Interstellar Governance: Legislation for Space Commercialization and Extra-terrestrial Ventures across India and Beyond

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Abstract: *We humans have been transcending the confines of what we think and pursue, the world since time immemorial has seen the creation of great inventions. The journey of exploration has extended outside earthly bounds. Outer space has been a subject of curiosity for major powers of the world, missions have been sent to space by these powers to secure dominance over interstellar activities. Looking at these developments, the international treaties, rules and statutes have been framed, and regulated by organisations such as the United Nations. The present scenario indicates a strong need for laws pertaining to space, especially in the wake of hyperactive commercialisation taking place in domestic and international spheres.*

The purpose of this article is to explain the way in which a necessity of elaborated space legislation is required, and how these laws can be incorporated in the Indian context, given the prevalence of the privatisation process being carried on in the Indian space industry. The authors herein suggest the presence of uniform legislation with regard to these endeavours, India possessing one of the largest space agencies of the world requires a robust framework to enhance and govern the role of corporate and private entities by virtue of amending and updating the present statutory mechanism.

Keywords - Space Industry, International Treaties, Space Laws, Commercialisation, Framework, Legislations, Statutory Mechanism

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I. INTRODUCTION

Law in its definition indicates a model of conduct for human beings in accordance with the accepted social construct. Laws are constructed to imbibe a structured way of dealing with resources, practices, and processes and imbibing the social values of justice and answerability in the human population. Regulations and statutes related to Interstellar activities carry a similar motive. Space Laws, as the term suggests are national and international regulations and treaties which are designed to regulate and govern various aspects of our activities regarding outer space. This includes addressing the evolution and power of the technology developed and designed to empower our research of outer space. Space laws also facilitate the process of dispute settlements over the contradictory views over the policies on research and utilisation of outer space by different nations and organisations. Space Laws were developed over the

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course of an increased interest of various institutions in the exploration of outer space. They have been utilised as a regulatory mechanism to govern the extent of exploration and utilisation of outer space by nations. Space Laws are a rather contemporary aspect of Law and have not been concretely defined. The United Nations Office for Outer Space Affairs defined Space laws as: *'body of law applicable to and governing space-related activities'.*

Outer space has always been a keen area of interest and exploration for human beings since the coming of technology into their hands. This keen interest in exploration went from the scope of science being interested in the contents of outer space to further development of this curiosity which led to the start of the commercialisation of space. The beginning of commercialisation of space began with the advancement of satellite technology and the coming of telephone and television technology. In the initial days, this technology consumed most of the usage of outer space. However, as research flourished, it was discovered that satellite technology had much wider uses than radio and television only. The usage of this technology was further expanded and the sciences of Global Positioning, Remote Sensing, and Geographical Information Systems came into the picture. These technologies have reached far ahead in recent times and have been utilised for the assessment of weather and climate patterns across continents, mapping and location services such as Google Maps. Satellite technology has also been utilised for military purposes by nations through the launching of nation-specific satellites into space. This has proven beneficial for security and travel purposes. This information has also been utilised for education purposes.

The outer space has no longer been just a horizon for science to expand to, it has actually become a whole new business and commercial ecosystem. This shows through the heightened interests of a lot of nations in the global reach into the utilisation of outer space for their individual purposes. Due to these advancements in research and achievements of nations in the area of space, various nations came up with legislations and legal frameworks in the form of Space Policies. Space Policies may be defined as the administrative and legal framework constructed to specify a nation's interest, strategy and goals regarding outer space and related activities. However, in recent times there has been the observation of an increased interest of private for-profit organisations into activities related to outer space. Private organisations have taken on many projects related to research and development to further the horizons in the area of outer space and have been supported by the governments of nations. Since these organisations have a much faster pace of working, they are outperforming governmental

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organisations. This is therefore making a much clearer way for the growing privatisation of the outer space business diaspora.

Space Research and development has picked up its pace in India over the last decade as well. India has achieved a lot in the area of Space, some shining examples of this being the success of the Chandrayan-3 lunar landing on the southern hemisphere of the moon in August 2023. Since then, India has come into the limelight as a potential dominating nation in terms of the outer space diaspora. India has also announced the Chandrayan-4 mission which aims to land on the far side of the moon and bring back lunar samples. These are a part of India's Space Vision 2047, which is a celebration of a century to India's independence from British rule. These achievements have been substantial in itself. However, India still lacks the part of commercialisation and privatisation of outer space since a considerable part of India's space activities are government-controlled and private organisations are yet to set foot into this field fully.

II. EVOLUTION OF THE INTERSTELLAR CAPACITY OF THE WORLD

Human Beings have had a long history of exploration and curiosity for outer space. The Extra-terrestrial has been a part of history, considering its importance in the faith and legends of religions and cultures all across the globe. The exploration of the extra-terrestrial bounds was in fact mentioned in French and British Literature across the 17th and 18th centuries. One of the first scholars to lay down practical principles of spaceflight was Russian mathematician Konstantin Tsiolkovsky. In his article 'Exploration of Cosmic Space by Means of Reaction Devices' in 1903, Tsiolkovsky laid down the principles of Spaceflight.[2] His work had a great impact on space research in Russia and Europe. Other research pioneers in the field include Goddard, who worked as a physics professor at Clark University, Massachusetts and gave the world the gift of liquid-filled rockets. These achievements by previous scholars were further enhanced when Hermann Oberth put a practical pinpoint on the principles and theories discussed and, in his book, "The Rocket into Interplanetary Space" explained the mathematical theory of rocketry and made the suggestion of using the same in the construction of actual space stations to facilitate the launching of space devices into the outer space. His work was

[2] Konstantin Tsiolkovsky, Exploration of Cosmic Space by Means of Reaction Devices, *Britannica;* https://www.britannica.com/science/space-exploration/History-of-space-exploration.html (Last Visited April 7, 2024)

considered very crucial in space development in Germany as it motivated the creation of Space clubs, one of them being the VfR: Society for Space Travel. The topic of the initiation of Space Launches is often related to the launch of Sputnik. However, when it is intricately analysed, the initiation of successful space launches started with the successful launch of the V-2 Ballistic Missile by Nazi space scientists in 1942. This was seen as a huge military development since V-2 was launched during the time of World War II and was aimed to be used as a weapon in Western Europe.

The success of V-2 captured the eyes of the two power blocs which emerged by the end of World War II, the USA and the USSR. Both the blocs saw the control of Space launch abilities as a medium of power. This was particularly exaggerated due to the ongoing cold war between the two blocs. Both countries initiated full-fledged efforts into outer space research. Joseph Stalin has taken a keen interest in this matter and appointed Dr Sergei Korolev as the head of the space programme of the nation. Korolev was said to be obsessed with the concept of space exploration and travel. With this, the USSR successfully launched the world's first military satellite Sputnik on October 4th 1957. Sputnik marked a revolution in the world as it represented the USSR's strategy of indigenous technology for communication and military advancement. The USSR also made a significant achievement with Vostok I which was the first spaceflight programme. They launched the Vostok 3KA space capsule in April 1961 with cosmonaut Yuri Gagarin, who is considered the first human being to be launched in space.

The USSR's rapid pace of space exploration put the USA in a position of discomfort. The USA announced that they would be the first to land on the surface of the moon. In mid-1944, the USA launched Operation Paperclip through which they provided a new identity to 116 nazi scientists. They recruited Dr. Werner Von Braun through this operation gave him the position of Director, Marshall Space Flight Centre, NASA. Dr. Braun was the person behind the idea and the design of the V-2. They successfully designed and launched the world's first Intercontinental Ballistic Missile Atlas A and the Saturn V rocket which took Neil Armstrong, Aldrin and Collins to the moon in July 1969. Following the lines of the two power blocs, countries like France, Japan and China also took to the exploration of outer space. These countries launched satellites all through the late 20th century.

In recent times, the advancement of technology has led to countries furthering their horizons in the field of space research. The diaspora of space achievement has gone from sending

satellites for military and communication purposes to exploring resources on the moon and conducting research on the possibility of life sustenance on planets like Mars. The point of commercialisation and privatisation can be seen under the newly introduced concept of Space Tourism. This includes the idea of orbital and suborbital flights which was put forward in 2021 by Richard Branson and Jeff Bezos. This concept includes an aerospace vehicle which takes off like an aircraft from spaceports on the Earth, surges upwards like a rocket into outer space across the Kamran Line and then returns to the Earth landing back like an aircraft. This concept has been made possible due to the use of 5G Communication technology which has advanced in recent times.

A. International Regulating Bodies and Legal Policies

It is said that Progress can never be made without Regulation. This comes true under a lot of lenses in the global scenario, particularly the lens pointing to Outer Space. Therefore, as a revolution of research and expertise grew in the field of outer space, so did the need to impose national and international regulations in order to protect their people and work. This also makes room for peaceful dispute resolution since access to outer space cannot be limited through boundaries. After the world war, when the two superpowers were racing against each other in the field of space research and achievements, it was felt that this may lead to yet another military confrontation within the blocs. None of the countries leaned towards this as the world was already suffering the immense impact of the World War. Therefore, there were peaceful negotiations which were mediated by the United Nations Organisation.

Thereafter, in November 1957, the USA and USSR agreed that Outer Space included the Moon and celestial bodies. According to the terms of UNGA Resolution 1148 (XII) dated 14th October 1957, it was agreed that activities for the research, exploration and use of outer space, including the Moon and celestial bodies would be undertaken for peaceful purposes. This negotiation interpretation of peaceful purpose was for non-aggressive purposes activities in outer space were made subject to international law, including the UN Charter. The UN Charter Article 2(4) protection ensured that neither would be subject to threats of terrestrial aggression and, should such an event happen, UN Charter Article 61 ensured that each retained the right

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of self-defence.[3] With the objective of enforcing Space legislations and regulations, two new institutions dedicated to outer space were established at the UN:

1. **UNOOSA: Office For Outer Space Affairs**

The United Nations Office for Outer Space Affairs (UNOOSA) works to promote international cooperation in the peaceful use and exploration of space and in the utilisation of space science and technology for sustainable economic and social development. The Office assists any United Nations Member States in establishing legal and regulatory frameworks to govern space activities and strengthens the capacity of developing countries to use space science technology and applications for development by helping to integrate space capabilities into national development programmes.

2. **UNCOPUOS: Committee on Peaceful Uses of Outer Space**

The Committee on the Peaceful Uses of Outer Space (COPUOS) was set up by the General Assembly in 1959 to govern the exploration and use of space for the benefit of all humanity: for peace, security and development. The Committee was tasked with reviewing international cooperation in peaceful uses of outer space, studying space-related activities that could be undertaken by the United Nations, encouraging space research programmes, and studying legal problems arising from the exploration of outer space. The Committee has two subsidiary bodies: The Scientific and Technical Subcommittee and the Legal Subcommittee, which were both established in 1961.[4] The setting up of the UNOOSA and the UNCOPUOS resulted in the formulation of five major treaties which have a huge impact on the global space laws to this day. These treaties are as follows:

i. **The Outer Space Treaty, 1967**

The Outer Space Treaty, 1967[5] holds a fundamental place in the Space Laws of the world. It embarks on the basic documents, policies and other legal documents which have been agreed

[3] Ranjana Kaul, *Legal Dimensions of commercialisation of space*, VIVEKANANDA INTERNATIONAL FOUNDATION, 9 (2023), https://www.vifindia.org/sites/default/files/Legal-Dimensions-of-Commercialisation-of-Space.pdf (Last Visited April 7, 2024)

[4] UNOOSA, *Committee for Peaceful Uses of Outer Space* , https://www.unoosa.org/oosa/en/ourwork/copuos/index.html (Last Visited April 7, 2024)

[5] The Outer Space Treaty, 1967; January 27, 1967; 61 I.L.M. 386; 610 UNTS 205.

upon by states through national and international negotiation. All the major powers of the world including Russia, the United States, China, the United Kingdom, France and Germany are parties to this treaty. It is in Article I of this treaty establishes that all activities related to outer space will be for peaceful purposes. A particular emphasis may be given to Articles VI, VII AND VIII of this treaty. Article VI establishes the principle of international responsibility of states for national space activities, whether such activities are carried out by governmental agencies or by non-governmental entities. Articles VII and VIII of the Outer Space Treaty contain rules on liability for damage and jurisdiction and control over space objects.

ii. The Rescue and Return Agreement, 1968

Article V of the Outer Space Treaty includes regulations regarding the assistance and help provided to astronauts in case of emergencies like dangerous activities, emergency landings and mental and physical distress. This article formed the basis for the Rescue and Return Agreement of 1968[6]. This agreement basically enlists the situations under which help should be provided to the astronaut by the state.

iii. The Liability Convention, 1972

This convention was based on Article VII of the Outer Space Treaty. This convention specifies the international liability of the launching state in case some damage is caused by the launched space object. The Liability Convention, 1972[7] puts forward the issues of the nature of the damage caused, the place where the damage was caused and the type of liability which resides over the launching state. This convention was put forward on the issue of the possible dangerous nature of space activities and objects which may inflict a certain degree of damage to another state.

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iv. The Registration Convention, 1975

The Registration Convention, 1975[8] is based on Article VIII of the Outer Space Treaty. This convention basically states that the States have to convey certain relevant information about

[6] The Rescue and Return Agreement, April 22, 1968 , 19 U.S.T. 7570, 672 U.N.T.S. 119, 7 I.L.M. 149

[7] The Liability Convention, March 29, 1972 , 24 U.S.T. 2389, 861 U.N.T.S. 187, 10 I.L.M. 965

[8]The Registration Convention, January 14, 1975, 28 U.S.T. 695, 1023 U.N.T.S. 15, 14 I.L.M. 43

the objects being launched into space by them as a way to ensure the safety levels of those objects. This also lowers the chances of any unwanted weapons being planted into orbit.

The Registration Convention establishes a double system of registration, either in a national registry or in the international register held by the U.N. Secretary-General. A key difference between the two is that, while the former is only accessible upon permission of the state of registry, the latter is publicly available to all states. This fact makes the international registry held by the U.N. Secretary General, a crucial source of information about man-made objects orbiting Earth.

v. The Moon Agreement, 1979

The Moon Agreement, 1979[9] is one of the most recent agreements. It establishes regulations regarding the exploration of the moon and the exploitation of its natural resources. This is essential since the moon has been the centre of space research since the beginning. This agreement lays special focus on the commercial exploitation of the resources of the moon.

B. Privatisation of Space

The human race and the world are on the path of utilising space beyond defence, security and military functioning, we have witnessed the creation of a commercialised space, wherein private entities are stepping into the space research and exploration industry, which erstwhile was a state's official government's domain. Building and maintaining satellites which primarily has been the responsibility of the government space agencies has observed a drastic shift to the private and commercial players taking the lead in offering these services to the official agencies across the globe. The hassle of establishing a network of satellite-based communication, and major earth, climatic and weather analysis is now taken over by commercial vendors and suppliers.

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The interest of the private players has led to an exponential increase in commercial activities. The leading privately funded space companies in this sector are Space Exploration Technologies Corporation (SpaceX), and Blue Origin LLC, Led by space barons Elon Musk and Jeff Bezos, these companies have popularised space in the private sector. They develop reusable boosters, launch civilians as well as commercial satellites into orbit, and deliver cargo

[9] The Moon Agreement, 1979; December 18, 1979, 1363 U.N.T.S. 22, 18 I.L.M. 1434

to low Earth orbit.[10] Overall commercial activity in space quadrupled in growth from $40 billion in 2005 to approximately $423 billion in 2020.[11]

The active involvement of the business giants has made us contemplate, whether would it be convenient to say that in the near future extraterrestrial activities would be monopolised by commercial space. The age of revolution has seen the development and evolution of how people travelled, starting from the use of domesticated animals to ships, and trains and at a later stage through aerospace. This rapid change suggests, "Is the idea of space travel and tourism a far-fetched idea?" "Or is it going to be the new reality?" Private space travel will commence, and missions to Mars and, the moon are not a fiction anymore, it is unhurriedly becoming a fact. The initiative of Space X in collaboration with NASA (National Aeronautics and Space Administration) has launched ventures, wherein it is sending its commercial astronauts to space. The Crew Dragon Spacecraft, funded by business tycoon Jared Isaacman, who also funded its first private spaceflight in 2021, will record history by making the first-ever commercial spacecraft excursion outside the spacecraft missions like Crew Dragon with Artemis II mission (manned mission to lunar surface).

Space X's Starlink, cooperation with NASA initiative by Blue Origin, Boeing, and Virgin Galactic marks the beginning of a new chapter of commercial space travel. For ages there has been enormous cross-border trade between the countries which made the world a "global village" for trade, the recent trend has demonstrated the conversion of space too into a trading arena, a marketplace where products can be marketed and sold with concepts like "space for earth economy." In 2019 95 % of the $366 billion in revenue earned in space was from this sector, the concept includes goods and services produced in space for use on Earth.[12] Revenue from commercial activities constitutes 78% of the total space economy, a consistent trend seen in previous years. The global space economy's continued robustness is attributed to $427.6 billion in revenue generated by commercial space ventures. Particularly noteworthy is the

[10] Bangkok bank Innohub, *Space Race 2.0: The Next Era of Commercial Space Ventures* (May 9, 2023) , BANGKOK BANK, available at: https://www.bangkokbankinnohub.com/the-next-era-of-commercial-space-ventures/(Last Visited April 7, 2024)

[11] Svetla Ben-Itzhak, *Companies are commercializing outer space. Do government programs still matter?* https://www.washingtonpost.com/politics/2022/01/11/companies-are-commercializing-outer-space-do-government-programs-still-matter/(Last Visited April 7, 2024)

[12] Matthew Weinzierl & Mehak Sarang, *The commercial space age is here,* (February 12, 2021), https://hbr.org/2021/02/the-commercial-space-age-is-here(Last Visited April 7, 2024)

growth observed in the communications sector, fuelled by increased demand for satellite broadband services. This segment saw its revenue rise to $28 billion, marking a 17% increase from the $24 billion recorded in 2021. Furthermore, there was a significant uptick in satellite manufacturing for commercial purposes, with a 35% increase in satellites launched into orbit from 2021 to 2022.[13]

The sector entails global observation, satellites, internet and telecommunications structures. The private partnerships have seen tremendous growth in space activities, numerous companies are entering into contracts with international space agencies for fulfil the needs of these space agencies, Made In Space's $74 million contract for 3-D print metal beams for use on NASA's spacecraft, Maxian technologies' $142 million contract for tools to be used in low earth orbit spacecraft, space tourism programmes launched by Jeff Bezos, Elon Musk and others, which will fly through sovereign aerospace (governed under Chicago Convention, 1944), then into outer space (governed under Outer Space Treaty, 1967) which prohibits the application of sovereign will have a significant impact on the international space laws treaty regimes.[14]

We all are inhabitants of this data-driven world, which entails our personal details, preferences, shopping choices, favourite movies, and loved clothes, everything is stored and revolves around a network of businesses which advance with data for strong market hold with their marketing campaigns, online algorithms, luring the targeted customers to buy products and services provided by these companies. The circulation of data takes place through satellites encircling the orbit. According to Morgan Stanley "The global space industry is expected to generate revenue of $1.1 trillion or more in 2040 from the current $350 billion."[15] The system of satellites makes the web accessible to billions of people which is helping farmers, urban planners, and other professionals in improving and restructuring the existing infrastructure. PNT satellites (position, navigation, timing) render greater efficacy in maintaining farming

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[13] Space Foundation Editorial Team*, Space Foundation Releases The Space Report 2023 Q2, Showing Annual Growth of Global Space Economy to $546B* (July 25, 2023), SPACE FOUNDATION , https://www.spacefoundation.org/2023/07/25/the-space-report-2023-q2.html (Last Visited April 7, 2024)

[14]Ranjana Kaul, *Legal Dimensions of commercialisation of space*, VIVEKANANDA INTERNATIONAL FOUNDATION, 13 (2023), https://www.vifindia.org/sites/default/files/Legal-Dimensions-of-Commercialisation-of-Space.pdf (Last Visited April 7, 2024)

[15] Knowledge at Wharton Staff, *Why Big Business Is Making a Giant Leap into Space* (June 4, 2019), KNOWLEDGE AT WHARTON, https://knowledge.wharton.upenn.edu/article/commercial-space-economy.html (Last Visited April 7, 2024)

methods and techniques. "What does this entail?" In agriculture, the use of satellite imagery and remote sensing assists farmers in monitoring crop health, predicting yields, and refining irrigation and fertilisation methods. In the energy sector, satellite data aids in resource exploration, power grid monitoring, and enhancing energy production. In logistics, space data helps in tracking traffic patterns, optimising fleet operations, and improving overall efficiency. As novel business models emerge and space data utilisation expands, it will reshape global commerce and trade, propelling the space sector beyond exploration towards unlocking the full potential of data and value-added content. Companies must grasp these insights today to develop their space data strategies for the future. PNT systems, encompassing GNSS like GPS, support various applications in aviation, transportation, logistics, and infrastructure like cellular networks and energy grids. Based on findings from BIS Research, the global PNT technology market reached a valuation of $961.7 million in 2020 and is anticipated to achieve $8.3 billion by 2031, with a CAGR of 22.45%.[16] Project Kupier of Amazon, one web satellite in partnership with Airbus is planning to launch thousands of satellites into orbit, envisioning to provide high-speed broadband data to every community and nation, this constellation of super advanced technology would bolster the space industry economy, as Anoop Menon says "This data-driven aspect when coupled with the rest of the space industry ecosystem could make it more robust."[17]

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2. Considering modern developments while updating the legal framework

The rules and treaties set by the United Nations do not deal with the contemporary issues of space tourism, space mining, and construction activities in ISS (International Space Station), Therefore there is no dedicated set of space laws for these endeavours, and this arises a need of legislations and legal framework for the corporate drivers outgoing into space. The hyperactive space race led by private companies shall be governed by the involvement of nations and international organisations. Ownership in outer space shall be a task of collective partnership of different nations and international bodies which can create a regulatory framework for ownership in outer space, laws and enactments pertaining to this shall be

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[16] *Latest Developments in the PNT Technology Applications across the* Globe (Sept. 7, 2022), BIS RESEARCH, available at https://bisresearch.com/news/latest-developments-in-the-pnt-technology-applications-across-the-globe. (Last Visited April 7, 2024)

[17] Knowledge at Wharton Staff, The Business Case for Space (June 26, 2019), BRINK, https://www.brinknews.com/the-business-case-for-space/. (Last Visited April 7, 2024)

formulated after a negotiation by the majority of nations, which will create a path for a peaceful and efficient space exploration and commercialisation projects. Nations instead of emphasising their local laws incentivising their own domestic space commercialisation programmes shall also lay focus on the bigger picture, international space research and establishments, helping the governments to align their goals with those of other countries, preventing cross-border conflicts, enhancing their technological infrastructure, synchronising the policies and laws related to modern corporate plans of the space industry. The Outer Space Treaty, notably in Article II, emphasises the optimistic principle that 'outer space' is beyond the realm of national appropriation through claims of sovereignty, use, occupation, or any other means.

The expeditious commercialisation has made a scope of startups and relatively newer companies to pursue the mission of landing outside the earth with their modern, unique and unconventional targets and strategies, these startups require intense capital to fulfil their aspirations to enter into the space market since they are comparatively new in the game, their credibility and goodwill is less as compared to the already established giants, creditors needs to be assured that companies dreaming of going into the marketplace existing outside the bounds of the earth are provided certain safety nets in the form of standard authority, conventions, regulations for crediting, sourcing, insolvency etc. and there are agencies and bodies supervising the whole process. Large banks should be playing a role in pressing their needs for rules in governing the process involved in this industry. The World Economic Forum's Global Risks Report 2022 underscores the expanding and competitive landscape of commercial activities in outer space, driven by enterprises worldwide. With many of these entities achieving self-sufficiency in launch capabilities, distinct and functional multilateral agreements are imperative to regulate rights and obligations in outer space. These agreements should transcend voluntary norms, aiming for enforceable legal frameworks.[18]

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The evolution of humans, civilisations, geographical structures, and lifestyle, displays a very vital aspect of what outcomes evolution can produce, we all can take a guess, “Exploitation!” Whenever there are discoveries and inventions, the resources are drained out in excessive and exploitative ways, fossil fuels, petroleum, diesel, coal, and minerals, all reflect a living example

[18] Scott Atkins, *The commercialisation of outer space* (June, 2022), NORTON ROSE FULBRIGHT, https://www.nortonrosefulbright.com/en-in/knowledge/publications/102a426e/the-commercialisation-of-outer-space#:~:text.html. (Last Visited April 7, 2024)

of what over-utilisation of various resources is, the economy extending beyond our planet, which is the space for earth economy utilises the products found in space for their use on earth. The environmental concern of outer space must be taken into consideration by space regulatory bodies and nations to recognise the need for legislation and laws, highlighting the limits and boundaries within which the private players and official agencies should act. Enhanced regulation is imperative for safeguarding the environmental integrity of outer space. With an increasing number of actors utilising outer space, the necessity for comprehensive regulation becomes evident. Similar to airspace, the establishment of a regime for space traffic management is indispensable. Additionally, stakeholders in outer space activities must recognize that it is in their own commercial interest to establish regulations aimed at mitigating and remediating space debris. It represents the choice between fostering a more stable international development and legal order with promising economic prospects or risking the loss of outer space's commercial potential and its viability for future human endeavours. Thus, proactive measures must be taken to establish a robust regulatory framework that fosters responsible and sustainable practices in outer space utilisation.

Opening the gates for business has made this large growing sector a competition ground with companies, start-ups, tech firms, business tycoons and giants being the key players in the ring. This massive competition demands for regulatory and ethical structure to enforce the laws related to monopoly, antitrust, malpractices and other competition laws, pertaining to the interstellar jurisdiction. Globally, nations shall provide seamless resolution in matters involving disputes between private players with regard to activities carried on beyond the bounds of this planet, in conformity with international laws and treaties. One promising area for collaborative efforts, both in terms of norms-based approaches and formal international cooperation, lies in space situational awareness (SSA) and space traffic management (STM). Establishing new agreements regarding SSA and STM would enhance transparency regarding the activities of different space actors, mitigate concerns about the dual-use nature of technologies, improve the precision of on-orbit operations, and alleviate worries regarding the management of orbital debris. Moreover, there is a pressing need to implement improved traffic management practices and regulations to prevent incidents in space.[19]If approached with care

[19] Sophie Goguichvili *et. al., The Global Legal Landscape of Space: Who Writes the Rules on the Final Frontier? (October 1, 2021),* WILSON CENTER, https://www.wilsoncenter.org/article/global-legal-landscape-space-who-writes-rules-final%20oand,related%orbital%20debris%20management. (Last Visited April 7, 2024)

and foresight, the exploration and utilisation of space could yield unparalleled opportunities for economic growth and sustainable development.[20]

III. INDIA'S SPACE LEAP: EMBRACING COMMERCIALIZATION AND THE CALL FOR STRONGER SPACE POLICY

For centuries, countries have been in the race of trade, gaining power and dominance over the resources spread across the globe. In recent times, this race has extended its jurisdiction outside the confines of this planet and a new race has started in a ground called the 'outer space'. Developed nations are marching to gain their share in space, India which is one of the fastest growing nations of the world through its projects and programmes is progressing in the field of space research and exploration. Successful space missions have been conducted in the past, including *Chandrayaan* 1 and *Mangalyaan,* making India the first Asian nation to reach Martian orbit, India's first solar mission - Aditya L-1, G-SAT 24, ASAT missile test, *Chandrayaan* 3, and other upcoming missions such as Gangayaan-1, Human spaceflight to low- earth orbit, NISAR, in collaboration with NASA, Venus orbiter mission- *Shukrayaan* are the initiatives glorifying the country's stance as a leading player in space technology and demonstrating what India's potential to reach to the heights of space exploration and scientific discoveries. Recently, India created history by launching a record 104 satellites into earth's orbit on February 15, 2017.[21]

India stands as a potential player in the international space market with its effectiveness in launching satellites and rockets in optimal and cost-effective ways. The technological advancements which ISRO (Indian Space Research Organisation) has inculcated in its missions have brought astounding outcomes to India's space sector. The nation is transitioning towards establishing itself as a cost-effective hub for space launches, providing significant returns to its space sector, steering in an era of privatisation and commercialisation, it is expanding its capabilities in exploration and scientific research. It seeks to incentivise its proficiency in

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[20] U. Tejonmayam, *ISRO creates history, launches 104 satellites in one go* (Feb 15, 2017), THE TIMES OF INDIA,https://timesofindia.indiatimes.com/india/isro-sets-history-launches-104-satellites-in-one-go/articleshow/57159734.html (Last Visited April 7, 2024)

[21] *Ibid.*

making satellites and providing launch services through the drastically developed and tested polar satellite launch vehicle (PSLV) by ISRO.[22]

A. Government and its Arms: Charting the Course for Effective Governance

The space market is regulated and controlled by the government, there is centralisation of the industry with major funding and investments from the government directed and managed by the office of the Prime Minister (PMO). Discovering the prowess of establishing communication satellites by the live telecast of the Olympic Games, Tokyo, 1964, across the Pacific by Syncom-3, an American satellite, Dr. Vikram Sarabhai, also known as the father of the Indian space programme, realised the effectiveness of these satellites, with this the space research and scientific activities were initiated in India. From its inception, the Indian space program has been well coordinated, establishing two key operational systems, INSAT- Indian satellite for telecommunication, television, broadcasting and meteorological services, and IRS- Indian remote sensing satellite for monitoring natural resource and disaster management support.[23]

The key mechanisms regulating the space industry in India are ISRO, Antrix Corporation Limited (ACL) and other legislations pertaining to space laws and rules. Antrix, the commercial wing of ISRO acts as a party with whose permission, agreements and contracts are formed regarding the launching services, foreign entities and organisations are required to form an agreement with Antrix to acquire services of launching. Since its beginning in 1969, the ISRO has led the way in space exploration and satellite technology with an aggregate of 124 spacecrafts missions completed entailing 17 satellites engineered by private entities or students. ISRO has launched 432 foreign satellites till now.[24]

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B. Current Policies for Space Research and Development in India

[22]Vikas, *Space Programmes of India* (July 7, 2022), VIKASPEDIA, https://vikaspedia.in/education/childrens-corner/science-section/space-programmes-of-india.html (Last Visited April 7, 2024)

[23] Express Web Desk, *Indian Space Missions 2024: Full list of significant space missions by ISRO* (February 28,2024), THE INDIAN EXPRESS, https://indianexpress.com/article/trending/isro-india-space-missions-full-list-9183521.html (Last Visited April 7, 2024)

[24] Free Law, *The Need for Space Legislation in India* (28 October, 2022), FREE LAW, available at: https://www.freelaw.in/legalarticles/The-need-for-space-legislation-in-India.html (Last Visited April 7, 2024)

India has entered the space commercialisation sphere with a significant number of capabilities in the last decade, as of recent times it is being recognised as a potential power in the global scenario of space research. Therefore, owing to the growth of space exploration potential of India, the following space policies were put into place for regulation activities:

1. ISRO Act of 1969

Dr. Vikram Sarabhai is considered as the Founding Father of the Indian Space Programme. Confident in India's potential for space exploration, he convinced and sought a brilliant team of scientists, anthropologists and communicators to spearhead India's space research. After this, the Indian National Committee for Space Research (INCOSPAR) was set up in 1962 under the Department of Atomic Energy. This was subsequently replaced by the India Space Research Organisation (ISRO) in August 1969. The Government of India established the Department of Space (DOS) in June 1972 and ISRO was put under the DOS in September 1972.[25] The ISRO Act of 1969 serves as the comprehensive legal basis for the functioning of the Indian Space Research Organisation. It is the primary legal framework governing India's Space Programme.

The ISRO Act defines the objectives of ISRO, which include promoting the development and application of space science and technology for national development. It also outlines the powers and functions of ISRO, empowering the organisation to undertake research, development, and other related activities in the field of space technology.

2. SATCOM Policy, 1997

The use and exploration of space capacity of nations took significant raise when satellite technology was initiated for military, communication and entertainment purposes. India's satellite communication sector is primarily government controlled. The Satellite Communication Policy, 1997 was enacted to allow Indian and Foreign entities to lease the satellite capacity of INSAT and to move towards the privatisation of satellite communication.[26] While both foreign and domestic entities were allowed to give services in India, the use of

[25] Indian Space Research Organisation (ISRO), *Genesis,* https://www.isro.gov.in/genesis.html#:~:text=Subsequently%2C%20Indian%20Space%20Research%20Organisation.html (Last Visited April 7, 2024)

[26] Laxmikumaran and Sidharan Attorneys, *Satellite Communications Policy in India- Time to revisit and Revise* (July 23, 2014) https://www.lakshmisri.com/insights/articles/satellite-communications-policy-in-india-time-to-revisit-revise.html (Last Visited April 7, 2024)

domestic satellites was given preferential treatment. However, the scope of this policy was quite limited with respect to the kind of satellite systems permitted. This policy also fell short since it mandated the entities go through a lot of administrative authorities, making the process time consuming and complicated. This discouraged and restricted a lot of global companies from operating in India. The SATCOM Policy of 1997 was replaced by the SATCOM Policy of 2000.

3. SATCOM Policy, 2000

The government realised the insufficiencies of the SATCOM Policy 1997 and in November 2000, it came up with 'Norms' to implement the policy. These norms specified the scope of the policy while preference was still being given to Indian Satellites. The SATCOM Policy, to this day, is the only legal provision governing the functioning of the Satellite System in India. The policy outlines the principles for the establishment, operation, and regulation of satellite communication systems in India, ensuring efficient utilisation of the available spectrum and encouraging private sector participation.The norms provided that such "registered Indian companies" having foreign investment "not exceeding 74%" shall be permitted "to establish and operate satellite systems".[27]

4. Technology Transfer Policy of ISRO

The Indian Space sector has advanced to great lengths since its inception. The technology and knowledge regarding outer space are much more significant and accurate now. ISRO shares these know-how with other industries of the country through its resources so as to facilitate the development of the industrial sector of India through the multiplier method as they quote. The process of sharing this information is called Technology Transfer. Recognising the potential for the space programme to generate a multiplier effect in terms of returns to industry and economy at large, from long-term investments made, it was realised that "spin-off" or fall-out returns and their multiplier effect could be many times the direct returns from investment in mission-oriented high technology programmes such as space technology. In order to facilitate this technology transfer, ISRO created a public sector company called the New Space India Limited (NSIL) in 2019, whose major objective is to act as a link between ISRO and the industry and facilitate the transfer of technology from ISRO to other private companies.

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[27] *Ibid.*

5. Remote Data Sensing Policy

This policy provides that for operating a remote data sensing satellite from India, due permission and licensing from the concerned authority will be necessary, as a national commitment and as a "public good" The government assures a continuous/improving observing/imaging capability from its own Indian Remote Sensing Satellites (IRS) programme. This policy provides that the Government of India, through the nodal agency, will be the sole and exclusive owner of all data collected and received from the IRS.[28] All users will be provided with only a licence to use the said data and add value to the satellite data. Government reserves the right to impose control over imaging tasks and distribution of data from IRS or any other Indian remote sensing satellite when it feels the necessity of doing so owing to activities concerning national security or under its foreign policies. The National Remote Sensing Centre of the ISRO is vested with the powers of acquiring and disseminating data from both Indian and foreign satellites.

6. Geospatial Information Regulation Bill, 2016

The term Geospatial refers to the location and composition of a place or a geographical feature on or inside the surface of the earth. The Geospatial Information Bill seeks to regulate the acquisition, publishing and usage of geospatial information in India. This bill also regulated the depiction of geographical boundaries and features on the map of India, this bill also puts strict penalties in case of breach of any procedure established under the act. It was basically proposed to safeguard the information and sovereignty of the Indian subcontinent.

7. Indian Space Policy, 2023

The Indian Space sector has always been under the hold of government authorities, with little contribution from private enterprises due to the many restrictions imposed on their functioning. The Indian space policy of 2023 indicates the Indian Government's vision to give private enterprises certain freedoms over space research and technology, this policy has been put into place to encourage the process of privatisation of the space industry of India and allow private enterprises to carry out end-to-end activities, from developing technology to launching

[28]Indian Space Research Organisation, *National Remote Sensing Centre; Brief Note;* https://www.nrsc.gov.in/EOP_irsdata_Policy/page_1?language_content_entity=en#:~:text=As%20a%20national%20commitment%20and,data%20collected%2Freceived%20from%20IRS.html (Last Visited April 7, 2024)

satellites to operating space stations. The privatisation of the Indian space industry has become a must now. The global space economy is currently valued at about USD 360 billion. Despite being one of a few spacefaring nations in the world, India accounts for only about 2% of the space economy.[29] The private players of the space industry such as SpaceX and Blue Originals have revolutionised the space industry. Therefore, the coming in of private players is bound to produce a positive impact on the Indian space industry as well. It is well known that the Constitution of India is the principal legal framework, giving legitimacy to the actions of the government and of other concerned authorities. This is applicable to the space industry as well. Hereby, the following constitutional provisions support the legal framework for the space industry:

ARTICLE 51: Promotion of International Peace and Security[30]

The State shall endeavour to—

a) promote international peace and security

b) maintain just and honourable relations between nations

c) foster respect for international law and treaty obligations in the dealings of organised peoples with one another

d) encourage settlement of international disputes by arbitration

Article 51 provides for the state to honour international peace and create a national policy in coherence with international law in order to maintain cordial relations with global entities. The enactment of space laws in India is in accordance with international space treaties and for the peaceful research and experimentation of space technology where other nations are on the same page with respect to the risks and rewards related to the same.

ARTICLE 73: Extent of Executive Power of the Union[31]

Subject to the provisions of this Constitution, the executive power of the Union shall extend—

[29] *Indian Space Policy 2023: Provisions and Gaps* (May 12, 2023) *available at* https://www.drishtiias.com/daily-updates/daily-news-editorials/indian-space-policy-2023-provisions-and-gaps.html (Last Visited April 7, 2024)

[30] INDIA CONST. art. 53.

[31] INDIA CONST. art. 73.

a) to the matters with respect to which Parliament has the power to make laws; and

b) to the exercise of such rights, authority and jurisdiction as are exercisable by the Government of India by virtue of any treaty on agreement: Provided that the executive power referred to in sub-clause (a) shall not, save as expressly provided in this Constitution or in any law made by Parliament, extend in any State to matters with respect to which the Legislature of the State has also power to make laws.

Until otherwise provided by Parliament, a State, and any officer or authority of a State may, notwithstanding anything in this article, continue to exercise in matters with respect to which Parliament has the power to make laws for that State such executive power or functions as the State or officer or authority thereof could exercise immediately before the commencement of this Constitution.

Article 73 grants the government the powers to make legislation by virtue of any treaty, which includes international space conventions and treaties, in parallel to which Indian Space laws have been constructed.

ARTICLE 253: Legislation for giving effect to international agreements[32]

Notwithstanding anything in the foregoing provisions of this Chapter, Parliament has the power to make any law for the whole or any part of the territory of India for implementing any treaty, agreement or convention with any other country or countries or any decision made at any international conference, association or other body.

Article 253 also talks about the Indian Government's power to implement and draft legislation in the country to implement a global convention or treaty. The Indian Government is doing so in the sphere of space laws, owing to the Outer Space Treaty and other authorising treaties to which the nation has consented.

C. Public- Private Innovation: Global Partnerships, Investments and Start Ups.

The Indian space industry has an enormous potential to accommodate private and commercial ventures, advancing the vision of space discoveries and related manoeuvres to the next step. Opening the doors for private companies, supervised by key government agencies, would take

[32] INDIA CONST. art. 253.

forward the development of the space programme and boost India's dominance over the category. The economic influence of this goal will bolster the nation's financial and economic growth prospects, and the large Indian market will attract huge foreign investments taking a leap in competition with major international organisations and entities. Global collaboration has invariably made a robust position for entering into major bilateral agreements which have facilitated exponential trajectories for the countries getting into such partnerships. In India, the government has sole control over the space sector. In a notable development encouraging India's 'Make in India' initiative, ISRO has recently delegated satellite production to the private sector for the first time, moreover, a contract was made last year with an Indian start-up for launching a satellite bound for the moon. These initiatives signal towards establishment of a private space industry, fostering enhanced collaborations and innovations. A clear framework is essential for seamless coordination among stakeholders, mitigating conflicts and ensuring accountability in case of incidents.[33]

Recent progress reports display a collaboration, the Indian- European partnership, both India and Europe have a huge potential for collaboration. India's GSAT 31 was launched by a French facility, Ariane, similarly, Spot 6 and Spot 7 satellites of France were launched on Indian PSLV. National governments, besides accommodating government-government partnerships shall pave the way for the interaction of commercial entities playing a role in manufacturing earth observation and communication satellites, defence security, navigation, remote sensing and monitoring systems, which would create a room for an increasing number of public-private collaborations. The era of private investments and global partnerships has pronounced the entry of entrepreneurial ventures, and the start-up culture has penetrated the burgeoning space sector. The Indian start-up landscape has reflected astounding figures. According to Union Minister Dr. Jintender Singh, the number of space startups has surged from just one in 2014 to 189 in 2023, as per the DPIIT Startup India portal, Dr. Singh also noted that investments in Indian start space startups reached $124.7 million in 2023. Dr. Singh emphasised that the current Indian space economy is valued at around $8.4 billion, comprising 2.3% of the global space economy with the implementation of the Indian Space Policy 2023; projected that the Indian space economy could reach $44 billion by 2033; the pivotal role of the private sector in

[33] Monica Shaurya Gohil, *Need for Comprehensive and Robust Indian Space Laws*, ILI LAW REVIEW, 63 (2021)

achieving the goal, and foreseeing their involvement in satellite manufacturing service provision and ground system manufacturing.

The enhancement of space-related education and activities begins at the grass root level to educate students and budding scientists. A national committee IN-SPACE (Indian National Space Promotion and Authorisation Centre) is formed envisioning the promotion of space technology across educational institutes in India. IN-SPACE has signed 45 memorandum of understanding with NGE'S, these agreements aim to facilitate the development of space systems. The upcoming Indian National Space Promotion and Authorization Centre (IN-SPACE), expected to become operational within the next six months, is expected to play a pivotal role in the facilitation of private sector engagement within the Indian space sector. Tasked with evaluating the diverse needs and demands of private entities, including educational institutions and research centres, IN-SPACE will collaborate with ISRO to address these requirements effectively. This effort aims to ensure that private players have access to the necessary infrastructure, resources, and data essential for conducting various space-related activities.

D. Need to Draft Comprehensive Space Laws in India

Commercialisation of the extra-terrestrial pursuits indicated the beginning of a revolution highlighting missions and projects to space. The outer space would not just be a place for scientific exploration and research but a striding industry, showcasing growth and potential for a new market, increasing the technological and economical capabilities of the world. Current developments such as space tourism and commercial space flights extended by the private companies exemplify the aforementioned claim. The beginning of this commercial wave shall be supplemented with relevant legal and legislative frameworks governing these endeavours. India is short of the legal framework required for regulating, controlling and supervising the process of privatisation, there are only a few laws and acts which regulate the space-related endeavours in India, including the ISRO Act of 1969, National Remote Sensing Centre (NRSC) guidelines of 2011. More emphasis and focus shall be concentrated towards establishing relevant statutes and laws which need to be instilled. These laws are necessary to control the programs pursued by the advancing Indian space industry. Contracts, agreements, licensing, duties, taxation, insurances, dispute resolution, and authorisation shall be topics of discussion while framing the domestic laws. Opening up of new avenues for commercial players and

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opening decks of stringent control will promote these companies to set up their own manufacturing units, make communication satellites, catering to both national and international consumers, thus a uniform space legislation controlling these courses of action can be devised. Rules relating to any unforeseen mishappening should be taken into account while framing the laws so as to protect the consumers, environment and national security in case of any damage made while undertaking these pursuits.

Moreover, the intricacies surrounding the protection of intellectual property rights pose notable legal challenges despite India's advancements in the space, there remains a wide bridge in creating a robust framework to safeguard both domestic and external intellectual property rights, it is therefore imperative to amend and update the Indian Copyright Act of 1957 to reflect contemporary developments in the space sector while the Information Technology Act of 2000 offered some relief regarding the electronically transmitted information. The absence of a dedicated framework for the protection of data can leave the country vulnerable, thus urgent efforts are needed from the government to enact the Personal Data Protection Bill of 2019. [34]India, guided by Article 51 and Article 253 of its Constitution, should enact legislation to promote public-private partnerships and accelerate technological advancement while boosting domestic manufacturing. Furthermore, revisions to the Satellite Communication Policy of 1997 and the Remote Sensing Data Policy of 2011 are necessary to meet evolving challenges. However, caution is warranted to prevent excessive regulation, which could discourage investment and drive potential investors to jurisdictions with more favourable regulatory environments, such as Luxembourg, Japan, Canada, Dubai, Singapore, Russia, and the United States of America (USA).[35] The pressing need for drafting an efficient set of laws related to space and a rapid privatisation of the space market. Elaborate space policy is a sine qua non for uplifting India's dominance as an eminent space-faring nation capable of expanding its horizon for the development of space technology.

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IV. CONCLUSION

The diaspora of outer space has been a matter of curiosity for human beings since the beginning. This may have arisen from several cultures taking their legends and regulations

[34] Monica Shaurya Gohil, *NEED FOR COMPREHENSIVE AND ROBUST INDIAN SPACE LAWS*, ILI LAW REVIEW, 63 (2021).

[35] *Supra* note 25

from the constituents of outer space. The rise of technology played a considerable part in converting man's curiosity to knowledge through exploration, experimentation and innovation. The global stance over outer space is a constantly changing one, this started from the western world engaging in strengthening their potential and scientific capabilities to constructing a room for leading players participating in the race to space. The extra-terrestrial pursuits have witnessed inception of a revolution entailing an ever-increasing role of commercial players, public-private partnerships and global collaborations, similar to establishing any industry, a strong foundation has been laid in making of an industry, extending its jurisdiction outside earthly affairs. Whenever industrialisation and the creation of a market space are registered, there is an observance of private entities taking the lead. This marks the necessity of framing relevant laws, statutes and legislative frameworks to regulate practices carried on in the market. Drafting laws specific to space is the need of the hour, noting the rapid developments taking place including commercial space trips, space mining, communication satellites, and indicates the facilitation of these laws by international bodies and organisations.

India is one of the newer nations in the global space research scenario. Over the past two decades, it has picked up its pace around space achievements and has received global recognition in the environment of the space commercial sector. However, India's space sector needs a significant push to compete against the bigger players of the industry in terms of its share in the global space diaspora. The Indian Space sector is still majorly government-controlled and hence receives considerably lesser investments due to limited interest from the global private players, this arises the need for proper balance between private and public players of the country in order to bring an equilibrium in economic, commercial and administrative competence with respect to the global counterparts.

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