered vehicle. This distributed process forms the severe legal grey areas in the Indian Patents Act, 1970, which are strictly national in nature.

The Indian patent holder will not be able to prevent copying by an Indian competitor if the copying takes the form of assembly or final manufacturing outside India, under Section 48 of the Act, which protects against unauthorized manufacturing or sale in India.

Whether Indian courts have jurisdiction to enforce an injunction after a foreign entity has placed an infringing component into an Indian-registered satellite payload in orbit is unclear.

The Docking and Joint-Venture Conundrum: When Indian companies participate in joint ventures and programs such as NASA's Artemis Accords, or when Indian ships dock with commercial space

stations, the question of how to determine the governing patent jurisdiction in such scenarios remains unaddressed. This regulatory delay is a significant disadvantage with respect to international regulatory frameworks. In the United States, for instance, this challenge was answered with 35 U.S.C. § 105 (Space Patents Act), which provides a grant of jurisdiction or control to US patent law over any space object or component that is under the jurisdiction and control of the United States. Germany followed suit with a similar extension in its national ratification of the Space Station Agreement (Article 2). This, in a country like India, is a gap in the law that leaves local space-tech start-ups exposed, which can be a deterrent for risk-averse institutional VC.

4.2 Data Protection, Remote Sensing, and Downstream Analytics

The most rapidly expanding segment of the Indian space economy is downstream applications, which include Earth Observation (EO), geospatial intelligence, and satellite remote sensing imagery. Arguably, the most notable Indian startups developing hyperspectral and synthetic aperture radar (SAR) satellites to provide high-resolution planetary data models are Pixxel and GalaxEye. This presents a different IPR problem with respect to copyright and trade secret laws:

Table 4: IPR Vulnerabilities in Downstream Space Data Analytics

Data Processing Tier	Primary Technological Output	Applicable Indian IPR Framework	Core Legal Vulnerability & Challenges
Tier 1: Raw Telemetry Data	Raw digital signals transmitted from satellite sensors to Indian ground stations.	Copyright Act, 1957 (as "Data Streams")	Raw data lacks human creativity or authorship. Under Indian law, it is often excluded from copyright protection, making it vulnerable to intercept interception or unauthorized scraping.
Tier 2: Structured Imagery	Corrected, stitched, and orthorectified geospatial raster images.	Copyright Act, 1957 (as "Compilations / Databases")	Vulnerable to "Data Laundering." Competitors can feed proprietary images into proprietary machine learning models to extract insights without infringing on the underlying image copyright.
Tier 3: Proprietary Insights	AI-driven predictive analytics (e.g., crop yield forecasts, mineral mapping, carbon credit tracking).	Trade Secrets / Contract Law	India lacks a dedicated, standalone trade secrets statute. Startups must rely on breach-of-confidence civil actions under common law, which offer weak protections against external corporate espionage.

This downstream vulnerability is made worse by delays in regulatory clarity. While the Indian Space Policy 2023 encourages the commercial use of remote sensing data, India's broader data governance framework remains fragmented. The Digital Personal Data Protection (DPDP) Act, 2023, focuses strictly on personal identifiers, leaving industrial, non-personal satellite telemetry data in a legislative grey area. Without clear statutory definitions governing ownership, licensing, and enforcement for downstream space data, private entities struggle to protect their core software assets, limiting their ability to monetize analytics globally.

5. Proposed Solutions and Policy Recommendations

5.1 Legislative action-Patent framework amendment

India should include clear, space-specific extensions to its IP framework to remove confusion and uncertainty regarding Indian Non-Government Entities (NGEs). This can be done either by adding a dedicated chapter to the long-pending Space Activities Bill or by adding a specific "extraterritorial"

provision to the Indian Patents Act, 1970. This legislative reform can be patterned after the United States' extraterritorial framework in 35 U.S.C. § 105 and adapted to the Indian context of civil procedure. The following limited provisions should be included in the proposed statutory change. Unless otherwise specified in this Act, any invention made, used, sold, or manufactured on a space object, space launch vehicle, or component thereof, which is carried on the Central Nodal Registry of India under the control and jurisdiction of the Government of India, shall be deemed to be made, used, sold or manufactured in the territory of India for the purposes of this Act. No space object or part of a space object shall be subject to the provisions of subsection, if an international treaty or cross-border launch agreement of which India is a signatory expressly provides for the exclusive jurisdiction of a foreign sovereign state over the object or part of the object. Moreover, India needs to modernize its judicial thinking for cross-border enforcement by adopting the "Doctrine of Transnational Orbital Infringement. In accordance with this doctrine, if an infringing action occurs outside Indian territory but the command-and-control telemetry, data downlinks, or benefits are returned to an Indian ground station or corporation, then Indian courts should exercise jurisdiction over the economic impacts in domestic markets.

5.2 Data Safeguards and Public-Private IP Co-Ownership Models

The framework governing technology transfers needs to be overhauled, as ISRO/DOS holds a disproportionate share of public-sector IP (PSIP) (~84.5% of active patents). The current model is highly license-dependent, typically implemented through NSIL, which can be cumbersome and often precludes startups from using venture capital without an exclusive market license. India needs to move towards an adaptive and multi-tiered system of IP allocation to align commercialization better:

Table 5: Proposed Public-Private IP Allocation Framework

Technology Origin Tier	IP Transfer Mechanism	Ownership Structure	Commercial Exploitation Rights
Tier I: Foundational Systems (e.g., Heavy propulsion, core launch vehicle physics)	Non-Exclusive Statutory Licensing	Retained fully by ISRO / Union of India.	Open to all registered NGEs to prevent commercial launch monopolies.
Tier II: Co-Developed Systems (e.g., Customized payloads via ISRO-industry joint R&D)	Joint Patenting / Co-Ownership	Shared equally between ISRO and the respective NGE.	The NGE receives exclusive commercialization rights for specific industrial markets for a defined period.
Tier III: Modified NGE Upgrades (e.g., Proprietary software or components added to transferred tech)	Independent Patenting	Owned 100% by the private NGE.	Full commercial and international licensing rights rest with the private startup.

Lastly, India needs to have a separate Sui Generis Database Protection framework for satellite telemetry and Earth Observation (EO) imagery to protect downstream analytics. The Copyright Act, 1957, does not confer any traditional "human authorship" on raw spatial data, so there is a need for a specific rule. This approach must ensure that significant financial and technical investments are safeguarded during spatial data extraction. It needs to clearly ban the commercial abuse and unauthorized extraction of structured satellite datasets, even if this is allowed by automated machine learning models.

6. Conclusion

6.1 Synthesis of Findings

As alluring as this growth is, the commercialization of India's space activities is at a pivotal legislative juncture. Empirical trends show that the private space sector has grown from just one company in

2014 to approximately 440 registered companies and recorded USD 618.5 million in private capital inflows, with NSIL's revenues rising at an explosive rate to ₹3,246.09 crore. But this fast growth is limited by an inflexible territorial IP system. The central research finds that there is a big difference between terrestrial law and space-based law, which is without boundaries. The problem is that the hard-line delineation between the Indian Patents Act 1970 and the non-appropriation principle in the Outer Space Treaty 1967 is in direct conflict with itself. This puts private actors at great risk of cross-border and orbital patent infringement.

- IP Concentration: The public sector accounts for ~84.5% of the total number of active domestic patents, and less than 5% of patents are owned by private start-ups. This skewed arrangement creates structural barriers for private companies seeking to gain access to and monetize proprietary technologies.
- Downstream Vulnerabilities: High-growth downstream sectors, such as Earth Observation (EO) and geospatial analytics, are significantly vulnerable under the Copyright Act, 1957, as raw data streams are not protected by a separate statutory regime against unauthorized data scraping and automated exploitation.

6.2 Strategic Imperatives for India's NewSpace Era

This regulatory lag is likely to hinder deep-tech VC, as institutional funds are reluctant to invest in innovations that lack legal protection once they leave the launchpad. India needs to move from soft policy statements to new, enforceable legislation to sustain its growth trajectory and preserve its fast-expanding space economy. An extraterritorial extension of the Patents Act, in the form of Proposed Section 157B, which resembles the US Space Patents Act, will give clarity to the legal protection of an Indian registered spacecraft in orbit. At the same time, a multi-layered public-private IP co-ownership system and the creation of standalone rights for satellite databases will help level the playing field for innovation. These legislative changes will ensure that India's technological assets are protected, private investment is secured, and India becomes a safe and globally competitive space for commercialization.

Reference

1. United Nations General Assembly. (1967). Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (Outer Space Treaty), 610 UNTS 205.
2. United Nations General Assembly. (1975). Convention on Registration of Objects Launched into Outer Space (Registration Convention), 1023 UNTS 15.
3. Bhise, C. P. (2024). Artificial Intelligence in Accounting and Auditing: Opportunities, Challenges and Future Prospects. International Journal of Engineering Technologies and Management Research, 11(11), 7–12. https://doi.org/10.29121/ijetmr.v11.i11.2024.1794
4. World Trade Organization. (1994). Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS Agreement), 1869 UNTS 299.
5. World Intellectual Property Organization. (1883). Paris Convention for the Protection of Industrial Property (as amended).
6. Nuzzaci, A. (2024). The use of Cultural and Environmental Heritage in Educational Contexts Between Spaces, Identities, Attitudes, and Cognitive Well-Being. International Journal of Research -GRANTHAALAYAH, 12(4), 11–23. https://doi.org/10.29121/granthaalayah.v12.i4.2024.5587
7. The Indian Patents Act, 1970 (Act No. 39 of 1970), Section 1(2), Section 48, Section 53.
8. The Indian Copyright Act, 1957 (Act No. 14 of 1957).
9. Gonzaga, E. B. (2024). Opportunities, Teachers' Attitude and Engagement in Continuing Professional Development (CPD) Activities. International Journal of Research -Granthaalayah, 12(4), 53–78. https://doi.org/10.29121/granthaalayah.v12.i4.2024.5598
10. Department of Space, Government of India. (2023). Indian Space Policy 2023. Indian Space Research Organisation.
11. United States Code. Patents: Inventions in Outer Space, 35 U.S.C. § 105.

12. Ministry of Law and Justice, India. (2023). The Digital Personal Data Protection Act, 2023 (Act No. 22 of 2023).
13. Indian National Space Promotion and Authorisation Centre (IN-SPACe). (2024). Nodal Registry Authorisation Data and Private Equity Trends in the Indian Space Sector. Department of Space.
14. Ministry of Finance, Government of India. (2024). Economic Survey 2024–25: Commercial Growth and Revenue Trajectory of NewSpace India Limited (NSIL). Press Information Bureau.
15. Press Information Bureau (PIB). (2024). Factsheet on Indian Space Start-ups and Technology Transfer Milestones. Ministry of Science & Technology.
16. Office of the Controller General of Patents, Designs & Trade Marks (CGPDTM). (2024). Annual Report & Intellectual Property Advanced Search System (IPAIR) Logs on IPC Class B64G (Cosmonautics). Ministry of Commerce and Industry, India.
17. Balsano, A. (1995). Intellectual Property Rights and Space Activities: A New Challenge. ESA Bulletin, (82), 65-72.
18. Gerhard, M. (2002). Transfer of Technology and Intellectual Property Rights in Space Activities. Commercial Use of Space: A New Legal Regime, 107-124.
19. Tracxn Technologies. (2024). Geo-Spatial and Space-Tech Financial Sector Funding Deep-Dive Report. Tracxn Research Ecosystems.
20. Von der Dunk, F. G. (2011). The Origin of Space Law and the Role of the United Nations. Handbook of Space Law, Edward Elgar Publishing.