Intellectual Property Rights in Outer Space: A Comparison between India and the World

[a]Ankita Puri, [b]Namrata Bhagia
[a]Symbiosis Law School, Pune, Symbiosis International University (2012-2017), India
[b]Symbiosis Law School, Pune, Symbiosis International University (2011-2016), India

Abstract

With the allocation of $1.2 billion for the 2015-16 fiscal year to the Indian Space Research Organization to fund the development, launch and operations of satellite technology, India is in dire need of a sound space legislation. Recently, 'Mangalyaan', a space probe on the country's first interplanetary mission successfully completed 1000 orbiting circles of the planet Mars, making India a forerunner in space activities. With ever increasing investment in research and development, it is expected that the private sector might soon partner with government agencies to help fund the much-needed financial and technical resources. India's intellectual property laws may be sound when it comes to innovations and creations within the country, however, the question is whether they are well harmonized with the national intellectual property laws of countries such as the USA, China, France and Russia, when it comes to outer space activities. There is a lack of an international space law regime common to all States, and not just India, which is currently hindering the involvement of the private sector in that area. Companies like SpaceX, Virgin Galactic, Orbital Sciences and Blue origin have already made their mark in remote sensing from space, direct broadcasting and research and manufacturing in micro- gravity environments. However, the problem lies in the fact that such investments become difficult to secure because there are no regulations or clear cut laws which govern intellectual property rights in space. This paper discusses the importance of intellectual property rights in the space regime together with legal principles developed by the United Nations, sovereignty in outer space and raises issues with respect to protection of those rights in light of the world's future in commercial space activities with special attention to India.

KEYWORDS-Intellectual Property Rights, United Nations, Sovereignty.

Background of the Study

Space related activities have come a long way considering the progress made in the field of commercial space especially after the launch of Sputnik-I by Russia in 1957 and the subsequent launch of Explorer-I by the United States of America in 1958. This was followed by numerous launches of manned satellites by Russia, America, Japan and India. At present, Virgin Galactic, a spaceflight venture of the British Virgin Group, is developing a commercial spacecraft to promote space tourism. Taking into account these contributions towards the advancement of space activities on a global level, one cannot ignore the importance of an established domestic law for the same.

Globalization as well as exposure to technology has invited the private sector to knock at the doors of commercial activities related to outer space. The Outer Space Treaty of 1967 had foreseen the same and provided that:

"*States parties to the Treaty shall bear international responsibility for national activities in outer space, including the Moon and other celestial bodies, whether such activities are carried on by governmental agencies or by non-governmental entities, and for assuring that national activities are carried out in conformity with the provisions set forth in the present Treaty...*"[1]

Thus, member States shall be responsible internationally for national activities in outer space carried out by governmental agencies or by non-governmental agencies. It further mentions that the States shall authorise the activities of non-governmental ventures in outer space. Activities including remote sensing from space, direct broadcasting, launch and space vehicle services, manufacturing in space, and microgravity research come within the scope of private entities.

The United States enactment of the National Aeronautical Space Act (NASA) in 1958 was the perfect approach towards establishing a Domestic Space Act which later influenced around 20 other countries to follow suit.[2] Now, with the private sector undertaking commercial space activities, an established Domestic Space Law seems inevitable for proper growth of the sector.

India, despite being a developing nation, is at par with the developed countries with respect to its foray into this sector. On 19th April, 1975, ISRO built Aryabhata, India's first satellite which was launched by the Soviet Union. In 2008, Chandrayaan-I landed on the moon. Recently, in 2013, India became the first Asian space agency to reach Mars.

Now that India is expanding towards commercialisation and privatization of space activities and with the launch of many such organisations in the country, space legislation is the need of the hour. The premise for this requirement is simple. Space ventures are a highly profitable sector, with guaranteed returns on investment. Hence, for the growth and advancement of the same, a set of transparent laws which clearly demarcate boundaries, eradicate all grey areas, facilitate accountability and protect intellectual property rights in the field is highly essential.

Research Methodology

The research paper has fulfilled the objects of the study by using primary data in the form of an interview with a notable business entrepreneur and co-founder of Dhruva Space. Secondary data has been employed in the form of scholarly articles, newspaper reports, journals, case studies and textbooks.

Importance of Intellectual Property Rights in Outer Space

Intellectual property is the creative work of the human intellect, such as literary and artistic works, inventions, designs etc. In order to encourage innovation and creativity, it is the duty of every nation to reward such expression by conferring economic rights on the creators as well as making such creations available to the public.

[1]Article VI, Outer Space Treaty, 1967

[2]Report of the National Commission on Space | Pioneering the Space Frontier. (1985) Available at: http://www.nasa.gov/pdf/383341main_60%20-%2020090814.5.The%20Report%20of%20the%20National%20Commission%20on%20Space.pdf [Accessed 30 Aug. 2015].

Intellectual property rights have been formally defined by the Convention Establishing the World Intellectual Property Organization (WIPO), 1967 as follows:

"Intellectual property shall include the rights relating to:

- literary, artistic and scientific works,
- performances of performing artists, phonograms, and broadcasts,
- inventions in all fields of human endeavour,
- scientific discoveries,
- industrial designs,
- trademarks, service marks, and commercial names and designations,
- protection against unfair competition,

and all other rights resulting from intellectual activity in the industrial, scientific, literary or artistic fields."[3]

These rights are in turn given statutory expression by the nations when they adopt intellectual property laws which aid in industrial, economic and technological development.

Activities in the space regime are characterized by the use of complex and sophisticated technologies which need to be protected in order to further protect rights of the organizations involved in such activities. WIPO plays a monumental role in promoting the protection of intellectual property rights throughout the world by administering treaties in collaboration with other nations as well as international organizations. It also ensures administrative cooperation among the intellectual property unions established by treaties administered, such as Paris Union and Berne Union.

The four important intellectual property rights that need to be carefully examined with relation to outer space activities are: patents, copyrights, trademarks and industrial designs.

1. Patents:

A patent is an exclusive, monopoly right conferred on an inventor to exploit his invention for a limited period of time (generally 20 years). During this period, the inventor is entitled to exclude anyone else from commercially exploiting his innovation. Thus, anyone who invents or discovers a new and useful process, product, article or innovates any new and useful improvement of any of those. Once the term of the patent expires, it enters into public domain.

Before a patent is granted, the inventor needs to disclose the information about his or her invention. This provides valuable information to researchers and inventors, and also promotes further creativity and innovation.

2. Copyrights:

Copyright is used to describe the rights of creators over their literary and artistic works like books, music, computer programmes, drawings, paintings, sculptures,

[3]Article 2 (viii), Convention Establishing World Intellectual Property Organization (as amended on September 28, 1979), Available at: http://www.wipo.int/wipolex/en/treaties/text.jsp?file_id=283833

cinematographic films, sound recordings etc. It generally provides to the owner of copyright the right to reproduce the work in any form; issue its copies to the public; perform the work in public; communicate it to the public; make any translation of the work; and make adaptations of the work. Thus, it is accompanied with a bundle of rights.

A copyright comes into existence as soon as an idea is expressed in a material form. A mere idea, procedure, or mathematical formula would not classify as a copyright.

3. Trademarks:

A trademark includes any device, brand, heading, label, ticket, name, signature, word, letter, number, three-dimensional signs, shape of goods, packaging or combination of colours or any combination thereof. It helps in identification of goods, their sources and is also indicative of their quality. Once a trademark is registered, it can be enjoyed perpetually on payment of renewal fees.

4. Industrial Designs:

A design means the features of shape, configuration, pattern, ornament or composition of lines or colours applied to any article whether in two dimensional or three dimensional or both forms, by any industrial process – manual, mechanical or chemical – which in the finished article are appealing and are judged solely by the eye.

Legal protection becomes necessary for creation of new designs and their application to articles as it ensures fair return on investment and promotes fair competition, encourages creativity and promotes more aesthetically attractive products.

Intellectual property rights can be enforced if there is an infringement of such rights which involved unauthorized exploitation of the property by a third party. Remedies available to the owner of the intellectual property are provided for in a nation's intellectual property laws and may be categorized as civil and criminal. Since different nations have different intellectual property laws, there may be instances when such laws conflict with each other due to international trade and exposure of the product or service to laws of other countries. For this reason, international treaties and conventions play a major role in establishing legal mechanisms that effectively protect intellectual properties.

Sovereignty in Outer Space

Outer space begins about 100 km above the Earth and begins where our planet's atmosphere ends. Outer space activities are characterized by ever-changing, massive technological innovations. From launching satellites weighing less than 1 kg to an orbiting, habitable space station, the world has come a long way since the launch of Sputnik-I in 1957. With increasing need for innovation, there is a need for private sector and entrepreneurs to step in and assist governmental organizations in monumentalizing the niche of commercial outer space activities.

Outer Space is governed by the Outer Space Treaty or the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies which entered into force on 10 October 1967. It represents the basic legal framework of international law related to

space regime. It holds that nations should strive to use outer space for "peaceful purposes" and may not launch nuclear weapons or other weapons of mass destruction in orbit around the Earth, on the moon, or toward any other celestial body.

One of the main principles advocated by the Treaty is the principle of sovereignty. Sovereignty is a nation's right to exert full control and authority over people, resources and jurisdiction. Article II and Article VIII of the Outer Space Treaty deal with this principle.

Article II: "*Outer space, including the Moon and other celestial bodies, is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means*."

Article VIII: "*A State Party to the Treaty on whose registry an object launched into outer space is carried shall retain jurisdiction and control over such object, and over any personnel thereof, while in outer space or on a celestial body. Ownership of objects launched into outer space, including objects landed or constructed on a celestial body, and of their component parts, is not affected by their presence in outer space or on a celestial body or by their return to the Earth. Such objects or component parts found beyond the limits of the State Party to the Treaty on whose registry they are carried shall be returned to that State Party, which shall, upon request, furnish identifying data prior to their return*."

Thus, no State can claim sovereignty in the outer space including the moon and other celestial bodies by means of use or occupation or any other activities. All the States have equal rights in outer space and shall be internationally responsible for their activities therein.

The Outer Space Treaty in Article VIII also deals with jurisdiction issues pertaining to objects launched by States. Once they are launched on a State's registry, their jurisdiction remains with that State and is not affected by their position in outer space or anywhere on the Earth. Any such object or part of it or debris thereof has to be returned to the concerned State having jurisdiction over that object.

United Nations Committee on Peaceful Uses of Outer Space, 1959

The United Nations Committee on Peaceful Uses of Outer Space (UNCOPUOS) was an ad hoc committee set up in 1959 after the launch of Sputnik-I to review the scope of international cooperation in peaceful uses of outer space, to devise programmes in this field to be undertaken under United Nations auspices, to encourage continued research and the dissemination of information on outer space matters, and to study legal problems arising from the exploration of outer space. According to the UNCOPUOS, a patent office adheres to the legal and administrative rules of its country keeping in account the patentability criteria and procedural questions. It could thus, render Article II of the Outer Space Treaty irrelevant as the patent inspector is not required to apply Article II during the course of his examination. For example, in cases of patent infringements in International law in this field, the only things taken into consideration may be related to the validity of the patent and its infringement. The same principle would apply towards copyrights, industrial design and trademarks.

As has already been established by the Committee on the Peaceful Uses of Outer Space, the above infringement of such rights can only be dealt with as a private issue, considering Intellectual Rights deal with "property" and not "territory".

Thus, to promote transparency and accountability and to protect the rights of the owner seeking remedy for the infringement of his Intellectual property, it is mandatory for every nation to interpret the concept of Intellectual Property rights in Outer Space and incorporate it in a Domestic Space Act.

In principle, Article II of the Outer Space Treaty did not foresee the need for a domestic law in outer space. However, Article VIII of the same called for its immediate implementation.

Both the WIPO and the TRIPs Agreement acknowledge and harmonise national space laws in order to provide some sort of global unity in the area.

Domestic Space Laws and Intellectual Property Rights: World Perspective

Algeria, Argentina, Bangladesh, Belgium, Brazil, Canada, Chile, Colombia, France, Germany, Italy, Iran, Japan, Netherlands, Norway, Russia, Republic of Korea, South Africa, Spain, Sweden, Ukraine, United Kingdom and the United State of America all have domestic space laws governing their outer space activities. India, despite being one of the top 10 countries pioneering in space exploration, is only beginning to draft the National Space Act.

For the purpose of this study, it is important to compare India's legislative progress with respect to the space regime with few of the countries who have solid domestic space laws which give them greater autonomy as opposed to India.

United States of America

So far, United States remains the only country to have extended its jurisdiction to space when it comes to IP laws which can be found both in the NASA and the US Space Bill. International Law states that the personnel, jurisdiction and control of a space object is determined by its nationality which is the registering state. The same has been confirmed by the patent laws of the United States under the US Space Bill.

Chapter 2 of the NASA Act covers Intellectual Property and Data rights as well as Patent and Invention Rights. The only act that can hinder NASA from protecting such Intellectual Property is the Freedom of Information Act.

Section 105 of 35 U.S.C. (Inventions in outer space) reads as follows:
(a) "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 for the purposes of this title, except with respect to any space object or component thereof that is specifically identified and otherwise provided for by an international agreement to which the United States is a party, or with respect to any space object or component thereof that is carried on the registry of a foreign state in accordance with the Convention on Registration of Objects Launched into Outer Space."

(b) "Any invention made, used or sold in outer space on a space object or component thereof that is carried out on the registry of a foreign state in accordance with the

Convention on Registration of Objects Launched into Outer Space, shall be considered to be made, used or sold within the United States for the purposes of this title if specifically so agreed in an international agreement between the United States and the state of registry."

India, however, does not have an express statutory provision like the patent law of America which provides a quasi-territorial effect on its registry of space objects.

Russia

Russia's Federal Law on Space Activity of August 20, 1993 provides for legal regulation for space activities and stimulates the application of the potential of space science and industry for solving socio-economic, scientific, technical and defence task of Russian Federation.

Article 16 of the Federal Law[4] provides for Legal Protection of the Results of Intellectual Activity. It provides that: "the legal protection of the results of intellectual activity obtained in the development of the space hardware and of space technologies shall be granted in conformity with the Civil Code of the Russian Federation."

Thus, it provides that the resulting intellectual property right shall be granted with respect to Russia's domestic Civil Code.

Australia

The Space Activities Act, 1998 establishes a system for the regulation of space activities carried on either from Australia or by Australian nationals outside Australia. It implements Australia's obligations under the UN Space Treaties and other international space cooperation agreements.[5]

Article VII of the Act ensures protection of intellectual property rights relating to outer space and their regulation in accordance with the domestic as well as international law. Moreover, the Attachment to the Act provides exclusively for grant of intellectual property rights and defines the sphere of application to copyright and confidential information.

China

China attaches great importance to the importance of intellectual property laws in outer space since the adoption of the open door policy in 1978.[6] China is also the only Asian country which serves as the Headquarters for the single regional space organisation, the Asia-Pacific Space Cooperation Organisation (APSCO) which is based in Beijing.[7]

Apart from being a member to all international intellectual property rights treaties, China has also hosted a convention for APSCO and assisted member states in

[4]Article 16 of Law of the Russian Federation No. 5663-I of August 20, 1993.
[5]Section 3, Space Activities Act, 1998. Available at: https://www.comlaw.gov.au/Details/C2004C01013
[6]See "Outline of the National Intellectual Property Strategy" Intellectual Property Protection in China, accessed September 4, 2015. (http://www.chinaipr.gov.cn/policyarticle/policy/documents/200806/241260_1.html)
[7]*Yun Zhao* National Space Law in China: An Overview of the Current Situation.

technological advancement of space activities and space products. China's inclination towards an established domestic space law can be seen through one such convention wherein an article states that: "Intellectual property rights of those inventions, products, technical data or techniques as well as other intellectual properties resulting from any programmes and activities that are carried out by the Organisation or through use of the resources owned by the Organisation shall be owned by the Organisation."[8]

According to the China National Space Administration, China will soon be implementing its domestic space laws by the year 2020. Moreover, at the 2014 Workshop on Space Law, it was revealed that the country has already made policies and regulations in the administration of civil space launch, registration of space objects and reduction and prevention of space debris.[9]

The Indian Space Research Organization (ISRO), on the other hand, has just started the process of formulating a National Space Legislation to address the short-term and long-term needs in the areas of Space Transportation Systems, Satellite Communication & Navigation, Earth Observation, Space Sciences & Planetary Exploration and Space-based applications for governance and development.[10]

Since the legislation is at its inception, there is no news regarding how ISRO would deal with intellectual property rights related to outer space ventures. Hence, though India is signatory to many international conventions regarding outer space activities, there are no acute details pertaining to the space regime which every other domestic space legislation of other countries has.

Commercialization of Outer Space: India's Standpoint

The Indian government formed the ISRO in 1969 which replaced the first ever committee formed for outer space, the Indian National Committee for Space Research. Aryabhatta was the first ever satellite to have been built by ISRO which was launched by the Soviet Union. Five years later, after having launched its own satellite, Rohini, it concentrated on launching communication satellites into geostationary and polar orbits. Subsequently, the Polar Satellite Launch Vehicle and the Geostationary Satellite Launch Vehicle were developed.

India's first mission to the moon, christened Chandrayaan-I, was a product of an international cooperation considering its contributories were India, USA, UK, Germany, Sweden and Bulgaria. These countries aided India's mission by helping it build the 11 scientific instruments in the space craft which enabled photo-geologic mapping, mineralogical and chemical mapping of the moon.

On 5th November 2013, India joined the United States, Soviet Union and the UK as one of the frontrunners in Outer Space missions by becoming the first Asian country to have launched a Mars Obiter successfully. "Mangalyaan" successfully entered the

[8]APSCO Convention, Article 22.
[9]Quoted.*XuDhaze*, Administrator of CNSA
[10]NRInews24x7.com (2015). ISRO has initiated a process of formulating a National Space Act for regulating space activities in India. NRInews24x7. Available at: http://nrinews24x7.com/isro-has-initiated-a-process-of-formulating-a-national-space-act-for-regulating-space-activities-in-india/ [Accessed 4 Sep. 2015].

Mars orbit in September 2014, making India the first country to have succeeded its first attempt.

The mars mission served as a great boost for further ISRO projects which have now been fuelled by inspiration. Upcoming projects include new-generation Earth Observation Satellites, Multimedia Broadcasting Satellites etc. ISRO is also collaborating with NASA for a joint project named, "NISAR" (NASA-ISRO Synthetic Aperture Radar) to be used for remote sensing. It is also set to be the first dual band radar imaging satellite.

Space Entrepreneurship in India:

With the boom of start-up culture in India, there are new businesses in every possible corner of the country. Ranging from e-commerce to space activities, budding entrepreneurs are making use of every opportunity to establish themselves in the start-up world. ISRO is the best example of an Indian start-up going global.

Many companies in India are trying to replicate the efforts of SpaceX and Virgin Galactic. These two big names in the outer space commercial industry started with manufacturing and launching satellites into outer space, and now they are putting in tremendous efforts to make space tourism a reality. These companies are extremely close to achieving that goal and have completed many successful "test flights". Virgin Galactic, world's first commercial Spaceline, has already invited application for pre-booking seats on its SpaceShipTwo and the prices go as high as $250,000.

Drawing inspiration from the same, Indian start-ups have begun manufacturing satellites and launch vehicles which are cost-effective and employ reusable technology. Some of the notable outer space start-ups from India are:

1. Dhruva Space: Dhruva Space is a Bangalore based new space company currently developing an indigenous small satellite platform with a primary focus on assembly, integration, testing and operation of satellites.
2. Team INDUS: It is an Indian team which intends to send a Lunar Rover to the moon and is currently being funded by Axiom Research Labs.
3. Earth2Orbit: E2O is leading India's foray into the global space marketplace which will help the country emerge as a global space player.
4. Aniara Space: With offices in Bangalore and Washington, it develops communications satellites for broadcasters, system integrators and governments.

India's space age looks promising with numerous privately funded companies emerging into the global marketplace. However, with new innovation comes the need for a legislation which would ensure the protection of their economic rights. Private ventures that develop cost-effective satellites, launch vehicles and frugal space crafts are seeking support that can help spur innovation and public-private partnerships which can in turn help reduce imports.

Need for a Domestic Space Legislation: Issues and Recommendations

In this paper, a special focus has been given to privatization and commercialization of space activities as home-grown innovation is the need of the hour. Instead of importing technology from Russia or the United States, India is fully capable of single-handedly venturing into the commercial space regime given it provides proper protection to the inventors which would encourage innovation.

For the purpose of this study, we requested the co-founder of Dhruva Space, Mr. Narayan Prasad, to give his views on privatization and commercialization of outer space activities and the need for space legislation in the country. Mr. Prasad was also a panellist at the Round Table Conference on the 'Commercialisation and Privatisation of Outer Space: Issues for National Space Legislation' organized by National Law School, Bangalore in association with TMT Law Practice where he highlighted the potential of private sector participation, responsibilities of state for private space activities, monitoring of space activities, liability for damages, insurance coverage and key elements for a space legislation, among other issues.[11]

On being questioned as to which areas of intellectual property rights have a direct bearing on his business, he stated that Trade Secrets are crucial to activities pertaining to outer space especially in his start-up which employs cost effective methods. With the lack of a legislation dedicated to trade secrets in India, ISRO could incorporate protection of sensitive information related to outer space in its National Space Act.

An obvious concern for the government is national security when it comes to sharing sensitive information such as satellite imagery with private players. For example, in China, the government controls the communication of the entire country. The same concern in India should be resolved by embracing open sky and open door policies following the examples set by USA, China and EU. Mr. Prasad firmly believes that privatisation is the only means of introducing competition, therefore reducing costs for consumers. The same method was undertaken by the Telecom Sector and so far its success has been commendable.

There are several key changes suggested to the current administrators of the space program. They include the commercialization of the launch systems given the strong track record of the Polar Satellite Launch Vehicle (PSLV), scaling of downstream services in geographical information systems (GIS), and development of an industry ecosystem for the development of turnkey solutions in space, among others.[12] Agreeing with Mr. Prasad, we firmly believe that even though the Outer Space Treaty does mandate government oversight of governmental as well as non-governmental operations in outer space, a domestic space act would resolve all the related issues and give exhaustive guidelines to private entities venturing into the space regime. Public-private partnerships, development of Special Economic Zones (SEZs) for the outer space industry and involving small and medium enterprises in the development programs is also recommended. Dhruva Space innovates and reuses launch vehicles to minimize costs and maximize gains. They manufacture micro-satellites at one-third the cost their foreign counterparts and continuously introduce innovation to their products and processes. Patenting their technologies under a domestic space legislation or classifying the information involved as a trade secret under the same would attract funding from investors and also ensure stronger protection from infringement of their intellectual property rights.

Commercialization of outer space has resulted in buying and selling of space assets. With that comes the issue of licensing and transfer of license pertaining to space

[11]Economic Times, "Why a one small step in Bengaluru could be one giant leap for creation of a national space law", July 21, 2015 Available at: http://articles.economictimes.indiatimes.com/2015-07-21/news/64683057_1_dhruva-space-berlin-space-technologies-space-sector[Accessed 29 Aug. 2015].
[12]Thespacereview.com, (2015). The Space Review: Renewing India's space vision: a necessity or luxury?. [online] Available at: http://www.thespacereview.com/article/2742/1 [Accessed 5 Sep. 2015].

assets. The international conventions and treaties do not provide for terms of license, transfer or registration of space products such as launch vehicles, nano satellites, spacecrafts etc. There should be a proper framework regarding transfer and license terms which is unambiguous and exhaustive.

The Round Table Conference on the Commercialisation and Privatisation of Outer Space also highlighted need for a specialized national space legislation by highlighting the issues faced by private start-ups in this business. In the conference, AmitavaChakraborty of TMT Law Practice remarked that the number of patents filed by India under remote sensing, satellite technology and earth observation areas is very low and that its global research and development sharing is rapidly declining.[13] The entrepreneurs feel hampered by the lack of a regulatory framework which could protect their intellectual property rights and in turn safeguard their economic rights. India as a country would lose out on profitable ventures which could turn its GDP around, if a proper charter for private as well as government entities in the outer space sector is not established soon enough.

Conclusion

ISRO, despite being a late entrant in the age of Space exploration, has managed to put itself in the elite club privy only to 3 other nations which have successfully reached the Mars Orbit.Not only did ISRO succeed in its first attempt with the Mangalyaan, it also executed the same in a highly cost effective manner. The overall cost for the mission was roughly around 67 million dollars making it the cheapest mission to mars in the world. Prime MinisterMr.Modi equated the ride to Mars to an auto ride as cheap as Rs. 7/Km.[14]

Commercial space ventures employ cutting edge technology with state of the art innovations which call for exorbitant amount of funding and investment. The Indian government has already been criticized for overlooking social problems such as poverty and hunger, and instead allocating much-needed funds towards outer space activities to be at par with developed nations. This calls for privatization or public-private partnerships which can be possibly regulated under a domestic space act. With the advent of venture capitalism in space entrepreneurship, the government can effectively channel its resources towards the so-called neglected areas.

Private parties need assurance in the form of a regulatory framework promising effective protection in the field of intellectual property rights such as patents, copyrights, trademarks, industrial designs as well as trade secrets. Although our country has existing intellectual property laws, dedicating provisions to intellectual property rights under the National Space Act would enable transparency, accountability to the right holders and better enforcement of their rights.

Domestic space legislation would certainly prove to be a flexible and dynamic platform which would give more authority to the State and encourage participation of

[13]Newspaceindia.com, (2015).*Excerpts of the 'Round Table Conference on Issues for National Space Legislation'* | Views of Space 2.0 India. [online] Available at: http://www.newspaceindia.com/excerpts-of-round-table-conference-on-issues-for-national-space-legislation [Accessed 3 Sep. 2015].
[14]The Times of India, (2015).*India's Mangalyaan ride cheaper than auto*, cost Rs 7 a km: Modi - The Times of India. [online] Available at: http://timesofindia.indiatimes.com/india/Indias-Mangalyaan-ride-cheaper-than-auto-cost-Rs-7-a-km-Modi/articleshow/43779945.cms [Accessed 4 Sep. 2015].

space entrepreneurs as well as enable the Indian private sector exploration and use of celestial resources.

Prime Minister Modi's 'Make in India' campaign has the potential to take space entrepreneurship to a whole different level. Healthy competition, transparency, accountability and flexibility amongst state participants have the potential to put India ahead of other countries in privatization and commercialization of space.

As Mr. Narayan Prasad said, "Trust, opportunity, transparency and encouragement are key to bringing about systemic changed within the space ecosystem". India's future lies in the hands of young entrepreneurs who need to be encouraged to ideate, innovate and bring about a superb change in the space industry nationally as well as globally.Protecting their economic interests in the form of intellectual property rights is the only way to ensure India's superiority in the global space race.

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