

Intellectual Properties Derived in Space Exploration: Issues and Scopes

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Intellectual Property Rights (IPRs) encourage creators by providing legal protection to their creations and by giving scope to make monetary profit. Even though most of the human endeavours and creative fields have recently fallen under the purview of intellectual property rights, space exploration, a significant area of human exploration, remains in direct conflict with IPR regulations. The lack of a legal IP regime for developed space technologies hardly encourages investors to invest the required large sums in such endeavors. It is acknowledged that the Space Treaty of 1967 places limitations on the creation of territorial intellectual property laws for space exploration; nonetheless, agreements like the Convention on the High Seas-1958 and the Registration Convention-1975 provide some avenues for achieving this. The paper examines the current state of space intellectual property regulations and puts forward some propositions on how this issue can be resolved. The paper also engages a study on India's response for adopting a Space IP Bill and highlights how this bill ignores about the IP rights of space agencies and other private investors while adhering to the Space Treaty's regulations and prioritizing national security concerns.

Keywords: Space Law, Intellectual Property Rights, IP Regime, Legislation

Intellectual Property Rights in Space Activities and Space Law

Space is a hub of infinitely unfolding stories. It has been attracting the human minds and intellects from the early stages of human civilization. In record, the beginning of the Space Age and the associated exploration of space beyond earth started with the Russian unmanned satellite Sputnik-I into space in October 1957.^{1,2} In subsequent phases, many seminal accomplishments such as the launching of telecommunication satellites to space, the placing of human in earth orbit and eventually moon landing, the placing of space stations into earth orbit, and the development of space-based technologies such as remote viewing etc. had happened in the following years.² Although, the number of objects sent into space increased steadily over time, the last few years have seen unprecedented levels of space exploration. Figure 1 shows the worldwide and few spacefaring nations' annual numbers of objects launched into space in the period 1957 to 2022.³ Space activities which were known for mere exploring of space objects and celestial bodies in the initial stage no longer remain the same but have widened its domain with the inclusion of activities like Remote sensing from space, direct Broadcasting, Launch and space

vehicle services, Manufacturing in space and Microgravity research etc.^{4,5}

These aspects of space exploration have opened a new era in space exploration by adding the aspect of commercialization. Because of it, the space activities which were purely governmental in the early stage, are now attracting private companies. From Virgin's space travel project to SpaceX's Starlink satellite constellation deployment to Blue Origin's moon landing ambitions, private companies are prime examples.^{6,7} In India also, the involvement of private companies and startups in space venture is noticeable. A total of 124 Indian satellites including those from

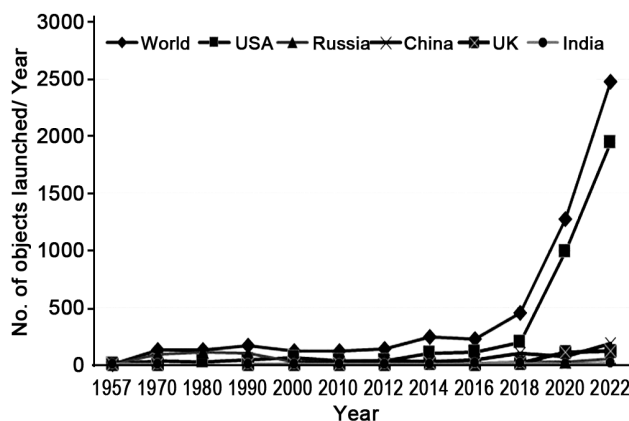


Fig. 1 — Number of objects launched into space annually
Source: Online Index of Objects Launched into Outer Space, 2023

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commercial companies and academic institutions have been launched until 2022. As of January 2023, the Indian Government owns 23 and 29 functioning satellites in Low Earth Orbit (LEO) and Geostationary Equatorial Orbit (GEO), respectively.⁸ These non-governmental entities are in general more conscious of their assets, both in tangible and intangible forms. Further, due to the requirement of huge financial and technical resources to accomplish space projects, collaboration of state-owned space agencies with the private entities is very much essential in the present time. However, the big question in front of these private entities is the situation of insecurity concerning the legal protection of their intellectual creations related to space activities and hence the high risks of investment return. Hence, this paradigm shift in the trends of outer space activities from government to private sectors has made it quite demanding that a legal framework must be there in each spacefaring nations to address the Intellectual Property issues arising out of outer Space activities. This would also incentivize and encourage the governmental sectors space agencies to collaborate with private space agencies both from own and foreign nations.

Intellectual property rights (IPRs) are legal rights assigned to the creators which give assurance to disclose their creations to the world, in consequence promoting technological progress and growth of the intellectual community. The modern concept of IPRs developed in England in the 17th and 18th centuries and from then many agreements and treaties were negotiated at different international forums to establish certain level of harmonization among various national intellectual property laws. Nonetheless, there are still substantial variances across nations' intellectual property laws, leading to a lack of uniformity in the level of intellectual property protection throughout them. Therefore, it is obvious to see disputes among space faring nations when negotiating a comprehensive intellectual property legal framework for space activities. A successful transformation of the practiced IP regime interrestrial IP matters to the off-world space activities thus requires a major adaptation of it.

The territorial nature of IP protection laws or the sovereign jurisdiction of a territory which is necessary or indispensable requirement for securing and enforcing IP right, is stood as the biggest challenge in protecting IP with respect to the activities in space, where the claims of sovereignty cannot be made. The

International Space Law Regime here draws contrast against the territorial nature of intellectual property protection regime. The Outer Space Treaty 1967, which is known as the backbone of International Space Law Regime, recognizes that space is a common place for mankind and must be explored through international cooperation and mutual understanding. One of the most important principles of the Space Treaty is the non-appropriation of outer space for any country as stated in Article II of the Treaty.⁹ It means no country can claim of its sovereignty in outer space, by means of use or occupation, or by any other means irrespective of its socioeconomic status. This article in principle stands as the barrier for the contract countries against the possibility of adopting their own IP regimes for space activities. A number of this treaty's principles are further elaborated in more specific way in other four United Nations treaties on space, namely, Rescue Agreement- Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into an Outer Space, 1968;¹⁰ Liability Convention- Convention on International Liability for Damage Caused by Space Objects 1972;¹¹ Registration Convention 1975- Convention on Registration of Objects Launched into Outer Space, 1975¹² and Moon Treaty -Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, 1979.¹³

Globalization of space activities in recent years has made the issue of intellectual property in space even more complicated. More and more space activities are taking place within the framework of international cooperation, such as the International Space Station (ISS). Such schemes include various players under different constituencies from different countries. Consequently, a lack of a comprehensive international legal regime bound parties to negotiate intellectual property clauses during each mutual space endeavor, which may include, for example, questions about data ownership, usage rights, distribution rights, licenses, confidential information, and confidentiality. A functioning extraterrestrial legal framework for tackling IP issues related to space missions is a fundamental requirement at the present days.

Progress in Adopting a Legal Framework of IP for Space Exploration

It is a widely acknowledged topic of discussion that the space-related treaties that were established in the

past were not futuristic and should be reevaluated in the present time. It is necessary to study the architecture of international space treaties to determine if a space IP regime can be included. The international legal regime of outer space needs to be amended so that a harmonious relation between the space law and IP regime can be established for a comprehensive growth in the field of space venture. As all the space treaties have already been signed by most nations, it would be very beneficial if the scope of such agreements were expanded to include intellectual property rights for space related inventions. Progress and opportunities in this direction have been discussed here.

Since space is a topic that transcends national borders, the existing international conventions that allow a country to exercise its power outside of its borders may have some applicability in space activities. One such situation arises in the case of the 'Law of the Flag', whereas embodied in the Article V of the Convention on the High Seas, 1958, the state having the registration of a ship retains control and jurisdiction over it and over people there and activities thereon board, on the high seas.¹⁴ By way of analogy, it was argued that, like in the case of ships which fly that state's flag on the high seas, the domestic IP Law might be too applicable to the space objects which are registered in that state.

As a significant progress in 1990, United States adopted its Patent Act for space related inventions by taking the inspiration from the Registration Convention 1975. With this Act, the USA became the single country to implement its Patent Law for space inventions. The Section 105 of the Act states that inventions made, used, or sold in outer space on a space object under the jurisdiction or control of the United States shall be considered as made, used, or sold within the United States. In spite of the comprehensiveness of this Patent Act, there remains some loop holes. One such loop hole in the Act says that a patentee can avoid patent infringement on an invention in outer space by registering its space object, *via* a launching State under the Registration Convention, in a country where the invention has not been patented.

A research on potential needs for laws and principles for the protection of intellectual property for inventions generated or utilized in space was carried out by the World Intellectual Property Organization (WIPO) in 1997 due to the urgency of

the issue.¹⁵ This study focused solely on international intellectual property law issues and more general international law issues such as territorial and jurisdictional issues and legal issues related to cooperative activities between spacefaring nations. The study also revisited the Article 5ter of the Paris Convention on 'Temporal Presence' in relation to its adaptability on space activities. The Doctrine of 'Temporary Presence' in general allows an inventor's rights to be limited by limiting its territoriality, allowing for an act that would normally be infringement to be un-actionable. This permits national IPR laws to be applied in outer space as well as allow certain intellectual property to be made and used temporarily in another state. To date, the United States and France have incorporated the principle of Temporary Presence Doctrine into their national legal frameworks to facilitate space exploration activities.¹⁶ The study sought clarification whether the territorial jurisdiction under intellectual property law permits the extension of each national (and regional) law to the objects which the respective country has registered and launched into outer space as mentioned in the Article VIII of Outer Space Treaty of 1967 in terms of the 'Doctrine of Quasi-Territoriality'. The scope of 'Quasi-Territoriality' allows for outer space to have a non-defined territoriality, while allowing states of registry to retain and control the space objects that were launched from it. The study also emphasized the standardization of contractual clauses protecting inventions and confidential information made or used in international cooperation agreements between space flight nations.

A good implementation of the Doctrines of 'Quasi-Territoriality' and 'Temporal Presence' observed in the International Space Station Intergovernmental Agreement (IGA), 1998, signed by the fifteen governments involved in the Space Station project. This Space Agreement allows space station partners to extend their national jurisdiction into space so that the elements they provide (such as laboratories) are placed on equal footing with their territories.¹⁷ Moreover, the Article XXI of the Agreement addressed all concerns about the IP ownership rights of any inventions occurred in the International Space Station. It allows inventions prepared in ISS to be recognized as intellectual property as if it were invented on earth. It also bound the member states to recognize all IPR related works made in the other member states, creating a harmonious IPR regime

within the scope of the IGA. Thus, the IGA provides a simple but effective method for regulating intellectual property rights in space and, just as importantly, a legal framework for cooperative space activities. A new treaty may be approved on the same lines of the IP sections of this International Space Station Intergovernmental Agreement, or this agreement may be amended to include the provision of intellectual property for outer space activities. At the same time, countries should enact specific national space laws that consider intellectual property aspects in space in accordance with international treaties.

In July 1999, a workshop on intellectual property rights in outer space was held in connection with the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space. (UNISPACE III). The resolutions of this workshop emphasized on the protection of intellectual property rights, in view of the growth in the commercialization and privatization of space related activities, however, at the same time without the violating the principles of outer space treaties.¹⁸ It was also endorsed that further consideration needs to be given to the feasibility of harmonizing international intellectual property standard and laws protecting intellectual property in space to improve international coordination and cooperation at both governmental and private levels. All nations should adequately protect intellectual property rights that affect space-related activities and technologies. The conference also recommended awareness and educational activities concerning intellectual property rights in relation to outer space activities. Following UNISPACE III, several delegations to the Legal Subcommittee of the Commission on the Peaceful Uses of Outer Space (COPUOS) proposed placing intellectual property issues on the subcommittee's agenda. However, such a proposal failed to gain sufficient support among the members of the subcommittee.¹⁹

Here, WIPO's involvement is also apparent. WIPO suggested a single patent regime and jurisdiction for inventions made in space in 2004. This would enable a patent applicant to submit a single application to be enforced globally in space. Alternatively, a cooperation treaty mirroring the Patent Cooperation Treaty could include all countries that are party to the Registration Convention, allowing for a more efficient patent application process. WIPO's proposal can be revisited to include the state of play in space in 2022, which has changed considerably in these two decades. In addition,

the survey should contain specific suggestions for implementing the action plan.

National IP Regime for Space Activities: The Context of India

Even after the accomplishments like record-breaking launching of 104 satellites from single rocket, lunar-exploration missions such as Chandrayan-1, Chandrayan-2, and Chandrayan-3, by Indian Space Research Organization (ISRO), the position of Indian national IP laws in space-related activities is still at the nascent stage. India is also a member of elite club of space-faring nations and member to the International Conventions and treaties mentioned above, there is not yet any specific national space legislation in India. Therefore, to compete with the other advanced spacefaring nations of the world there is an urgent need for the institution of its own national space legislation for space activities. Following this urgency in the last six years, Indian Department of Space (DOS) along with the Indian Space Research Organization's (ISRO) and few premier organizations of India introduced the Draft Space Activities bill, 2017.²⁰ The bill was proposed with the specific objective of promoting and regulating India's space activities and encouraging private sector participation under government guidance and approval. The Draft Space Bill specifies that space exploration should be conducted for two reasons: first, for peaceful purposes in accordance with the Space Treaty of 1967, and second, for the sake of national security. Another feature of the Bill is that it requires the government to make broader policies, but it does not directly render its responsibility for investing in space infrastructure. This aspect of the Bill makes it clear that the government only wants to regulate the sector and let the commercial industries develop themselves. The Bill also points out that the legal system adopted should only enable the smooth and continuous growth of space activities in India and not just a regulatory or restrictive regime. To some extent, this approach supports the US model for large-scale privatization of space activities by masking the obligations of the International Space Exploration Treaty. The provision of protection of intellectual property rights created during any space-related activities has been highlighted in the Section 25 of the Space Bill.²⁰ The problem with this provision, however, is that it proposes that intellectual property rights created on

board of a space object should be considered property of the Government of India. As such, it is unclear what rights intellectual property creators enjoy for their intellectual endeavours. This model of state monopoly on space-based intellectual property rights discourages space investors from sponsoring inventions and other intellectual creations in space. The Bill also omits certain key provisions such as orbital patents and flags of convenience. Thus, in general, while attempting to cover a wide spectrum of activities within its domain, the Draft Bill does not provide a clear and comprehensive regime for regulating space activities in India. To have an inclusive Space Bill, policy makers may consider the engagement of educational institutions such as national law universities, DPIIT IPR chairs, etc. and the agencies which were involved in the preparation of 'National IP Policy 2016'.

Propositions that Might be Taken into Consideration

Given the recent advancements in the field of space exploration, it is currently imperative that all spacefaring countries, who are parties to the Registration Convention of 1975 should urgently adopt their own legal frame work with minimum standardization for IP perception of space activities. Else, competitors of any patented space inventions from a country where one such IP Act exists can easily circumvent the patent infringement by launching or registering a space technology from other contract member of the Registration Convention, where such IP Act is not there. As a long-term goal, a convention, mutually agreed upon by WIPO and WTO member nations, especially addressing trade-related issues of space missions, might improve the global status of the IPR regime for the space related inventions. Such a treaty can make all the member countries bound to adopt their own IP acts for space related activities soon.

All the advanced spacefaring nations require that their partner country have a standard intellectual property system for the protection of their inventions for effective technology transfer agreements to take place. Thus, the development of emerging countries' space endeavors depends on the existence of workable intellectual property rules for technology relevant to space. Therefore, developing countries need to adjust their IP laws and create a suitable path for passing their own IP legislation relevant to space exploration. Regarding the possibility of having a global IP regime

of space, the proposal given by WIPO can be taken forward by all the member nations to reach a consensus on the adoption of a worldwide intellectual property law regime space activities. Under the implementation of this intellectual property regime, a space innovation might be legally protected in every WIPO member nation with only a single IP application.

Conclusion

The problem of protection of intellectual property associated with space activities is more serious, given that the tension between the Obligation of the International Space Treaty and today's commercial reality is increasing. The challenge for international authorities is to decide whether to adhere to the principles of existing space agreements or seek to update them to address today's intellectual property landscape related to space activities. The relation between the IP regime that is deemed to be applicable to space activities, and international space law appears to be more complicated. The progress of one seems to inevitably undermine the other. Nevertheless, scopes are being explored that would soften the relationship between these two regimes of law so that a successful IP regime can be framed for space activities without violating the international obligations of space law. The international treaties and conventions must take the necessary steps to amend the existing terms and conditions involved in regulation of space activities seeing the nature of space ventures in the in the present era of commercialization. Such initiatives can only boost the spirit of private entities to take part in more space activities else the questions of insecurity regarding the return of their huge investments would rise always. A state cannot apparently allow the private sectors to operate without proper regulation considering the international space treaties obligations and liability for both public and private space activities. The responsibility of individual states is also crucial here to acquire their own national space legislations with defined IP regimes for the space activities. Though framing of a balanced space IP framework is no easy task, this paper puts forward some propositions in this regard. India's attempt in drafting a Space Legislation Bill is applaudable though the present form of the bill is far from satisfactory because of several inherent drawbacks as discussed above. In general, the Bill does not provide a clear and comprehensive IP regime to govern India's space activities. It can be realized

that the Bill requires a major reconsideration and together the preparation of comprehensive national space legislation for India requires adequate collaboration between the legal fraternity and the scientific community.

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