COMMENTS

COMMERCIAL HUMAN SPACEFLIGHTS: LEGAL CHALLENGES FOR INTERNATIONAL REGULATION

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Commercial Human Spaceflight – a new addition to the commercial activities in outer space – is attracting the ultra-rich section of the society. It has enormous potential to accelerate the economic aspect of commercial spaceflight since with the development of reusable technologies it is expected to become cheaper. At the same time, it poses a severe threat in various ways to the status quo of the existing regime of space regulation. Taking humans to outer space as a passenger affects the current social, psychological, political, and legal setup. The paper highlights the legal issues that are arising from commercial human spaceflights. Therefore, in section one, the article discusses applicable international law to this emerging activities. Part two details specifically on the international space law that is relevant to regulate these activities. After analyzing the existing international law on space activities in sections one and two, which are essential for the commercial human spaceflights, part three identifies several legal challenges that are not sufficiently addressed by the existing laws. Section four examines the role played by the regulatory organization to develop the space law, and the role of the International Civil Aviation Organisation (ICAO) has been discussed in detail. As the ICAO holds good

experience in handling air transportation, many believe that the ICAO is naturally well placed to regulate commercial space transportation. This aspect has been elaborated in detail in this part. In the fifth, i.e. the last section, the authors conclude by arguing to develop a new international convention to regulate it.

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Introduction

Since ages, Moon, stars, and other celestial bodies have been a matter of great attraction for humans. The human access and reach to outer space – the final frontier (as it is called) took long times of human efforts.[1] Since the first venture to the outer space with the launch of the sputnik satellite in 1957, there have been significant changes in outer space activities, including space resources' commercial use.[2] The Commercial Human Spaceflight (hereinafter "CHS") is a new avenue of human activities in outer space that includes public, private, or public and private ventures to carry humans to space. The CHS is the transportation of "persons to, from, or through outer space for compensation."[3] It is different from other forms of carrying humans to space as it involves the commercial nature of transportation.[4] Due to the absence of definition under international law, a workable definition could be derived by examining the common usage of the term "commercial," "human," "space," and "flight."[5] The CHS is conducted for diverse areas of human activities such as exploration, entertainment, transportation, or extraterritorial resource acquisition in outer space.[6]

With the increasing economic relevance, the commercial activities in outer space have significantly expanded. These commercial activities are no longer a field of states' monopoly – private entities and individuals are showing significant interests and have/is actively participating in outer space activities.[7] Private participation in those activities has paved the way for diverse activities in outer space. From satellite launch to space mining to space tourism – private initiatives have become the center-stage. For commercially carrying humans to space, apart from state agencies, private

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1 Andrew D. Watson & William G. Schmidt, *Legal Issues Surrounding the International Space Station*, 7 U.S. A.F. Acad. J. Legal Stud. 159 (1997).

2 Marina Lits et al., *International Space Law*, 6(2) BRICS L.J. 135, 137 (2017).

3 Michael C. Mineiro, *Assessing the Risks: Tort Liability and Risk Management in the Event of a Commercial Human Space Flight Vehicle Accident*, 74(2) J. Air L. & Com. 371 (2009).

4 *Id.* at 372.

5 For details on the definition of the CHS, *see Id.* at 372–373.

6 Sara M. Langston, *Reimagining Icarus: Ethics, Law and Policy Considerations for Commercial Human Spaceflight*, IntechOpen (2018), at 1 (Aug. 8, 2021), available at https://commons.erau.edu/cgi/viewcontent.cgi?article=2324&context=publication.

7 *Routledge Handbook of Space Law* 321 (Ram S. Jakhu & Paul S. Dempsey eds., 2016).

companies such as Virgin Group, SpaceX, Blue Origin, Orion Span, and Boeing has made a significant investment for the human-crewed missions.

Thus these CHS, in terms of its conducting body/ies, could be of two kinds: public manned spaceflights and private manned spaceflights.[8] Public manned spaceflights are predominantly a state or group of states' activities of carrying a human to space. The best example of such activity is the creation of the International Space Station (ISS). The ISS partners have developed *sui generis* systems to regulate the ISS activities, namely the Intergovernmental Agreement (IGA) 1998. The IGA provides the provision for a Memorandum of Understanding (MoU) concluded between the Cooperating Agencies of the State parties for the ISS projects. At the third level, all further implementing arrangements between the same entities form part of the ISS regulatory framework. After that, contracts and subcontracts could be entered to involve private entities. These contracts mostly include the commercial use of the ISS.[9]

Private manned spaceflights, often known as "space tourism," have a broader attraction from the people interested in an adventure the outer space. Unlike public space activities, such private space activities mainly involve a person of different legal, i.e. "non-governmental" – persons or entities not formally part of the state's official bodies. Therefore, they act with the motive of personal profits. Thus, the use of "space tourism" as a legal term should be carefully used. Unlike in the case of aircraft, there is a difference between the "tourists" passengers and "business" passengers on the board of spacecraft – as there are legal constraints in the case of manned spacecraft/commercial human spaceflight. Therefore, the "private manned spaceflight" means flights of humans intended to enter outer space (a) at their own expense or that of another private person or private entity, (b) conducted by private entities, or (c) both.[10] Therefore, in this paper, considering the possibility of carrying passengers by both the public or private entities, the authors have used the term "Commercial Human Spaceflights (CHS)."[11]

With the emerging trends of commercial human spaceflights due to technological advancement, space has become an attractive tourist destination for ultra-rich adventurous individuals. In the coming time, the cost of space tourism is supposed to reduce due to the development of reusable launch vehicles (RLVs). Data from different sources estimate that humans' access and presence in outer space will rise in the coming decades.[12] The traversing commercial human spaceflight areas can be

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8 *Handbook of Space Law* (Frans G. von der Dunk & Fabio Tronchetti eds., 2015).

9 *Id.*

10 *Id.*

11 *See* for details, Frans G. von der Dunk, *Space Tourism, Private Spaceflight, and the Law: Key Aspects*, 27(3) Space Pol'y 146 (2011).

12 OECD, The Space Economy at a Glance (2011) (Aug. 8, 2021), available at https://www.oecd-ilibrary.org/docserver/9789264111790-en.pdf?expires=1562135698&id=id&accname=guest&checksum=819174

broadly categorized into three categories based on their flying zones: sub-orbital, orbital, and point-to-point.[13] This new aspect of "commercial space" has raised various legal concerns that need to be addressed to smooth it. However, the existing legal regime does not address the new phenomena of CHS.

Consequently, states have started to enact national space legislation to involve the private entities in launches and operations of space objects/crafts.[14] Yet there are limited countries that have mentioned about human spaceflights specifically.[15] In this connection, it is necessary to explore the viability of applying existing international law in general and outer space law in particular to the CHS.

1. Applicability of International Law

Outer space is comparatively a new area of regulation that has emerged within the structure of international law.[16] It has taken the shape of a branch of general international law where international treaties and customs are part of its sources.[17] International Space Law (hereinafter "space law") is a branch of public international law that combines customs and treaties that govern the international community's interactions.[18] The general principles of Public International Law also apply to space law.[19] The 1957s' entry – clearly of an international character – raised the concern for developing an "effective, fair, and transparent legal regime" at the international level.[20] Legal studies existed on

0A51BAF7FFBE2EF4E68A9 BA13C; TAURI Group, Suborbital Reusable Vehicles: A 10-Years Forecast of Market Demand (2012) (Aug. 8, 2021), available at https://space.nss.org/media/Suborbital-Reusable-Vehicles-A-10-Year-Forecast-of-Market-Demand.pdf; Federal Aviation Administration, The Annual Compendium of Commercial Space Transportation: 2018 (January 2018) (Aug. 8, 2021), available at https://www.faa.gov/about/office_org/headquarters_offices/ast/media/2018_ast_compendium.pdf; Forecasting Future NASA Demand in Low-Earth Orbit: Revision Two – Quantifying Demand (June 2019) (Aug. 8, 2021), available at https://www.nasa.gov/sites/default/files/atoms/files/forecasting_future_nasa_demand_in_low-earth_orbit_revision_two_-_quantifying_demand.pdf.

13 Derek Webber, *Space Tourism: Its History, Future, and Importance*, 92(2) Acta Astronautica 138 (2013). There are authors and commentators who favors for ICAO's role in the sub-orbital and point-to-point travel and transport. However, the present paper argues for separate regime for the CHS irrespective of their areas/zone of operation.

14 Dunk 2011.

15 The United State is the first country to specifically refer the "space flight participants" in its national space law. *See* in detail Stephan Hobe, *Legal Aspects of Space Tourism*, 86(2) Neb. L. Rev. 439, 440 (2007).

16 Francis Lyall & Paul B. Larsen, *Space Law: A Treatise* 2–3 (2nd ed. 2018).

17 Gennady Zhukov & Yuri Kolosov, *International Space Law* 17 (2nd ed. 2014).

18 Dionysia-Theodora Avgerinopoulou & Katerina Stolis, *Current Trends and Challenges in International Space Law* (Aug. 8, 2021), available at https://www.essc.esf.org/fileadmin/user_upload/essc/Article_Current_Trends_and_Challenges_in_Space_Law.pdf.

19 *Id.*

20 *Handbook of Space Law*, *supra* note 8, at 35.

the possible regulation of human activities in outer space even before the activities started in actuality (such aspects have been discussed in Part 2).[21]

It is observed that the technological development in the aviation and outer space linkage generated discussions on developing the legal regulations. In this context, it is pertinent to examine the existing applicable international law in general and space law, particularly to the CHS.

1.1. Customary International Law

Customary international law remains a profound source of international law even in the wave of law-making treaties.[22] It remains of great importance, also where the international/multilateral agreements exist.[23] Article 38 of the International Court of Justices' statute recognizes the "international custom, as evidence of a general practice accepted as law." The customary international law is different from the notion of customary law under the domestic/national level. Under international law, custom is recognized as a law with two preconditions: state practice and *opinio juris*. To testify the state practice on any specific matter can be ascertained in various ways. Such as examination of "state's legal officers, legislative institutions, courts, diplomatic agents, and political leaders"[24] ministerial and other official statements, governmental manuals, and certain unanimous or consensus resolutions of the UN General Assembly.[25] *Opinio juris,* on the other hand, can be identified as and when the states believe that their particular practice is "legally obligatory" and binding upon them.[26] However, establishing *opinio juris* is "difficult" and depends on circumstances.[27]

In contrast to the other areas of international law-making, space law formation has seen the trend of treaty-making.[28] Some authors have listed out the reasons for the dominance of treaty-making over customs in creating space law.[29] These are mainly three factors, namely; (a) Number of states participating in outer space activities and norm generation was very few (however, the number of participating nations are increasing now); (b) Specific character of the problem arises from the outer space activities which require a description of detailed rules to spell out the

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21 Fabio Tronchetti, *Fundamentals of Space Law and Policy* 4 (2013).

22 *Nicaragua v. United States of America*, 1986 I.C.J. 14.

23 Vladlen S. Vereshchetin & Gennady M. Danilenko, *Custom as a Source of International Law of Outer Space*, 13(1) J. Space L. 22 (1985).

24 Malcolm N. Shaw, *International Law* 60 (8th ed. 2018).

25 Anthony Aust, *Handbook of International Law* 7 (2nd ed. 2010).

26 Shaw 2018, at 62.

27 Aust 2010, at 8.

28 Vereshchetin & Danilenko 1985, at 113.

29 *Id.*

rights and obligations of horizons of states activities; (c) The tendency of developing legal regulation rapidly even before the governance issues arises in real. The importance of custom as a source of general international law is equally relevant in space law and has formed the bedrock for it as well.[30] The state practices in outer space activities also generate customary rules as a source of space law.[31] One such example of the relevance of custom in space law is the delimitation of air space and outer space.[32] Myres S. McDougal has emphatically listed out the significance and claims of emerging customary law in the context of outer space activities with a disclaimer that the custom was not an adequate source to specifically address the all legal challenges arising from outer space activities (it is to note that he opined this in 1963).[33] Treaties as a source of law to regulate outer space activities have been discussed in Part 2.3 of the paper.

Custom is a crucial source of international law even on the point where multilateral treaties exist. Certain treaty principles can be recognized as customary law or even *jus cogens*.[34] In the context of outer space, the Outer Space Treaty's principles, as preferred by various authors, have attained the status of customary international space law.[35] G.S. Sachdeva has positively argued in favor of considering the Outer Space Treaty as customary international law.[36] There is a common understanding that many principles of the Outer Space Treaty are customary in nature.[37] Thus, these principles also bind the states that have not signed or ratified the Outer Space Treaty.[38]

From the point of CHS, the norm of "right to passage into outer space, or the norm of using the airspace of another state while launching an object without shouting permission from that state is relevant accepted state practices.[39] The only way to escape this customary obligation is the rule of "persistent objection." However, the validity of such an objection concerning the usage of outer space is not evident. Thus, customary international law can play a significant role in CHS regulations. A similarity can be drawn from the regulatory mechanism of other resources beyond national

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30 Vereshchetin & Danilenko 1985, at 117.

31 *Id.*

32 I.H.Ph. Diederiks-Verschoor & Vladimir Kopal, *An Introduction to Space Law* 9–10 (3rd ed. 2008).

33 Myres S. McDougal, *The Emerging Customary Law of Space*, 58(5) Nw. U.L. Rev. 618 (1964).

34 Convention Relating to the Status of Refugees 1951, and Convention for the Prevention and Punishment of the Crime of Genocide 1948.

35 Vereshchetin & Danilenko 1985, at 123.

36 G.S. Sachdeva, *Select Tenets of Space Law as Jus Cogen* in *Recent Developments in Space Law* 7, 12–15 (R. Venkata Rao et al. eds., 2017).

37 *Routledge Handbook of Space Law*, *supra* note 7, at 8–9.

38 *Id.*

39 *Id.*

jurisdictions. Such as regulation of high seas and Antarctica and commercial activities in these areas can sufficiently guide the international community to develop consensus to govern the outer space, especially for commercial human spaceflights.

1.2. Principle of Jus Cogens

There are certain general principles of international law, which have been anomalously accepted to outer space activities. Such as obligations *erga omnes*, as described by the International Court of Justice (ICJ) in the *Barcelona Traction* case that certain obligations bind all states.[40] Such *erga omnes* includes *jus cogens* and important human rights.[41] However, while *erga omnes* carry more procedural aspects where state-having legal interests in the matter, *jus cogens*, on the other hand, are substantive rules with a higher status.[42]

Jus cogens as defined under Article 53 of the Vienna Convention on the Law of Treaties 1969:

> a norm accepted and recognized by the international community of states as a whole as a norm from which no derogation is permitted and which can be modified only by a subsequent norm of general international law having the same character.[43]

However, the degree to determine whether a particular norm is *jus cogens* or not is controversial and unclear.[44] There are, though, certain generally accepted norms as a *jus cogens* such as the use of force, genocide, slavery, and torture. In the connection of outer space, certain fundamental principles are unanimously globally accepted peremptory norms.[45] G.S. Sachdeva lists out five fundamental principles applicable to outer space as *jus cogens*. He calls it "*Panchsheel* of *Jus Cogens*." These principles are: outer space as the province of mankind; freedom of access to all states for exploration and use; state responsibility to humanity; prohibition on placement of weapons in earth orbit; and rescue and return of astronauts and space objects. However, he suggests that these five are tentative and suggestive and can be debated further. The selection of these five principles, he justifies, is based on solid foundations of "*jus natural*, Treaty Law and empiric state practice." A recently published research paper also argued that the principles such as "exploration and use of outer space

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40 Aust 2010, at 11.

41 *Id.*

42 Shaw 2018, at 92.

43 Vienna Convention on the Law of Treaties (1969), 1155 U.N.T.S. 331.

44 Aust 2010, at 11.

45 Sachdeva 2017, at 17.

for the benefits of all peoples, freedom of exploration and use of outer space, and non-appropriation qualify to be *jus cogens*.[46]

Moreover, these general principles of international law of higher character, certain national legal principles, as called borrowing principles common to all or most national legal systems, are also applicable to space law. The principles based on "natural justice" such as principles of good faith, estoppel, proportionality, *lex specialis derogate legi generali*, and *lex posterior derogate legi priori*, which apply to general international law, are equally relevant and applicable to space law.[47] The non-appropriation principle even has been contended as the *grundnorm* of international space law.[48]

The emerging trends of commercialization of outer space activities in general and commercial human spaceflights, in particular, are sowing the seeds of private international law or conflict of laws a possible role to play in space law. Various cross-border cooperative activities in outer space will make the spaghetti bowl of issues where private international law's role will become pivotal. The role of fundamental principles of private international law will rise, especially in the case of CHS. However, it is not clear whether the rules of private international law will apply to disputes arising from outer space activities as there lies no territorial claim in outer space.[49] In this regard, the Registration Convention can play a meaningful role in identifying the applicable laws (Registration Convention has been discussed in Part 2.3.4).

1.3. Role of the United Nations

There is a long history where states have been involved with each other bilaterally or multilaterally, but the trend of the establishment of international organizations mainly developed in the late nineteenth century.[50] Since then, these international organizations have strived to develop the rule of law in the areas of global concerns. The League of Nations established the "political organization of an open and universal character".[51] The era of the establishment of international organizations has been as categorized: whereas the nineteenth century from 1815 to 1914 has been described as "the era of *preparation for* international organization," afterward is considered as "the era of *establishment of* international organization."[52] Soon after the end of the World War I, various international organizations were established.[53] Now the trend

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[46] Ekta Rathore & Biswanath Gupta, *Emergence of Jus Cogens Principles in Outer Space Law*, 18(1) Astropolitics 1, 17 (2020).

[47] Peter Malanczuk, *Akehurst's Modern Introduction to International Law* 49 (7th ed. 1997).

[48] Zachos A. Paliouras, *The Non-Appropriation Principle: The Grundnorm of International Space Law*, 27(1) Leiden J. Int'l L. 37 (2014).

[49] Tosaporn Leepuengtham, *The Protection of Intellectual Property Rights in Outer Space Activities* 149 (2017).

[50] C.F. Amerasinghe, *Principles of the Institutional Law of International Organizations* 1 (2nd ed. 2005).

[51] *Id.* at 5.

[52] *Id.*

[53] Such as League of Nations, International Labor Organization, initiatives to regulate civil aviation, Treaty of Paris (Kellogg-Briand Pact) 1928 for renunciation of war.

of international organizations, mainly after World War II, has become pervasive.[54] Due to the authenticated flying technologies (aircraft), international aviation law developed during the nascent stages of the aviation age. Such technologies have leaped even to outer space.

Now we are living in an age of "perpetual technological revolution." Since Russia's first satellite launch, a lot has changed in terms of technological capabilities to explore outer space. The venture to outer space started the era of the "space-age." Due to military advantage, apart from the human fanaticism, grabbed the attention of states to invest in developing outer space technologies during the initial days of growth. Thus, such reach to outer space was presented as a muscular achievement and of pride. This was the initial days of the cold war. Since the beginning of space activities, the United Nations (UN) has played an active role in developing regulations. Yet, space law developed under the UN's auspice considering its international character; the commercial aspects of outer space activities, especially the CHS, were barely envisaged.[55] Thus, CHS's success is facing various legal, regulatory, financial, technological, and operational hurdles.[56] Details of the UN's role in the making of space law have been discussed in the subsequent Part.

In a first move, the UN, soon after the launch of *Sputnik*, through General Assembly (GA) Resolution 1348 (XIII), establishes an *ad hoc* Committee on the Peaceful Uses of Outer Space (COPUOS) in 1958.[57] The Committee consisted of 18 members to look into the activities and resources of the UN, the specialized agencies, and other international bodies on the peaceful use of outer space, to facilitate international cooperation among organizations within the framework of the UN, and to deliberate on legal issues that arise from the outer space activities.[58]

The UN GA in 1959 by adopting Resolution[59] 1472 (XIV), made the COPUOS a permanent body of the General Assembly. During that time, the COPUOS comprised of 24 members.[60] The Committee exclusively deals with international cooperation in the peaceful uses of outer space and plays a role in discussing

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54 Amerasinghe 2005, at 6.

55 Frans G. von der Dunk, *Space for Tourism? Legal Aspects of Private Spaceflights for Tourist Purposes*, Space, Cyber, and Telecommunications Law Program Faculty Publications, No. 26 (2006), at 19 (Aug. 8, 2021), available at https://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1025&context=spacelaw.

56 Andrea J. Harrington, *Governing Activities in Outer Space: Responsibility, Liability, Regulation and the Role of Insurers*, DCL Thesis, McGill University (2017), at 73.

57 General Assembly resolution 1348 (XIII), Question of the Peaceful Use of Outer Space, RES 1348 (XIII), 13 December 1958 (Aug. 8, 2021), available at https://www.unoosa.org/oosa/oosadoc/data/resolutions/1958/general_assembly_13th_session/res_1348_xiii.html.

58 COPUOS History, UNOOSA (Aug. 8, 2021), available at https://www.unoosa.org/oosa/en/ourwork/copuos/history.html.

59 General Assembly resolution 1472 (XIV), International Co-operation in the Peaceful Uses of Outer Space, RES 1472 (XIV), 12 December 1959 (Aug. 8, 2021), available at https://www.unoosa.org/oosa/oosadoc/data/resolutions/1959/general_assembly_14th_session/res_1472_xiv.html.

60 COPUOS History, *supra* note 58.

space activities, including technological advancements in space exploration, geopolitical changes, and new use of space science and technology for sustainable development.[61] The Committee provides a platform to governmental and non-governmental organizations for exchanging information, assisting in the study of outer space activities.[62] The Committee has two Subcommittees: the Scientific and Technical Subcommittee; and the Legal Subcommittee, to deal with complex issues on technical and legal matters.[63]

A secretariat support team for the COPUOS was created, which was named in 1992 as the Office of Outer Space Affairs (OOSA).[64] The Office works to promote international cooperation for the peaceful uses of outer space.[65] It also implements the Secretary General's responsibilities entrusted under space law and maintains the United Nations Register of Objects Launched into Outer Space.[66] The Legal Subcommittee has prioritized the matter of commercial activities in outer space in its several reports.[67] The OOSA has discussed various aspects arising from commercial activities in outer space.

The Legal Subcommittee has intensely discussed the newly emerging legal challenges to the existing space law regime that is happening due to the rapid development of technology. The broad discussion took place at the Subcommittee, as observed from its reports. It could be divided into three aspects based on the attitude of the delegates:[68] (a) There are views from certain delegates that the increasing commercial activities in outer space require "improvements or mechanisms to strengthen the existing legal framework"; (b) Some delegates opined that the new regulatory mechanism is needed to comprehend the commercial realities of space activities. In this regard, the Subcommittee welcomed the step taken by the International Civil Aviation Organisation (ICAO) and International Institute for the Unification of Private Law (UNIDROIT), which adopted the Convention

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61 COPUOS and its Subcommittees, UNOOSA (Aug. 8, 2021), available at https://www.unoosa.org/oosa/en/ourwork/copuos/comm-subcomms.html.

62 COPUOS History, *supra* note 58.

63 *Id.*

64 Stephen E. Doyle, *A Concise History of Space Law*, Nandasiri Jasentuliyana Keynote Address on Space Law, at 8 (Aug. 8, 2021), available at https://www.iislweb.org/website/docs/2010keynote.pdf.

65 Roles and Responsibilities, UNOOSA (Aug. 8, 2021), available at https://www.unoosa.org/oosa/en/aboutus/roles-responsibilities.html.

66 *Id.*

67 For example, Reports of Legal Subcommittee.

68 *See* generally for details: Report of the Legal Subcommittee on its Forty-First Session Held in Vienna from 2 to 12 April 2002, A/AC.105/787; Report of the Legal Subcommittee on the Work of its Forty-Third Session, held in Vienna from 29 March to 8 April 2004, A/AC.105/826; Report of the Legal Subcommittee on its Fifty-Eighth Session, held in Vienna from 1 to 12 April 2019.

on International Interests in Mobile Equipment 2001 (Cape Town Treaty) and its Protocol on Matters Specific to Space Assets 2012 (Berlin Space Protocol). The Cape Town Treaty and Berlin Space Protocol contended for a supervisory authority to be played by the ICAO to discharge the functions entrusted by the states. Some of the delegates argued for the UN Secretary-General (SG) to perform the role of the Supervisory Authority. However, some delegates objected to the idea of UN SG assuming such a task. They contended that the OOSA should not be compared with the ICAO as a part of the UN Secretariat. They argued that it would be beyond the mandate of the UN Charter and inappropriate to assume the commercial role by the UN Secretariat; (c) Surprisingly, the recent 2019 report of the Subcommittee did not focus on developing a new regime for commercial activities. Instead, the views were expressed that commercial utilization is consistent with the UN treaties on outer space and contended that the Outer Space Treaty does not preclude commercial activities. The view was expressed that the overregulation will inhibit the growth of space industries. It was opined that the national space regulation, focused on the safety of operations, is the appropriate means to regulate the commercial space transportation industry. Thus, it is argued that it will be premature for ICAO or any other body to assume the role to develop "internationally binding rules or standards relating to suborbital or orbital space flight or commercial spaceports."

Thus, the dispensation on the regulatory framework for the CHS under international law is benevolent and not clear. Opinions of the delegates from the states are divided on commercial activities in outer space in general and the CHS in particular.

2. Provisions Under International Space Law

There are few instances in the history of law-making at the international level where the legal regulations have simultaneously responded to technological development. Making of space law to regulate the outer space activities is one among them. The academic discussions and possibilities for developing legal regulations emerged before the actual venture in 1957.[69]

In 1903, Tsiolkovsky, a Russian space pioneer, published a paper predicting human expansion in outer space using liquid fuel rockets.[70] The Institute of International Law also deliberated on the question of the upper limit of the state's sovereignty over airspace.[71] The first paper on legal aspects was published by a Belgian lawyer, Emile Laude, in 1910.[72] He argued for a new law to govern the juridical relations in space

[69] Tronchetti 2013, at 4.

[70] *Id.*

[71] Matthew J. Corrigan, *Outer Space Lawyers: Eagles or Turtles*, 51 ABA J. 858 (1965).

[72] Doyle, *supra* note 64, at 2.

and highlighted the emerging issue of ownership and the use of Hertzian waves.[73] He thereby considered the law of space as a generic term. A German legal publisher in 1922 publishes a paper on "legal questions of traveling into the outer space."[74]

A paper was presented by V.A. Zarzar from Soviet Aviation Ministry at a conference on air law held in Moscow in 1926. He admitted that the state retains sovereignty over its air space. However, he kept the scope open for discussion on the limit of that territorial claim. Thus these two initial deliberations made it substantially clear that the basic altitude and operational differences need a separate legal regime.[75]

The first monograph on space law was published in 1932 by Vladimir Mandl.[76] His study, originally written in German, points out various issues that could arise from rockets reaching outer space. Only 25 copies of the monograph could be sold out at that time. However, the study is assessed as the most significant work and reflects in the present legal regime of outer space.[77] He emphasizes the fundamental concept of space law as an independent branch of law based on the specific need for spaceflights and is different from the law of the sea or law of the air.[78] Perhaps, he recognizes the relevance of legal regulations of various subjects of laws, specifically air law.[79] His study is divided into two heads: "The Present" discusses selected issues of civil, criminal, and international law relating to outer space. The second head, called "The Future" – not a science-fiction, elaborated on several upcoming issues. Such as, he rejected the idea of sovereignty above the atmospheric space. This made it possible to use areas above the atmospheric space for spaceflights. His consideration finds much relevance in the current legal regime and is of much importance for the CHS.

Since then, many authors wrote on the subject, discussing legal issues arising from outer space activities.[80] Arguments from these commentators establish that the sovereignty prevails only up to airspace, and beyond that, limits the state's jurisdiction.[81] The notable dissent came from Soviet scholar Korovin in 1934, who defended the flights over the national territory, irrespective of speed or altitude, that could threaten safety and security. Thus, he propounded, states, as a matter of right,

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73 Doyle, *supra* note 64, at 2.

74 Corrigan 1965, at 858.

75 Doyle, *supra* note 64, at 2.

76 Tronchetti 2013, at 4.

77 Vladimir Kopal & Mahulena Hofmann, *Vladimir Mandl* in *Pioneers of Space Law* 57 (Stephan Hobe ed., 2013).

78 *Id.*

79 *Id.*

80 For details, *see* Doyle, *supra* note 64, at 2. *See also Pioneers of Space Law* (Stephan Hobe ed., 2013).

81 Doyle, *supra* note 64, at 2.

can defend and protect their national security by any appropriate means, including "the seizure of the crew … to reprisals of all kinds."[82]

Such discussions laid the foundations of international space law. Various arguments of these commentators formed the basis of the present space law framework. These bases are inherent for commercial activities in outer space, including CHS. Outer space law has a "composite picture," which includes various sources available under international and national levels.[83] Studying the current international legal regime could be divided into two crucial phases: Pre-1967 Regulations through the UN Resolutions, and Post-1967 Regulations through Treaties.

2.1. Pre-1967 or Regulation Through UN Resolutions

The ingress to outer space stressed the need for developing the new branch of international law.[84] The academic discussions and the demand from states have taken the center-stage at the international level. Following the same, various initiatives were taken by the UN to regulate outer space activities. The whole legal regime relating to outer space developed as a "discrete body of law within international law."[85] So far, since its inception, space law remains state-centric law. Thus, the present space law provides a "rudimentary framework" for commercial activities in outer space.[86] However, it can be concluded that the existing regime does not consider private activities illegal.[87] The UN, as a norm entrepreneur, took the lead in developing the space law. The UN GA adopted numerous resolutions to regulate the outer space activities, which led to the foundations for developing future treaties. As widely accepted, the UN GA resolutions form the basis of "soft law," despite this fact, states, during initial days, resorted to this law-making mechanism.[88]

The UN GA's history of adopting resolutions pertaining to space activities starts with Resolution 110 (II), 1947.[89] The resolution condemned "all forms of propaganda … which is either designed or likely to provoke or encourage any threat to the

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82 Doyle, *supra* note 64, at 2.

83 Tronchetti 2013, at 3.

84 Ricky J. Lee, *Reconciling International Space Law with the Commercial Realities of the Twenty-First Century*, 4(2) Sing. J. Int'l & Comp. L. 194 (2000).

85 Steven Freeland, *Up, Up and … Back: The Emergence of Space Tourism and Its Impact on the International Law of Outer Space*, 6(1) Chic. J. Int'l L. 1, 4 (2005).

86 Wayne While, *The Legal Regime for Private Activities in Outer Space*, Space Future (2001) (Aug. 8, 2021), available at http://www.spacefuture.com/archive/the_legal_regime_for_private_activities_in_outer_space.shtml.

87 *Id.*

88 Gerardine M. Goh, *Softly, Softly Catchee Monkey: Informalism and the Quiet Development of International Space Law*, 87(3) Neb. L. Rev. 725, 726 (2008).

89 Ogunsola O. Ogunbanwo, *International Law, and Outer Space Activities* 11 (1975).

peace, breach of the peace, or act of aggression" and requested the states to promote friendly relations and peace.[90] The objectives of this resolution are equally applicable to countries involved in outer space activities.[91] This resolution was mentioned in the first legal instrument on outer space adopted by the UNGA in the form of the Declaration[92] and the Outer Space Treaty – the first treaty developed to regulate outer space activities.

The COPUOS was also established through UN GA Resolution 1348 as an *ad hoc* body, later on, made as a permanent by Resolution 1472. The body was established to "govern the exploration and use of space for the benefit of all humanity: for peace, security and development." The Committee, in 1959, submitted a report to the UN GA. Two significant observations of the report were: (a) The Committee considered that "as a matter of principle the UN Charter and the Statute of the International Court of Justice were not limited in their operation to the confines of the earth"; (b) Countries during 1957-58, in principle, establishes a practice that "outer space is, on conditions of equality, freely available for exploration and use by all in accordance with existing or future international law or agreements."[93]

The UN GA in 1961 passed a resolution asserting that the international law, including the UN Charter, applies to the outer space, the moon, and other celestial bodies.[94] The resolution forwarded two crucial principles to govern the outer space activities: (a) "International law, including the Charter of the United Nations, applies to outer space and celestial bodies"; (b) "Outer space and celestial bodies are free for exploration and use by all States in conformity with international law and are not subject to national appropriation."[95] This is a recognition of the Committee Report submitted in 1959. The resolution also recognizes the outer space as the "common interest of mankind." The resolution also laid the Registration Convention's foundation by calling upon the states to register "launching (of) objects into orbit or beyond" through the Secretary-General.

The resolution also involved various international organizations such as the International Telecommunication Union (ITU), the World Meteorological Organisation (WMO), the United Nations Educational, Scientific and Cultural Organisation

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90 General Assembly resolution 110 (II), Measures to be taken against propaganda and the inciters of a new war, A/RES/110 (II), 3 November 1947 (Aug. 8, 2021), available at https://research.un.org/en/docs/ga/quick/regular/2.

91 Ogunbanwo 1975, at 11.

92 Lee 2000, at 194.

93 Ogunbanwo 1975, at 11.

94 General Assembly resolution 1721 (XVI), International Co-operation in the Peaceful Uses of Outer Space, A/RES/1721 (XVI), 12 December 1961 (Aug. 8, 2021), available at https://www.unoosa.org/oosa/oosadoc/data/resolutions/1961/general_assembly_16th_session/res_1721_xvi.html.

95 Ogunbanwo 1975, at 11.

(UNESCO), and other specialized agencies and governmental and non-governmental organizations in implementing its mandates successfully. With regard to the CHS, the resolution is specific as it mandated the ITU to establish wave frequencies for space communications via satellites and assist member states on technical matters for their communication needs and domestic communication facilities.

The UN GA adopted another comprehensive Resolution 1802 (XVII) to set the background and expedite the making of "basic legal principles governing the activities of States in the exploration and use of outer space and on liability for space vehicle accidents and on assistance to and return of astronauts and space vehicles and on other legal problems."[96] The resolution also laid the foundation of the first declaration and international agreement to rescue the astronauts.

The first declaration, called the first legal instrument, was adopted by the UN GA. The Resolution was entitled the "Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space."[97] The Declaration codified and gave legal sanctity to the existing state practices concerning outer space activities. It listed out certain principles for the states to follow in the exploration and use of outer space. These are as follows: (1) "The exploration and use of outer space shall be carried on for the benefit and in the interests of all mankind." (2) Outer space and celestial bodies are free for exploration and use by all states based on equality and international law. (3) Outer space and celestial bodies are not for national appropriation, which means no sovereignty claims lies over them by means of use or occupation. (4) Activities by states in the exploration and use of the outer space shall be carried on as per the international law, including the Charter of the UN, to maintain international peace and security and to promote international cooperation and understanding. (5) The state has international responsibility for their national activities in outer space, irrespective of the fact that the activities are carried by governmental and non-governmental entities. States have to abide by the principles outlined in this Declaration. In case of activities by non-governmental entities, the concerned state has to authorize and supervise the activities. If the activities are carried by the international organizations, the responsibility of compliance with the principles set out in the Declaration lies to that international organization and by the participating states. (6) "In the exploration and use of outer space," states are guided by the principle of co-operation and mutual assistance and "shall conduct all their activities in outer space with due regard for the corresponding interests of

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[96] General Assembly resolution 1802 (XVII), International Co-operation in the Peaceful Uses of Outer Space, A/RES 1802 (XVII), 14 December 1962 (Aug. 8, 2021), available at https://www.unoosa.org/oosa/oosadoc/data/resolutions/1962/general_assembly_17th_session/res_1802_xvii.html.

[97] General Assembly resolution 1962 (XVIII), Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space, A/RES/1962(XVIII), 13 December 1963 (Aug. 8, 2021), available at https://www.unoosa.org/oosa/oosadoc/data/resolutions/1963/general_assembly_18th_session/res_1962_xviii.html.

other States." If another state has "reason to believe that an outer space activity or experiment planned by another State would cause potentially harmful interference with activities in the peaceful exploration and use of outer space may request consultation concerning the activity or experiment." (7) State on whose registry an object is launched in outer space shall retain jurisdiction and personnel thereon. (8) "Each State which launches or procures the launching of an object into outer space, and each State from whose territory or facility an object is launched, is internationally liable for damage to a foreign State or to its natural or juridical persons by such object or its component on the earth, in air space, or in outer space." (9) A newly created obligation on the state that they shall regard astronauts as "envoys of mankind in outer space, and shall render to them all possible assistance in the event of accident, distress, or emergency landing on the territory of a foreign State or on the high seas." Rescued astronauts should be safely and promptly returned to the state of the registry of their space vehicles. The Declaration holds the basis for future law-making on outer space. The principles propounded in the Declaration are crucial for the CHS and future regulation on the same. Jenks has termed the Declaration as "the Twelve Tables or Ten Commandments of Space Law."[98]

2.2. Governing/Operating/Basis of Outer Space Regulation

These resolutions, as widely opined by international law lawyers, are not binding on the states. It remains merely a soft law obligation. However, two UN GA resolutions, namely Resolution 1721 (XVI) and Resolution 1962 (XVIII) often considered as "the first chapter in the book of space law."[99] Bin Cheng has discussed in detail whether these resolutions can form "instant" international customary law.[100] The significant difference of opinion between two space powers at that time causes the adoption of initial resolutions based on a compromise. The Soviet (as it was then) wished to develop an international treaty, whereas the US emphasizes for the resolutions. Bin Cheng, observing the nature and legal consequences of these two resolutions, has stated that:[101]

> [T]he general conclusion would, therefore, be that resolution 1721A and 1962 are not legally binding on any Member State of the United Nations *qua* Assembly resolutions. The principles they enunciate are, for the most part, only optional and in themselves non-binding, principles, and standards. A few States *might*, however, be considered legally bound by these optional

98 C. Wilfred Jenks, *The Evolution of Space Law Continues* in *Mélanges Offerts à Juraj Andrassy* 135, 137 (Vladimir Ibler ed., 1968).

99 Bin Cheng, *Studies in International Space Law* 1 (1997).

100 *Id.* Part II, at 1–28.

101 *Id.* at 18.

principles either because of their unilateral undertakings to be so bound or because of their acceptance of these principles as rules of existing international law. But even assuming that they are so bound, the extent to which they are bound both *rationepersonae* (as among which States?) and *ratione temporis* (whether and how they may release themselves from the obligations assumed?) remains an open question.

Regardless of the nature of obligations these resolutions created, they laid down the fundamentals of outer space regulation and carried a consensus opinion from different states. The principles laid down in the Declaration stands the functional point for further/future treaty-based mechanism for outer space. The principles contained in the Declaration are equally important for regulating the CHS. Few principles need specific mention in the context of carrying humans to outer space commercially. These are as follows (drawn from the Declaration): (a) Outer space and celestial bodies are free for exploration and use by all states (Principle 2); (b) Outer space and celestial bodies cannot be appropriated by a claim of national sovereignty, use or occupation, or by any other means (Principle 3); (c) Activities of states shall be carried on in accordance with international law, including the Charter of the UN (Principle 4); (d) States bear international responsibility for their national activities carried by governmental or non-governmental entities (Principle 5); (e) State of registry of a launched space object retains the jurisdiction over it (Principle 7); (f) Launching State has to bear the liability for damages (Principle 8); (g) States shall regard astronauts as envoys of mankind in the outer space, and shall render to them all possible assistance in the event of an accident, distress, or emergency on the territory of a foreign state or on the high seas. These principles are very pertinent for the CHS (discussed in detail below).

2.3. Post-1967 or Regulation Through Treaties

With the rapid development in space technologies, the regulatory mechanisms for human activities in outer space need a comprehensive redressal both at the national and international levels. The CHS is one of the recent addition of human activities in outer space. It is substantially noted that space law is a "complex mixture of international and domestic laws that govern a wide spectrum of activities."[102] Such activities require various laws to come into action, namely "administrative law, intellectual property law, arms control law, insurance law, environmental law, criminal law, and commercial law, as well as international treaties and domestic legislation written specifically for space."[103] The UN GA resolutions set out the basis

[102] Joanne I. Gabrynowicz, *Space Law: Its Cold War Origins and Challenges in the Era of Globalization*, 37 Suffolk U.L. Rev. 1041 (2004).

[103] *Id.*

for developing outer space regulations. Thus, the COPUOS became instrumental in drafting the five international treaties. These five treaties are as follows:

1. *Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies 1967* (Outer Space Treaty);

2. *Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space 1968* (Rescue Agreement);

3. *Convention on International Liability for Damage Caused by Space Objects 1972* (Liability Convention);

4. *Convention on Registration of Objects Launched into Outer Space* 1975 (Registration Convention);

5. *Agreement Governing the Activities of States on the Moon and Other Celestial Bodies 1979* (Moon Agreement)

These are the five international treaties currently dealing with outer space activities. These treaties were formed based on previously adopted UN GA resolutions and incorporate the governing principles agreed upon by states in those resolutions.

2.3.1. The Outer Space Treaty

Due to the space race between the US and the Soviet Union, the original proposal for space regulation contemplated the exclusive governmental use and control over outer space activities and involved technologies.[104] That proposal was designed as a public law regime to regulate and determine liability for the activities carried by governments and their agents in outer space, to prevent the assertion of sovereignty, and militarising the outer space.[105] Thus, the space law was not "designed to foster utilization and exploration of space resources, or to encourage private entities to harvest solar system resources and make them available to Earth."[106] Instead, such deliberated move of the UN GA "balanced the fear and security need of the superpowers and their alliances against the anti-colonial feelings and economic fears of the Non-aligned Movement."[107] Thus, tension remains prevalent between the legal regime created by the five treaties and the expanding commercial uses of space.[108]

The Outer Space Treaty, with the widest acceptance among the international community, is regarded as the fundamental charter of international space law.[109] It is often termed as "quasi-constitutional," which formed the basis for all ensuing

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104 Richard Berkley, *Space Law Versus Space Utilization: The Inhibition of Private Industry in Outer Space*, 15(2) Wis. Int'l L.J. 421 (1996).

105 *Id.*

106 *Id.* at 422.

107 *Id.*

108 *Id.*

109 Lee 2000, at 197.

treaties.[110] It inhibits the Charter of the UN and all of the international law. The Treaty contains fundamental principles of space law, and all subsequent treaties reaffirm those principles or specify in detail to address any particular situations.[111] The provisions under the various articles of the Treaty also paved the way for the four other international treaties: the Rescue Agreement, the Liability Convention, the Registration Convention, and the Moon Agreement.[112] The important principles forwarded by the Outer Space Treaty are as follows:

(a) The exploration and use of outer space, including the Moon and other celestial bodies, shall be carried out for the benefit and in the interests of all countries.[113]

(b) Outer space shall be free for exploration and use by all states without discrimination of any kind.[114]

(c) Outer space shall be the province of all mankind.[115]

(d) "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."[116]

(e) State activities (exploration and use) in outer space shall be in accordance with international law, including the Charter of the UN, in the interests of maintaining international peace and security and promoting international cooperation and understanding.[117]

(f) The Moon and other celestial bodies shall be used by all States Parties exclusively for peaceful purposes. States are also prohibited "to place in orbit around the Earth any objects carrying nuclear weapons or any other kinds of weapons of mass destruction, install such weapons on celestial bodies, or station such weapons in outer space in any other manner" (weaponization and militarization of outer space are prohibited).[118]

(g) States shall regard astronauts as "envoys of mankind" in outer and shall render to them all possible assistance in the event of accident, distress, or emergency landing on the territory of another state or on the high seas.[119]

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110 Gabrynowicz 2004, at 1042.

111 Lee 2000, at 197.

112 Jonathan F. Galloway, *Revolution, and Evolution in the Law of Outer Space*, 87(2) Neb. L. Rev. 516, 517 (2008).

113 Outer Space Treaty 1967, 610 U.N.T.S. 205, Art. 1.

114 *Id.*

115 *Id.*

116 *Id.* Art. 2.

117 *Id.* Art. 3.

118 *Id.* Art. 4.

119 *Id.* Art. 5.

(h) States shall bear international responsibility for national activities in outer space carried by governmental or non-governmental entities, and such national activities shall be carried on in conformity with the provision outlined in the Treaty.[120]

(i) State of registry of a launched object into outer space retains the jurisdiction and control over such object, and any personnel thereof, while in outer space or on a celestial body.[121]

(j) In the exploration and use of outer space, states shall be guided by the principle of cooperation and mutual assistance and shall conduct all their activities with due regard to the corresponding interests of all other states, including to avoid harmful contamination and adverse changes in the environment of the Earth resulting from the introduction of extraterrestrial matter.[122]

(k) To promote international cooperation in the peaceful exploration and use of outer space, state conducting activities in outer space, agree to inform the Secretary-General of the UN as well as the public and the international scientific community, to the greatest extent feasible and practicable, of the nature, conduct, locations, and results of such activities.[123]

Since space activities are inherently "international in nature because of the physical characteristic of outer space and because the sphere of operation of such activities is beyond the territorial jurisdiction of any State,"[124] "international law prima facie applies."[125] Thus in the wake of the increased commercial viability of the space resources, it is pertinent to examine whether the Outer Space Treaty provides for commercial uses of outer space. Furthermore, it is necessary to explore the principles contained under the Treaty to support the CHS and research into the possibilities that need to be done to address the needs of the CHS adequately.

It is often argued that space law, in general, developed under the shadow of the Cold war, is highly state-centric. Thus, it does not comprehend the commercial activities in outer space by the governmental or non-governmental entities. Contrary to this notion, it is observed that the commercial activities in outer space began much before the treaty-based space law in the field of communications satellite and spread by including the space manufacturing and research ventures, private launch services, and more.[126] However, scrutiny of the Treaty hints that the commercial activity in outer space is not illegal. A fair comparison of the legal status of outer

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120 Outer Space Treaty 1967, 610 U.N.T.S. 205, Arts. 6 & 7.

121 *Id.* Art 8.

122 *Id.* Art. 9.

123 *Id.* Art. 11.

124 Ram S. Jakhu, *Legal Issues Relating to the Global Public Interest in Outer Space*, 32(1) J. Space L. 31 (2006).

125 Eng Teong See, *Commercialization of Space Activities – The Laws and Implications*, 82(1) J. Air L. & Com. 145, 147 (2017).

126 Glenn H. Reynolds & Robert P. Merges, *Outer Space: Problems of Law and Policy* 2 (2nd ed. 1997).

space with Antarctica, as devised in the Antarctica Treaty 1959, inspired the Outer Space Treaty negotiations. Details on the meaning of the principle of freedom of use and exploration of outer space mentioned in Article 1 of the Outer Space Treaty connotes a similar understanding as of Antarctica.[127] Thus, the space activities that need to be supervised by the state authorities provided under Article 6 of the Outer Space Treaty is considered consistent with the principle of freedom of use and exploration of outer space.[128] Similarly, the law of high seas and the air space under the doctrine of freedom of air in early aeronautical law fulfills the requirement of freedom to use and explore outer space.[129]

As it is explicitly clear from Article 1 that the outer space is free for use and exploration, no other state can restrict another state's legitimate activities in outer space.[130] However, the question arises that to what extent this right of use and exploration guaranteed is "for the benefit and interests of all countries." The question remains relevant as many space activities such as telecommunications, broadcasting, and other commercial services benefit only some states.[131]

The mention of the word "use" in Article 1 and other parts of the Outer Space Treaty also hints at the possibilities of commercialization of outer space activities. The French delegate during the negotiation of the Treaty raised the concern that the word "use" can lead to exploitation and is different from "exploration." However, it was finally concluded that the analogous provision in the Declaration of 1963 mentioned the word "use" along with "exploration." Thus, there would be no disagreement to use it in the Outer Space Treaty, even though potential uses were foreseen at that time.[132]

Subsequently, Article 6 of the Outer Space Treaty provides leeway for commercial activities where even private/non-governmental entities can be involved. The article provides for "international responsibility for national activities in outer space … whether such activities are carried on by governmental agencies or by non-governmental entities". Since the Treaty does not specify on the scope of "national activities in outer space," it is argued that activities of non-governmental entities, including private companies, can assume the role of space actors, provided authorization and supervision by the national authorities.[133]

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127 Reynolds & Merges 1997, at 41–42.

128 *Id.* at 42.

129 *Id.*

130 Christopher D. Johnson, Handbook for New Actors in Space, Secure World Foundation, 3-4 (2017).

131 Ram S. Jakhu et al., *Overview of the Existing Mechanisms of Global Space Governance* in *Global Space Governance: An International Study* 15, 22 (Ram S. Jakhu & Joseph N. Pelton eds., 2017).

132 Paul G. Dembling & Daniel M. Arons, *The Evolution of the Outer Space Treaty*, 33(3) J. Air L. & Com. 419, 431 (1967).

133 Frans G. von der Dunk, *Billion-Dollar Questions? Legal Aspects of Commercial Space Activities*, 23(2) Unif. L. Rev. 418, 423 (2018).

Despite these interpretations of the Outer Space Treaty provisions, it is widely understood that commercial and private space activities at that time "were neither expected nor, consequently, required to be dealt with any detail."[134] The Treaty, therefore, did not foresee the private space travel/commercial human spaceflight.[135] To explore deeper into the viability of the CHS, the paper, in the subsequent portion, discusses the principles of the Treaty as incorporated in the subsequently adopted treaties.

2.3.2. The Rescue Agreement

The Rescue Agreement[136] is the contribution of the Legal Subcommittee of the UNCOPUOS.[137] After approval of the Outer Space Treaty, a need was felt for the detailed international agreement to list out the general duties of the states mandated under Article 5 of it.[138] The Rescue Agreement is the shortest among all five space treaties, having only ten articles. The preamble of the Agreement reflects in detail the mandates of the Outer Space Treaty and calls itself to be prompted by the sentiments of humanity.

The Agreement provides elaboration on the mandate mentioned in Article 5 of the Outer Space Treaty. Article 5 of the Treaty obliges the member states to regard "astronauts as envoys of mankind" and "shall render to them all possible assistance in the event of accident, distress, or emergency landing on the territory of another State Party or on the high seas." The state where astronauts landed shall handover them "safely and promptly" to the state of registry of their space vehicle. Another compelling mandate of the provision is that astronauts of one state have to render all possible assistance to the astronauts of other states while carrying activities in outer space and on celestial bodies. Member State is also asked to "immediately inform the other State Parties to the Treaty or the Secretary-General of the United Nations of any phenomena they discover in outer space … which could constitute a danger to the life or health of astronauts."

However, a significant shift in the use of terminology can be found from Article 5 of the Outer Space Treaty to the Rescue Agreement. Article 5 uses the term "astronauts" to denote the person traveling to space and conferred them the status of "envoys of mankind." Whereas the Rescue Agreement, except in its title and preamble, did not use the word "astronauts." Instead, the operative body of the

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134 Dunk 2018, at 423.

135 Rachel Mitchell, *Into the Final Frontier: The Expanse of Space Commercialization*, 83(2) Mo. L. Rev. 419, 433 (2018).

136 Rescue Agreement (1968), 672 U.N.T.S. 119.

137 For detailed negotiating history of Rescue Agreement, *see* Paul G. Dembling & Daniel M. Arons, *The Treaty on Rescue and Return of Astronauts and Space Objects*, 9(3) William & Mary L. Rev. 630 (1968).

138 *Id.* 637.

text used the term "personnel of a spacecraft." In the view of emerging commercial human spaceflights or space tourism, this term seems more appropriate to expand the obligations of the Rescue Agreement on states to render supports to the person aboard the spacecraft.

Another point that favors the application of the Agreement is that it has not used the principle of "envoys of mankind" to refer to the person traveling to space/astronauts. Therefore, it means the provisions of the Agreement could be applied to every person boarding the spaceflight, including commercial participants. It is agreed that the Rescue Agreement extends greater protection to space personnel than provided in Article 5 of the OST.[139] Moreover, it is argued that the Agreement is based on the philosophy of humanitarian aid and sentiments. Therefore, it is viewed that the states should broaden the interpretation of the Agreement to include the CHS participants.

Article 2 of the Agreement has broadened the scope of the duty to assist the personnel of a spacecraft. Whereas Article 5 of the Outer Space Treaty mandated to render "all possible assistance in the event of accident, distress, or emergency landing," Article 2 of the Rescue Agreement added the word "unintended landing." The nature of assistance has been set out that the obliged state is required to "immediately take all possible steps" to rescue personnel of a spacecraft. This mandate seems greater obligation of assistance than mentioned under Article 25 of the Chicago Convention,[140] which requires only as "practicable" by the state where landing is made.[141] However, the real distinction between "all possible steps" and "practicable" would depend on the efforts taken by states in comparable situations.[142]

However, the question that arises here is whether the duty imposed on states remains effective in the case of commercial human spaceflight. In this regard, the rule of treaty interpretation to give literal meaning to the plain language and ordinary meaning affirmatively supports the application of the Outer Space Treaty and the Rescue Agreement to commercial ventures.[143] Perhaps it is pertinent to ask whether this interpretation of the Treaty and the Agreement applies to the space tourists or passengers of the commercial human spaceflights. To answer this question, different terminologies used in different treaties are relevant. The Outer Space Treaty uses the term "astronaut," which is considered the narrower term, and conferring the status of "envoys of mankind" to them works as a limitation. Considering humans aboard

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139 James J. Trimble, *International Law of Outer Space and its Effect on Commercial Space Activity*, 11(3) Pepp. L. Rev. 521, 536 (1984).

140 Convention on International Civil Aviation (1944), 15 U.N.T.S. 295.

141 Dembling & Arons 1968, at 646.

142 *Id.*

143 Mark J. Sundahl, *The Duty to Rescue Space Tourists and Return Private Spacecraft*, 35(2) J. Space L. 163 (2009).

spacecraft as a "personnel" in the Rescue Agreement is a broader term and making the Agreement applicable to the passengers aboard the CHS. The most favorable provision for the passengers is available under the Moon Treaty, which refers to humans in space as "persons" and making them eligible to get benefits of the Outer Space Treaty and the Rescue Agreement (This has been discussed in detail under Part 2.3.5 of the paper).

2.3.3. The Liability Convention

With the growing participation of non-governmental entities in outer space activities, especially in the case with the CHS, the existing space law pertaining to liability is "inadequate."[144] Since the involvement of non-governmental entities, mainly intended to make profits, the clarity on the liability regime is much needed and reasonable. The current liability regime, as mentioned in Articles VI and VII of the Outer Space Treaty and elaborated in the Liability Convention,[145] are state-oriented.[146] Article VI of the Outer Space Treaty mandates that the state "shall bear international responsibility for national activities in outer space … whether such activities are carried on by governmental agencies or by non-governmental entities". The inclusion of the term non-governmental entities hints at the role of private entities for commercial activities. However, such non-governmental entities shall be authorized and continuously be supervised by the concerned state authorities to assure that the activities are not violating the mandates of international space law. Thus, Article VI places an obligation on states and limitations on private entities/individuals within those states.

Article VII provides that "each State Party from whose territory or facility an object is launched, is internationally liable for damage to another State Party to the Treaty or to its natural or juridical persons by such object or its component parts on the Earth, in air space or in outer space …" The Liability Convention has been based and elaborated upon the provisions given under Articles VI and VII of the Outer Space Treaty.

The Liability Convention details the implementation of the "international liability" regime imposed on states by the Outer Space Treaty. Articles 2 and 3 of the Convention, more precisely than the Outer Space Treaty, bifurcate the liability into two different principles: firstly, Article 2 defines that "A launching State shall be absolutely liable to pay compensation for damage caused by its space object on the surface of the Earth or to aircraft in flight." Hence, Article 2 of the Convention, in line with Article VI of the Outer Space Treaty, provides for absolute liability obligation on the launching states. However, the launching state can be exonerated from the absolute liability if it is shown that the claiming state has acted negligently or

144 Steven Freeland, *Fly Me to the Moon: How will International Law Cope with Commercial Space Tourism*, 11(1) Melb. J. Int'l L 90 (2010).

145 Liability Convention (1972), 861 U.N.T.S. 187.

146 Freeland 2010, at 17.

intentionally, or such a state as a launching state was not working in compliance with international law.[147]

Secondly, Article 3 provides that if any damage is caused by the space object of a launching state to another launching state, the "latter shall be liable only if the damage is due to its fault or the fault of persons for whom it is responsible." It means, through this "fault-based" liability principle, launching states will not be liable to pay damages just merely in the event of damage. The claiming state has to prove the fault or negligence of the launching state.

However, it is not clear whether the Liability Convention will apply to passengers of a space object or spaceflights. Article 7 of the Convention provides that this Convention does not apply to damage caused by a space object of a launching state to its own nationals and foreign nationals during the time they are participating in the operation of that space object. Another issue is that the Liability Convention may not apply to passengers, as they do not participate in the operation of the space object. Thus, a passenger cannot get the benefit of the Liability Convention.[148] Hence, a legal vacuum is there concerning liability mechanisms under the Outer Space Treaty and the Liability Convention for the CHS. However, in the absence of provisions under the Convention, one can establish the liability under the domestic laws, if available.[149]

2.3.4. The Registration Convention

Registration Convention[150] is of much importance to determine which state owns the space object launched into space. It makes clear to the international community that who owns, control, and exercise jurisdiction over the space object. The bare provision has been set out in Articles V and VIII of the OST. Article V mandates that the state party shall return the astronauts safely and promptly rescued in distress to the state of registry. Article VIII clarifies that the state retains jurisdiction not only over the space objects but also the personnel aboard them. The state on whose registry an object is launched retains such jurisdiction and control. This provision is relevant from two perspectives: firstly, to identify and determine the liability of the state in case of any misfortune. Secondly, as stated in Article VIII, if "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 …" Thus to identify the real and actual state of the registry is relevant for applying various laws arising due to any space activities. However, these articles do not prescribe the details of the procedure and requirements for registering space objects.[151]

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147 Trimble 1984, at 541.

148 Hobe 2007, at 450.

149 *Id.*

150 Registration Convention (1976), 1023 U.N.T.S. 15.

151 Ram S. Jakhu et al., *Critical Issues Related to Registration of Space Objects and Transparency of Space Activities*, 143 Acta Astronautica 406 (2018).

The Registration Convention expands on the bare provision of the Outer Space Treaty. It defines certain terminologies such as launching state, space object, and state of registry.[152] The Convention was brought to achieve transparency in the space activities, and the registry would assist in identifying the launching state.[153] It contains 12 articles only to detail "one rather straightforward concept: the registration of space objects."[154] The objective of the Convention is to establish and maintain a mandatory central register of space objects to be maintained by the Secretary-General of the UN – a publicly accessible document, to assist in identifying the space objects.[155] Such registry fosters the effective application of space law, mainly the Outer Space Treaty, the Rescue Agreement, and the Liability Convention.[156]

The Convention provides for registration of every launch at two-level. Firstly, Article 2 mandates for maintaining the national register of a space object when launched into earth orbit or beyond. It also puts an obligation on the launching state to inform the SG of the UN of the establishment of such a register. This obligation to maintain the national register is broader in ambit than the Article VIII of the Outer Space Treaty by establishing the jurisdiction by virtue of the national registry.[157] Such jurisdiction establishes a legal link with the space object and manifests legislative and executive control of the state over the space object.[158] The article also prescribes modalities if there are two or more launching states. In such a scenario, one of the states shall become the state of registry, and the joining states shall jointly determine that. However, the article does not describe the contents of the national registry. It remains open to states to determine the contents of the registration and how to maintain it.

Secondly, Articles 3 and 4 provide for international registration. Article 3 of the Convention directs the SG of the UN to maintain a global register. The information contained in the register shall be full and have open access. The maintenance of such an international register lies in obligations arising in Article XI of the Outer Space Treaty.[159] This article of the Treaty puts a legal obligation on states to "disclose information regarding nature, conduct, locations, and results of their activities in outer space."[160]

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152 Registration Convention, Art 1.

153 Jakhu et al. 2018.

154 Frans G. von der Dunk, *The Registration Convention: Background and Historical Context*, Space, Cyber, and Telecommunications Law Program Faculty Publications, No. 32 (2003) (Aug. 8, 2021), available at https://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1031&context=spacelaw.

155 Registration Convention, Preamble.

156 von der Dunk, *supra* note 154.

157 Anja Nakarada Pecujlic, *Registration Convention* in *Oxford Research Encyclopedia of Planetary Science* 9, 9–10 (2020).

158 *Id.*

159 *Id.*

160 *Id.*

Unlike Article 2 of the Registration Convention, which does not list out the contents of information for the national register, Article 4 specifies the details that need to be furnished in the international register. These are (a) name of launching state or states, (b) an appropriate designator of the space object or its registration number, (c) date and territory or location of launch, and (d) basic orbital parameters, including nodal period, inclination, apogee, perigee, and general function of the space object. The state of the registry, from time to time, has to inform the SG with additional information concerning the space object.

The Convention does not have that much attention and has fewer signatories than the Outer Space Treaty. However, it is evident that in the coming days, the Convention would become a necessary legal document for outer space activities.[161] In the wake of emerging commercial activities and private participation – as they also have to follow this registration procedure through state mechanism, the number of registration will rise, especially in the case of commercial human spaceflights.[162]

2.3.5. The Moon Agreement

On the initiation of the Soviet Union (as it was then) in 1971, the COPUOS worked on a draft of the Moon Agreement[163] and got finalized in 1979.[164] The Agreement reiterates and rewords many of the Outer Space Treaty articles. It also included many new additions to regulate outer space activities effectively. Many provisions of the Agreement have taken the contrary or segregated views from the Outer Space Treaty as if the Agreement is specifically applicable to the Moon. Two crucial departed views from the Outer Space Treaty are being highlighted here that is quite relevant for the CHS. Firstly, as mentioned in the Article I of the Outer Space Treaty, outer space, including the Moon and other celestial bodies, "shall be the province of all mankind," the Moon Agreement in Article 4 reiterates that the "exploration and use of the Moon shall be the province of all mankind." However, the same Moon Agreement forwarded a new concept of "common heritage of mankind" (CHM) for the Moon and its natural resources.

On the one hand, the "province of mankind" under the Outer Space Treaty considers outer, including the moon and other celestial bodies, free for use and exploration by the countries. This provision does not provide equitable sharing of the benefits to the developing countries which do not conduct space activities. However, the inclusion of the "common heritage of mankind" makes it possible that an equitable

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161 Dunk, *supra* note 154.

162 Robert A. Goehlich, *Space Tourism: Hurdles and Hopes*, 1(1) International Journal of Aviation Systems, Operations, and Training 17, 27 (2014).

163 Moon Agreement (1979), 1363 U.N.T.S. 3.

164 Heidi Keefe, *Making the Final Frontier Feasible: A Critical Look at the Current Body of Outer Space Law*, 11(2) Santa Clara Comp. & High Tech. L.J. 345, 353 (1995).

share shall be given to developing countries.[165] This sharing mechanism shall be effectuated by establishing an international regime. Thus, many countries capable of space exploration and mining feel this CHM is against their interests and hinders private participation. However, as concluded by Ram Jakhu, this is a misinformed conception.[166] The CHM does not prohibit commercial activities in outer space. It merely enables the developing countries to get a share of benefits arising from those activities.

Secondly, Article 10 of the Moon Agreement broadens the ambit of the term "astronauts." It says, "States Parties shall adopt all practicable measures to safeguard the life and health of persons on the Moon." Furthermore, the article says, any person for this purpose shall be regarded as an astronaut, and Article V of the Outer Space Treaty and "personnel of spacecraft" given under the Rescue Agreement shall apply to that person. In this way, this provision becomes favorable to a person who lands on the moon aboard commercial human spaceflight. He is an astronaut regardless of his purpose of visit and who is funding that visit. However, the question remains uncertain whether this mandate applies to persons visiting outer space other than the moon. Article 10 directs to confer such status of astronaut only to "persons on the Moon." Another issue regarding the actualization and realization of the Moon Agreement, as observed by Francis Lyall, remains uncertain. He opined:

> The Moon Agreement was a well-intentioned effort to take the generalities of the 1967 Treaty further, and to spell out in more detail various matters with the Moon specifically in view. It remains to be seen whether attempts will be made to resuscitate it, although at least one distinguished commentator considers this unlikely in the near future. But whatever happens to the Moon Agreement, the fact is that it does identify several fundamentals. Its main problem is the "common heritage" principle, with the implication of some "Authority" as a hidden reef.[167]

3. Issues Relating to the Commercial Human Spaceflights

After analyzing the existing provisions under international in general and space law in particular, it is observed that there is an inadequacy of legal provisions concerning CHS regulation at the international level. The five international treaties provide a very rudimentary and unclear picture of the commercial activities in outer space. Since the CHS is a new addition to the emerging commercial activities

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165 Moon Agreement, Art. 11.

166 Ram S. Jakhu, *Twenty Years of the Moon Agreement: Space Law Challenges for Returning to the Moon*, 54 ZLW 243, 253 (2005).

167 Francis Lyall, *On the Moon*, 26(1) J. Space L. 129 (1998).

in outer space, the problem becomes more apparent due to the involvement of humans directly or carrying them to outer space. The CHS is posing several basic questions to the existing space law. These questions challenge the fundamentals of space law, and for fully realization and growth of the CHS, much depends on how these questions are being addressed. The issue has been categorized into two parts: (1) Definitional Issues and (2) Concerning Issues.

3.1. Definitional Issues

3.1.1. Air Space, Outer Space, or Aerospace

The applicable law in any particular territory lies in how the jurisdictional issues are conferred to states claiming their jurisdiction over that particular territory. Due to the proximity of the physical location of air space and outer space, air law and space law are often juxtaposed.[168] In the context of applicable law on the CHS, there is a difference of opinions. Since the CHS flies over air space as well as outer space, and there is no concrete demarcation between these two areas, the applicable laws remain uncertain, unclear, and are in limbo. The fundamental question to delimit these two areas raises the question as to how and from where these two areas can be bifurcated. For this, there is two generally accepted viewpoint: spatial, and functional. The spatial view supports for fixing a particular altitude from the sea level as a boundary line between air space and outer space. For this purpose, the spatial approach favors the Soviet proposal of fixing it at an altitude not exceeding 110 kilometers above sea level.[169] Some states were also stressing for the delimitation, as it was "desirable to have a global and easily determinable boundary."[170] The majority view and some state practice also accept the von Karman line, i.e. at the altitude of 100 kilometers, as the boundary line between air space and outer space.[171]

Instead, the functional approach opined for establishing the regulations "to avoid possible interferences among space activities and adverse consequences for human life on earth."[172] This approach, therefore, focused on specific purposes rather than having a general delimitation.[173] This approach considers this demarcation issue "irrelevant," focuses on "the creation of the nature or purpose of a given activity in determining which legal regime should apply."[174] However, a third viewpoint has

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168 Stephan Hobe et al., *Space Tourism Activities – Emerging Challenges to Air and Space Law*, 33(2) J. Space L. 359 (2007).

169 Stephen Gorove, *Current Issues of Space Law Before the United Nations*, 11(1) J. Space L. 5, 10–11 (1983).

170 *Id.*

171 Hobe et al. 2007, at 362–363.

172 Gorove 1983.

173 *Id.*

174 Hobe et al. 2007, at 362.

adopted a "pragmatic" approach, which advocated that a delimitation would not be "responsive to any practical need." Instead, it may have "unforeseen negative effects on the progressive development of space activities and space law."[175]

Due to the absence of a defined boundary, various questions arise regarding what law should apply to the CHS. "Should air law apply for part of the journey and space law then be applied at some (undefined) point in the overall space tourism activity?"[176] Here for the CHS regulation, the functionist or pragmatic viewpoint seems more useful. A wholesome regime for the entire journey would make it convenient to develop one international treaty regime for the CHS.

3.1.2. Astronauts

International space law does not define the term "astronaut." However, this deficiency did not hinder the initial days of carrying humans to space. There is a workable understanding of the meaning of it. Astronauts, in general, understood as a person who is/are "a pilot, an engineer, a scientist capable of carrying out scientific experiments and knowing not only his vehicle and his work but also the work of his neighbors in the event of a replacement."[177] Armand Spitz and Frank Gaynor defined the dictionary meaning of the term as a person who actively engages in the science and technique of spaceflight, concerned with flying through space or one who navigates through space.[178] However, the incorporation of the term "astronaut" into the Outer Space Treaty has been a controversial one in the beginning, "passing from *cosmonaut*, a person navigating in the universe – preferred by the Russian – to *crew*, intended in a more general sense, and then to an *astronaut*."[179]

Due to the risks involved and collective achievement of humans in outer space activities, an astronaut is granted the status of "envoys of mankind" in outer and is eligible for certain protections and privileges. Yet the contents of diplomatic immunity that can be conferred to astronauts is not precise.[180] The problem that arises here is considering a person visiting space as an "astronaut" confers them the status of the "envoys of mankind." Thus the question is whether a person who is carried to the outer space for his own adventurism could be called the astronaut. Will they be conferred the status of the "envoys of mankind" in outer space? To avoid this conflict, a clear definition of "astronaut" is essential. The Rescue Agreement, it observed, did realize the

175 Gorove 1983.

176 *Id.*

177 Gabriella Catalano Sgrosso, *Legal Status, Rights and Obligations of the Crew in Space*, 26(2) J. Space L. 163, 164 (1998). For details of the work performed by the astronauts, *see* Robert B. Voas, *A Description of the Astronaut's Task in Project Mercury*, 3(3) Hum. Factors 149 (1961).

178 Armand Spitz & Frank Gaynor, *Dictionary of Astronomy and Astronautics* 32 (1959).

179 Catalano Sgrosso 1998, at 166.

180 *Id.*

issue and used the term "personnel of spacecraft" – a broader term that only does not include trained personnel who pilots spacecraft.[181] "Personnel" includes other persons "assigned to and accompanying the spacecraft, such as a scientist or physician."[182]

3.1.3. Space Tourists as Astronauts

The absence of clarity of the term astronaut's definition is felt with the emergence of commercial human spaceflights.[183] Though initially was not an area of priority, the CHS emerged as significant aspect of commercialization, with the visit of Dennis Tito in 2001 and Mark Shuttleworth in 2002.[184] The crux of the issue is whether the space tourist could be considered as an astronaut. Whether space tourists can be conferred with the status of "envoys of mankind." Whether a similar level of protection, as available to astronauts, can be afforded to astronauts.

It is necessary to examine three treaties, namely the Outer Space Treaty, the Rescue Agreement, and the Moon Agreement, to address these questions. These three treaties have used different connotations to denote persons in space. Article V of the Outer Space Treaty uses the term "astronaut" and conferred them the status of "envoys of mankind." However, it is observed that the term "envoys of mankind" conveys a "symbolic value."[185] It also indicates from the preparatory work of the COPUOS that the term does not carry "any specific legal rights or duties."[186] The same Outer Space Treaty in Article VIII mandates that the state of registry retain jurisdiction and control over the space object and personnel thereof. It means the provision intends to include the passengers traveling to space aboard commercial/private spaceflights. However, the question as to whether they can be considered as the "envoys of mankind," even though the term does not convey any "specific legal rights and duties," is not clear. Perhaps the absence of this status does not hinder them from getting assistance during any distress.

Since it is clear from the preamble of the Rescue Agreement that the state is directed to render "all possible step(s) to rescue" the "personnel of a spacecraft."[187]

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181 Stephen Gorove, *International Protection of Astronauts and Space Objects*, 20(3) DePaul L. Rev. 597, 600 (1971).

182 *Id.*

183 Francis Lyall, *Who Is an Astronaut? The Inadequacy of Current International Law*, 66(11-12) Acta Astonautica 1613 (2010).

184 For detailed history of space travel, *see* S. Abitzsch & F. Eilingsfeld, *The Prospects for Space Tourism: Investigation on the Economic and Technological Feasibility of Commercial Passenger Transportation into Low Earth Orbit*, Space Future (1992) (Aug. 8, 2021), available at http://www.spacefuture.org/archive/investigation_on_the_economic_and_technological_feasibiity_of_commercial_passenger_transportation_into_leo.shtml.

185 Hobe 2007, at 455.

186 *Id.*

187 Rescue Agreement, Art. 2.

Though it can be argued that these provisions did not foresee the eventualities of commercial human spaceflight, the humanitarian approach of the Agreement creates a possibility of rendering assistance even to passengers. However, some conclude that the "personnel of spacecraft" "would not appear to include regular passengers."[188] The Moon Agreement, in this regard, also paves a way by considering every "person" on the moon as an "astronaut," and thereby making them eligible for all benefits of the Outer Space Treaty and the Rescue Agreement. Still, it is clear that the existing Space Law does not clearly define the "legal status of commander, crew, and passengers."[189]

3.1.4. Space Objects

Any "satellites, artificial satellites, installations, constructions, vehicles, equipment, facilities, and so forth" are generally termed as space objects.[190] Another definition of space object, as defined by some, is "any object which was designed to be launched into outer space, such as, a space rocket, spacecraft, spaceship or space laboratory."[191] In this regard, the space treaties, "seemingly without much distinction," use different terminologies such as "space vehicles, spacecraft, space objects, man-made space objects, objects launched into outer space, and so forth."[192] The space object is vital to apply various provisions of the different space treaties. Article VIII of the Outer Space Treaty creates jurisdiction over objects launched into outer space with the state of registry of that object. The process of registry of the space object has been described in the Registration Convention. This registration of object helps in applying the mandates of Article V of the Outer Space Treaty, Rescue Agreement, and Liability Convention. Still, a clear definition of the term remains vague. An inclusive definition provided in Article I(d) of the Liability Convention says that the "space object" includes any component part and its launch vehicle and parts thereof. Thus, the definition is illustrative and not clear. As stated by some, the Liability Convention and the Registration Convention provide only "partial definition," which leaves certain questions unanswered, such as "what is or is not a space object or under what circumstances an object becomes or ceases to be a space object."[193] Whether any debris created out of any space object will be considered the "object" is debatable. The definition was also not drafted with a thought on commercial space transportation as well.[194] As Ricky J. Lee rightly observes:

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188 Gorove 1971.

189 Hobe 2007, at 457.

190 Lee 2000, at 212.

191 Gorove 1971, at 612.

192 Lee 2000, at 212.

193 Stephen Gorove, *Toward a Clarification of the Term "Space Object" – An International Legal and Policy Imperative?*, 21(1) J. Space L. 11, 12 (1993).

194 Paul Stephen Dempsey, *The Legal Regime Governing Space Transportation Systems* (Aug. 8, 2021), available at https://www.mcgill.ca/iasl/files/iasl/ASPL633-Space-Transportation-Regime.pdf.

> … it is clear that "space objects" must be more clearly defined in the near future if the space treaties are to be given their adequate practical effect. This is especially the case in relation to the space debris problem, where the absence of a clear definition on space objects would have a significant impact in the application of relevant legal principles.[195]

The definition becomes necessary, in the CHS context, as the Liability Convention creates an obligation of liability in the event of "damage caused by space objects." The inadequacy of definition raises whether the liability regime provided under the Liability Convention would apply to damages caused by the space debris and human activities in outer space.[196]

3.2. Concerning Issues

3.2.1. Authorization, Supervision, Registration, and Certification

Article VI of the Outer Space Treaty clarifies that the state shall "bear international responsibility for national activities in outer space." It means any activities carried by governmental or non-governmental entities will have the same status as national activities in the international sphere. Thus, it becomes incumbent on states to ensure that: (a) all national activities – done by government or non-government bodies, shall be carried out in conformity with the provisions outlined in the Treaty; (b) Concerned state has to authorize and continuously supervise the activities carried by non-governmental entities. These mandates have been further elaborated in the Liability Convention. The purpose of authorization and continued supervision for non-governmental entities, especially for the CHS, assures the "state responsibility and/or liability" provided under the Outer Space Treaty and the Liability Convention.[197] States are obliged, therefore, to adopt domestic regulations for governing space activities.[198]

To determine the jurisdiction over any space object launched into outer space depends on the state where the space object is registered with. This provision to register a space object emanates from Article VIII of the Outer Space Treaty. This article mandates that the state of registry of an object launched into outer space retains jurisdiction and control over "such object, and over any personnel thereof…" This provision assists in fulfilling various obligations and duties imposed on states under the Outer Space Treaty and subsequently adopted treaties. To understand the significance of registration, the elaborated provisions of the Rescue Agreement and the Liability

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195 Lee 2000, at 213.

196 Elena Carpanelli, & Brendan Cohen, *Interpreting "Damage Caused by Space Objects" under the 1972 Liability Convention*, IAC-13,E7,1,5,x18256 (Aug. 8, 2021), available at https://iislweb.org/docs/Diederiks2013.pdf.

197 Dunk 2011, at 143.

198 Mark J. Sundahl, *Legal Status of Spacecraft* in *Routledge Handbook of Space Law*, *supra* note 7, at 62.

Convention can be looked into. A detailed Registration Convention was adopted to give meaningful effectuation of the mandates of the Outer Space Treaty. This Convention provided procedural guidelines to register an object at the national as well as with the UN Secretary-General. For CHS, these provisions are of more considerable significance. Since both the Outer Space Treaty and the Registration Convention confer jurisdiction to the state of registry over the space object and "personnel thereof," the question arises whether tourists can be considered as the personnel of spacecraft. Another point is that whether tourists can escape the state jurisdiction? So far as the Outer Space Treaty and the Registration Convention do not expressly exclude the space tourists, the understating is that the "personnel thereof" includes the tourists.[199]

Apart from challenges arising out of treaties and their domestic incorporation, the CHS puts new challenges, i.e. certification for the spacecraft operations and related issues. The issue of certification concerning commercial spaceflight has been beautifully captured by Frans G. von der Dunk as follows:

> The private operation of manned spacecraft now calls for the application of concepts well-known in aviation, such as safety certification of the vehicles and the hard and software involved, and licensing of the crew involved in flying the spacecraft, at least in principle, something not considered necessary as long as the transportation was essentially undertaken by public agencies. In addition, concepts such as 'wet lease' and 'dry lease' and their respective legal consequences might now become involved. Finally, with the advent of paying passengers on the scene, their contractual arrangements will also deal with contractual liability or waivers thereof, with gross negligence and with wilful misconduct, all this partly in relation to certification issues.[200]

3.2.2. Training and Selection Criteria for Tourists

Considering any person visiting space as an "astronaut" depends on two elements: training and altitude.[201] A valuable and practical distinction can be made between tourists and astronauts by identifying these two elements.[202] Astronauts are trained and skilled personnel to perform scientific or technical duties on board. A similar analogy can be drawn from the "crew of a ship or an aircraft" for the astronauts or "personnel." There are no such international standards prescribed for astronauts. Different governmental space agencies specify different criteria. However, certain aspects are common for the selection of astronauts. These are psychological condition, physical condition, medical condition, technical and science skills

199 Dunk 2011, at 151.

200 *Id.*

201 Lyall 2010.

202 Yanal A. Failat, *Space Tourism: A Synopsis on its Legal Challenges*, 1 Irish L.J. 120, 124 (2012).

criteria, and pilot experience certificate.[203] After fulfilling these criteria, a person has to undergo rigorous training of different types, such as robotics systems training; navigation; flight training; ground operations training; mission assignment training; medical, physical, and psychological preparations; extreme environmental survival training; extravehicular activity training, and training for/after return to earth.[204]

If training would have been one criterion to consider commercial passengers as astronauts, they are supposed to undergo such rigorous training. However, the training requirement differs for commercial passengers. Such as at least six months of training is required for visiting the ISS, and further training is imparted for a spacewalk.[205] The private companies, on the other hand, renders one week and even three days of training.[206] In these scenarios, the question of the status of astronauts to commercial passengers becomes problematic. However, if these commercial passengers, if considered as "personnel," the benefits of the Outer Space Treaty and the Rescue Agreement could be extended to them as the existing space law does not exclude them expressly. Yet this broader interpretation is doubtful concerning privileges and protections available to astronauts, whether it will be available to space tourists or not.

3.2.3. Space Traffic Management

Space is busier like never before. The increased launching activities, including the CHS, have increased the "space traffic," which needs to be managed, and particularly "the safety-focused aspect of *traffic control*."[207] Space objects in general and human spaceflights, in particular, face a grave threat from the "debris" or "junk" that can cause an accidental collision with them.[208] To avert such collision needed a "consistent and unified systems."[209] Today, space activity is "no more just a tool for pioneering," it supports "economic growth, mitigate risks and ensure innovations on Earth."[210] Thus

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[203] For details of these criteria, *see* Matt Harasymczuk, *Astronaut Training Program*, Release c311c2f, 8 August 2019 (Aug. 8, 2021), available at https://buildmedia.readthedocs.org/media/pdf/astronaut-training-program/latest/astronaut-training-program.pdf.

[204] For details of training that astronaut has to undergo, *see Id*.

[205] Failat 2012.

[206] *Id.*

[207] Frans G. von der Dunk, *Passing the Buck to Rogers: International Liability Issues in Private Spaceflight*, 86(2) Neb. L. Rev. 400, 427 (2007).

[208] In 2006, a tiny space debris collided with the International Space Station. In 2009 Iridium 33/Cosmos 2251 collision is an eye-opening event.

[209] Glenn Peterson et al., *Space Traffic Management in the Age of New Space, Centre for Space Policy and Strategy*, Center for Space Policy and Strategy (April 2018) (Aug. 8, 2021), available at https://aerospace.org/sites/default/files/2018-05/SpaceTrafficMgmt_0.pdf.

[210] Space Traffic Management: Top Priority for Safety Operations (Aug. 8, 2021), available at https://iislweb.org/docs/Diederiks2017.pdf.

as observed, Space Traffic Management (STM) can interlink various issues that space sectors are facing, such as small satellite business, reusable rockets, space mining, commercial human spaceflight, and space debris mitigation.[211] Therefore, there is a need for "international STM standards, guidelines, and best practices" that should drive the rapid growth of space activity.[212]

As per estimation, more than 500,000 debris or space junk are tracked orbiting the Earth at the speed up to 17,000 mph, capable of damaging any satellite or a spacecraft.[213] More than 23,000 known human-made debris of about 4 inches or bigger in size revolve around the earth.[214] The United States Space Surveillance Network, as of 2020, is tracking more than 14,000 pieces larger than 4 inches in size.[215] Even small debris, due to its high speed, can damage the spacecraft; for example, space shuttle windows often need to replace due to the collision of human-made debris of 1 mm (0.04 inch) size.[216] The risk of damage due to the collision of debris with the spaceflight is one in three hundred.[217]

STM is to minimize the effects of debris on spacecraft.[218] It also provides a foundation for further research on collision avoidance, improved utility of geo-synchronous orbit, sun-synchronous orbit (SSO) congestion, and dangers to human spacecraft.[219] Neither of the space treaties prohibits legal regulation nor specify for solutions to the traffic issue.[220] The STM was first exposed to the world community in 2006 by the International Academy of Astronautics (IAA) in its report. However, the report did not consider STM as a "priority from the regulatory point of view."[221] The Report titled "Cosmic Study on Space Traffic Management" defined the STM as:

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211 Space Traffic Management, *supra* note 210.

212 Michael P. Gleason, *Establishing Space Traffic Management Standards, Guidelines and Best Practices*, First Int'l Orbital Debris Conf. (2019) (Aug. 8, 2021), available at https://www.hou.usra.edu/meetings/orbitaldebris2019/orbital2019paper/pdf/6182.pdf.

213 NASA, Space Debris and Human Spacecraft, 27 September 2013 (Aug. 8, 2021), available at https://www.nasa.gov/mission_pages/station/news/orbital_debris.html.

214 Maya Wei-Hass, *Space Junk is a Huge Problem – and it's only Getting Bigger*, National Geographic, 25 April 2019 (Aug. 8, 2021), available at https://www.nationalgeographic.com/science/space/reference/space-junk/.

215 Erik Gregersen, *Space Debris*, Encyclopedia Britannica, 27 April 2020 (Aug. 8, 2021), available at https://www.britannica.com/technology/space-debris.

216 *Id.*

217 *Id.*

218 Brian Weeden et al., *Space Traffic Management*, International Space University (Aug. 8, 2021), available at https://www.unoosa.org/pdf/pres/stsc2008/tech-05.pdf.

219 *Id.*

220 Space Traffic Management, *supra* note 210.

221 *Id.*

"the set of technical and regulatory provisions for promoting safe access into outer space, operations in outer space and return from outer space to Earth free from physical or radio-frequency interference."

At a national level, in 2016, one report titled "Orbital Traffic Management Study – Final Report" was prepared for the National Aeronautics and Space Administration (NASA) by the Science Applications International Corporation (SAIC). The report did not define the orbital traffic management or the STM. Instead, it focused on developing a national system than the international regime.[222] The report also preferred the term "safety" over "management." An adequate framework for the STM includes various pressing issues. Such as "Collision Avoidance and Data Sharing,""Debris Mitigation,""Behavior Guidelines/Code of Conduct,""Organizational Oversight," and "Comprehensive Communication Strategy."[223]

Thus, it can be concluded, despite the imminent threat from space debris and growing space launches, an appropriate framework to regulate the traffic in outer space is lacking. However, in the future, it is expected that the International Civil Aviation Organisation (ICAO) would assume the role to manage and track the space traffic (details of the role of the ICAO have been discussed in Part 4). Kai-Uwe Schrogl has beautifully described the intricacies of the STM:

> In this situation, STM challenges the current condition of space law and the way it will be developed further. While this present state could be regarded as "piecemeal engineering," STM would provide to the law a regulatory "big bang." STM would not tackle single issues but would regard the regulation of space activities as a comprehensive concept. This concept is based on functionality, aiming at the provision of a complete set of rules of the road for the present and future. Space activities have to be regarded as a traffic system and not as disconnected activities of States. This would require not only new, interacting levels, and forms of regulation (binding treaty provisions/technical standards, international/national provisions) but also new ways of organizing the supervision and implementation.[224]

3.2.4. Liability

A concrete liability and financial risks are fundamental for any commercial activity. This becomes essential in the case of commercial human spaceflights. Liability arising

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222 Space Traffic Management, *supra* note 210.

223 For detail, *see* The American Institute of Aeronautics and Astronautics Inc., Space Traffic Management (STM): Balancing Safety, Innovation, and Growth – A Framework for a Comprehensive Space Traffic Management System, Position Paper (November 2017) (Aug. 8, 2021), available at https://www.aiaa.org/docs/default-source/uploadedfiles/issues-and-advocacy/policy-papers/position-papers/stmpapernovember2017.pdf?sfvrsn=219af38f_0.

224 Kai-Uwe Schrogl, *Regulation for Future Space Traffic Control and Management* in *Space Safety Regulations and Standards* 303 (Joseph N. Pelton & Ram S. Jakhu eds., 2010).

from the CHS can be categorized into two kinds: (i) passenger liability and (ii) third-party liability.[225] For CHS, to determine the applicable law on liability depends on the vehicle used for launching: (a) Laws applicable before separation in case of aircraft launch scenario; and (b) Laws applicable after separation in case of aircraft launch scenario, or rocket-propelled launch scenario.[226]

In the case of the aircraft launch scenario, before separation, two regimes of laws apply to aircraft, as it applies to the conventional aviation liability system. Firstly, the Warsaw Convention[227] 1929 and its additional instruments, collectively called the "Warsaw System." Secondly, the Montreal Convention, 1999.[228] These two instruments have an explicit provision to determine the aircraft carrier's liability in the event of passenger injury or death or delay. However, the application of this liability law has certain limitations to the CHS as this law applies only to the "international carriage of persons." It means a person is taken from one country to another. Therefore, this law suffers limitations if the launching and landing location of the space tourists are the same/or same country.[229]

Provisions of space law apply in the cases of separation of aircraft launch or rocket-propelled launch scenario.[230] Under Article III of the Liability Convention, passengers can seek a claim against the spaceflight operator, other passengers, the vehicle manufacturer, and against launching states.[231] However, due to the state-oriented approach of the liability mechanism under the Outer Space Treaty and the Liability Convention, it is submitted that the relevant state can only initiate the legal proceedings even in case of damage suffered by individuals.[232] It means space tourists cannot claim compensation themselves under the Liability Convention. However, they can avail of the remedies under the national laws, which also suffer from many limitations such as sovereign immunity.[233] Thus, as observed by Steven Freeland, a liability mechanism needs overall maneuvering considering the new space realities:

> For all of these reasons, it is preferable that, operating over and above the range of any relevant domestic legislation, a uniform and comprehensive

225 Hobe et al. 2007, at 368–371.

226 *Id.*

227 Convention for the Unification of Certain Rules Relating to International Carriage by Air (1929) (popularly known as "Warsaw Convention 1929"), 137 L.N.T.S. 11.

228 Convention for the Unification of Certain Rules for International Carriage by Air 1999 (popularly known as "Montreal Convention 1999").

229 Hobe et al. 2007, at 368.

230 *Id.* 369.

231 *Id.*

232 Freeland 2005, at 16.

233 *Id.*

> regime for passenger liability arising from space tourism activities be developed at the international level. These new rules, developed as part of the international law of outer space, should allow for direct private claims by passengers and operate from the moment of launch until the return to a final destination.[234]

Liability towards a third party can be of two kinds: (a) aircraft launch scenario before separation – is governed by the Convention on Damage Caused by Foreign Aircraft to Third Parties on the Surface 1952. (b) After the separation of aircraft launch scenario or rocket-propelled launch scenario, space law applies. However, Article 7(a) of the Liability Convention excludes the damages caused to the nationals of launching state(s). It means third-party liability under the Convention is a limited one. Parties from the same launching country cannot claim against each other.

3.2.5. Insurance

Space insurance, as a new phenomenon, gained its prominence in the early 1980s in the area of commercial satellite industries.[235] The existing space law clarifies that the state shall be liable "internationally" for their national activities even though the private sectors carry them. Thus, to maintain the financial risks, states started to insist on private players to insure their activities. With initial reluctance due to the involvement of high risks and colossal money, insurance companies have taken up with the technique of "coinsurance and reinsurance."[236]

Space insurance, in the view of high risks involved in space activities, "could provide effective relief for a whole range of liability risks currently associated with space activities, including space tourism."[237] Broadly, two types of space insurance exists.[238] Firstly, insurance of space objects. Secondly, liability insurance, including third-party liability and product liability. The object insurance can be further divided into three: (a) pre-launching insurance; (b) launch failure and initial operation; and (c) insurance of the satellite.[239] In a few countries, liability insurance has already started; however, its purchase is costly due to high risks. On the one hand, insurance is necessary to shoulder the CHS; legal certainty is required to regularise and popularise it. As stated by Zhao Yun

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234 Freeland 2005, at 17.

235 Sandeepa Bhat B., *Space Liability Insurance: Concerns and Way Forward*, 6(1) Athens J.L. 37 (2020).

236 *Id.*

237 Zhao Yun, *A Legal Regime for Space Tourism: Creating Legal Certainty in Outer Space*, 74(4) J. Air L. & Com. 959 (2009).

238 *Id.*

239 Diederiks-Verschoor & Kopal 2008, at 114.

> In theory, for space tourism, space liability insurance should work along the lines of the commercial liability regime. However, insurance companies need to make a profit, otherwise, they will not enter the industry. Since space tourism is new, insurance companies will need to assess their own risks. Knowing how much they can potentially be liable for will be an excellent starting point. Again, the current aviation liability principles are excellent starting points for the insurance companies.[240]

3.2.6. Celestial Property Rights

Among various fundamental principles for the use and exploration of outer space, "non-appropriation" and the area beyond sovereign claim define the limits of outer space activities of states. This exhibits from the principle declaring outer space as a "province of all mankind." With the increasing number of private participation in space activities, it is being viewed that the "non-appropriation" principle works as "an absolute barrier in the realization of every kind of space activity."[241] Since the investment stakes are quite huge to develop the capability to explore the outer space, private investors look for the "highest degree of legal rights to protect its investment for commercially viable formulae."[242] Such protection of intellectual creation in outer space and ownership over the space infrastructures is a genuine expectation from the private investors' perspective. However, the existing regime under Outer Space Treaty or the Moon Agreement strictly mandates not to grant any property rights to any state or international intergovernmental or non-governmental organizations or any natural person.

The principle of "non-appropriation" has a different face from the state practices as the International Telecommunication Union (ITU) allocates "quasi property rights" to states necessary for space activities. The ITU allocates radio spectrum "slots" in the geostationary orbit (GEO) based on "first-come-first-served." Later on, in 1994, the rule of first-come-first-serve was amended to assure the "equitable access" to states, on the push from Australia.[243] Still, the struggle for private investors in human spaceflights faces stringent legal hurdles. As Stevan Freeland has beautifully summarized it:

> These are very difficult issues to consider and go to the core of the fundamental bases upon which the international law of outer space has been developed. The question of property rights is obviously not peculiar to space

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240 Yun 2009.

241 Diederiks-Verschoor & Kopal 2008, at 28 (cited in footnote 32 of the book).

242 Freeland 2005, at 12.

243 Audrey L. Allison, *The ITU, and Managing Satellite Orbital and Spectrum Resources in the 21st Century* 31 (2014).

tourism activities. However, the development of these types of activities-including the possibility that they will eventually lead to the establishment of permanent settlements or "colonies" in space-highlights the need to "update" international space law in a way that will encourage the full potential of space tourism adventures that lie before humankind. This will require a clear outline of the scope of formal property rights that can be acquired by private entities seeking to promote their space tourism services.[244]

3.2.7. Space Environment

Any activities in outer space are "ultra-hazardous."[245] It is expected, and trends show that humans are showing interest in experiencing the pristine environment of outer space.[246] However, the "paradoxical implication" is that human presence will threaten that pristine.[247] Space debris – significant contamination in the space environment, has been recognized by the world community as a "hazard," causing severe risk and damage to the spacecraft and on the ground.[248] Apart from creating more debris, the increased CHS activities will inevitably pollute the pristine space environment at a higher speed.[249] Transporting passengers to sub-orbit or orbit requires more energy than any other earth location generates more pollution.[250] A study has projected that the number of space tourists from 2010 to 2065 is projected up to 200,000, which would emit 0.006 to 1.5 percent.[251] It is argued that space tourism is a "project for maximum environmental destruction," and it will "rapidly become the world's primary source of carbon dioxide emissions."[252]

The protection of the pristine natural environment of outer space is an inherent element of the philosophy of the "province of mankind."[253] It is also an essential element of the concept of the "Common Heritage of Mankind."[254] Thus, it can be said

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244 Freeland 2005, at 14–15.

245 Stephan Hobe, *Environmental Protection in Outer Space: Where We Stand and What is Needed to Make Progress with regard to the Problem of Space Debris*, 8(1) Indian J. L. & Tech. 1, 9 (2011).

246 Erik Cohen, *The Paradoxes of Space Tourism*, 42(1) Tour. Recreat. Res. 22, 28 (2017).

247 *Id.*

248 Hobe 2011.

249 Freeland 2005, at 19.

250 Goehlich 2014.

251 *Id.*

252 George Monbiot, *Lost in Space*, The Guardian, 13 November 1999 (Aug. 8, 2021), available at https://www.monbiot.com/1999/11/13/lost-in-space/.

253 Tanja Masson-Zwaan & Steven Freeland, *Between Heaven and Earth: The Legal Challenges of Human Space Travel*, 66(11-12) Acta Astronautica 1597, 1606 (2010).

254 Freeland 2005, at 19.

that the existing space law describes the environmental protection of outer space. However, it does not sufficiently detail the regulations and standards.[255] Article IX of the Outer Space Treaty provides that the states shall conduct their activities in outer space "so as to avoid harmful contamination and also adverse changes in the environment of the Earth." It also mandates the states to "adopt appropriate measures" for such a purpose where it is necessary. However, the provision is "ill-defined and imposes only minimal obligations on States."[256] The ambiguity of the provision is apparent when it provides that the Member State "shall undertake international consultations before proceeding" with any activity or experiment if the concerned State "has reason to believe" that such activity or experiment "would cause potentially harmful interference with activities of other States Parties."[257] This provision suffers from certain limitations such as "sufficient advance information on space activities of other States" and the "subjective conviction" of the launching states to engage with the consultation.[258] The negligence of this process can disrupt the peaceful use of outer space. Any collision of space infrastructure, due to that negligence, can create havoc to the outer space environment, especially space debris. The launching state can lawfully conduct those space activities in the absence of information regarding potential interference, even if it causes harmful interference.[259] Another flexible provision under Article 7 of the Moon Agreement mandates the states to preserve the moon's environment while exploring it. Moreover, a significant limitation of the Outer Space Treaty and even the Moon Agreement is that, despite space environment being a matter of great importance, it "is unfortunately limited to the parties to the treaty" and do not provide for "declaration of some general-purpose or intent of a broader scope."[260] Still, there are no "hard laws" to prevent states from pollution-prone activities. It also does not define the term space debris. Therefore, as Steven Freeland observed, fully-grown CHS activities will worry about the outer space environment protection without detailed principles. He observed:

> There is an unavoidable conflict between the development of space tourism activities and any environmental protection principles that form

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255 Adrian Taghdiri, *Flags of Convenience and the Commercial Space Flight Industry: The Inadequacy of Current International Law to Address the Opportune Registration of Space Vehicles in Flag States*, 19(2) B.U. J. Sci. & Tech. L. 405 (2013).

256 Freeland 2005, at 20.

257 Outer Space Treaty, Art IX.

258 I.H.Ph. Diederiks-Verschoor, *Environmental Protection in Outer Space*, 30 German Y.B. Int'l L. 144, 147 (1987).

259 *Id.*

260 Stephen Gorove, *Pollution and Outer Space: A Legal Analysis and Appraisal*, 5(1) N.Y.U. J. Int'l L. & Pol. 53, 61 (1972). *See also* Art. 7 of the Moon Agreement.

part of international space law. It will, therefore, be necessary to establish clear guiding principles to regulate such activities.[261]

3.2.8. Ethical and Moral Considerations

Apart from the above-mentioned legal issues requiring the formulation of "hard law," certain ethical considerations cannot be overlooked for developing an adequate regulatory measure for the CHS. As such, these are the ambit and scope of people traveling to space, protecting heritage in space, and biotechnological interventions to humans to cope with the adverse situations of outer space.

Steven Freeland has discussed the moral aspects of space tourism in detail. Regarding ambit and scope of the appropriate activities of the space tourists, he has described as follows:

> For example, what sorts of space tourism activities are appropriate? Should there be any restriction at all on the nature of these activities to preserve the "integrity" of humankind's endeavours in outer space, which to date have been largely of a scientific nature? On what basis, if any, should these restrictions be determined? Would it be acceptable, for example, to allow advertising billboards to be constructed, or casinos or even brothels to be established on the moon or other celestial bodies to cater to space tourists? How do space tourism activities correlate with the underlying philosophy by which international space law has always operated-that the exploration and use of outer space shall be carried out for the benefit and in the interests of all countries?[262]

He has also argued for protecting certain "heritage sites" and "national parks" in outer space such as Neil Armstrong's footprints and the first lunar landing site – that could be damaged by the space tourists accidentally or deliberately. To protect these sites, he has advocated for developing the "Space Heritage Treaty" to restrict and regulate these sites' access by tourists. Yet he has raised a pertinent question that would need to address shortly as to "whose heritage space is."[263]

Another moral issue that has been raised by George S. Robinson regarding biotechnological intervention that can be meted to humans to survive in the space environment.[264] He has taken the "mankind" debate to the next level by extending the future of space exploration and settlement to be conducted by different species of humankind. He has focused on the probability that humankind and its decedents

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261 Freeland 2005, at 21.

262 *Id.* at 19–20.

263 *Id.* at 21.

264 George S. Robinson, *Space Law: Addressing the Legal Status of Evolving Envoys of Mankind*, 36 Annals Air & Space L. 447 (2011).

are likely to be biotechnologically altered to survive in the space atmosphere in the future. He has, therefore, categorized the humankind into "*transhumans*" and "*posthumans*." Transhumans are a kind of extension of biologically-based humanism, whereas "posthumans" are to be "completely synthetic artificial intelligence, or they could be enhanced uploads … or they could be the result of making many smaller but cumulatively profound augmentations to a biological human." Law as a tool to regulate these evolving patterns of mankind needs to be used "no matter how transitory" the process is.

4. Role of the ICAO

The dilemma over applicable laws and the governing body for the space activities in general and the CHS, in particular, is well-founded on the jurisdictional claim and nature of the territory. Air space is an area where a state is authorized to assert its sovereign claims, whereas states cannot assert sovereignty in outer space and rights *in rem*. Traversing in the airspace is a well-regulated and technologically connected zone where the ICAO plays an immensely important role. On the other hand, for developing the regulations for outer space, the UNCOUPS is a leading organization. However, the role of the UNCOUPS is not as developed and detailed under the outer space treaties. Another organization that plays an important role, especially for the CHS, is ITU, which provides slots for radiofrequency. So the debates arise here: which authority will be appropriate for regulating the commercial human spaceflights – the ICAO or the UNCOUPS, or should there be a new organizational setup to deal with it.

Some argue for the extended role of the ICAO for spacecraft or aircraft reaches the upper layer of the earth's atmosphere. The Chicago Convention does not restrict the ICAO's regulatory competence over the suborbital aerospace transportation vehicles (SATV).[265] The definition of "aircraft" provided under Article 3(a) of the Chicago Convention does include the SATV.[266] The ICAO mainly regulates international civil aviation by developing the Standards and Recommended Practices (SARPs) under its Annexes. In the past, the ICAO has amended the "aircraft" definition to exclude the "hovercraft."[267] So, to the extent of its competence, ICAO has to simply redefine the "aircraft" defined under the appropriate Annexes to include the SATV to exercise its authority.[268] Annexes are considered as a part of the Chicago Convention and have

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265 Paul S. Dempsey & Michael C. Mineiro, *ICAO's Legal Authority to Regulate Aerospace Vehicles*, Proceedings of 3rd IAASS Conference – Rome 2008 (Aug. 8, 2021), available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1289547.

266 P. Paul Fitzgerald, *Inner Space: ICAO's New Frontier*, 78(4) J. Air L. & Com. 3, 9–10 (2014).

267 In 1967 the ICAO amended the definition of "aircraft" to exclude "hovercraft" from its ambit of regulation.

268 Dempsey & Mineiro, *supra* note 266.

the "same legal validity," yet the states may deviate from the SARPs by notifying the ICAO.[269] Therefore, it could be said that the ICAO may play a role as the regulatory body for SATV.

The ICAO's objective is to ensure the "safe and orderly" growth of international civil aviation.[270] This means the purpose of the Convention was not strained to the "specific" vehicle; instead, to foster international civil aviation in a "safe and orderly" manner.[271] Thus it is argued that the ICAO can play an essential role in managing the SATV as it does for the aircraft. Some commentators even argue, since ICAO holds substantial experience in managing air space activities, it can efficiently regulate the CHS regardless of the events taking place in orbit, sub-orbit, or point-to-point travel. Still, it is not the solution that the CHS needs to flourish.

However, against this popular belief, Ruwantissa Abeyratne, among many, has negated the expected role of the ICAO to manage outer space transportation. He observed:

> The first inconsistency in these claims is that, contrary to popular belief, ICAO is by no means a legislative body. The second is that the 19 Annexes to the Chicago Convention are entirely on civil aviation, and there is no practical way in which they can be amended, or added on to or revised, or new Annexes adopted under the Chicago Convention (which is entirely and exclusively on civil aviation) to cover such areas as licensing of spaceports, human space flight, space traffic management, the safety of personnel and astronauts and security. To accomplish such a task, ICAO should be renamed – as the International Aerospace Organization – and a new wing should be added to the Organization comprising experts in space safety, security, and the establishment and running of spaceports. So far, the only argument that the academics (who are mostly experts in space law) anchor themselves on to buttress their claim on ICAO is seemingly the fact that a spacecraft (or space object as it is sometimes called) traverses air space before its entering outer space. To start with, spacecraft often do this vertically and in a trajectory that may not pass over much of State-to-State airspace, whereas international civil aviation, as covered by ICAO, is exclusively involved with the country to country air transportation.[272]

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269 Fitzgerald 2014, at 8.

270 *Id.*

271 *Id.*

272 Ruwantissa Abeyrante, *Commercial Space Travel: Security and Other Implications*, 6(3) J. Transp. Secur. 257 (2013). *See also* Ruwantissa Abeyrante, *Regulation of Commercial Space Transport: The Astrocizing of ICAO* (2015). *See also* Frans G. von der Dunk, *Space Traffic Management: A Challenge of Cosmic Proportions*, Space, Cyber, and Telecommunications Law Program Faculty Publications, No. 91 (2016) (Aug. 8, 2021), available at https://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1091&context=spacelaw.

On the other hand, the UNCOUPS – the leading body for developing the consensus among states to establish legal regulations for outer space, has proved insufficient in many aspects, including the CHS. Such as the UNCOUPS has been unable to delimit the boundary between air and outer space, to cope up with the pace of commercialization of space activities including the CHS, protection of space environment, space debris, space traffic, and to establish an international body to manage the outer space activities, among many others.

The Outer Space Treaty – fundamental among all space treaties or laws does not provide for "new international decision-making STM authorities" to manage the space traffic.[273] The suggestion rendered for the STM is to adopt an STM Protocol to the Treaty that would enable the states (only those that ratify it) to track the space traffic.[274] So the role of ICAO as an STM regulatory body is also not-so-gloomy.

There has been consistent opinion from commentators to develop a new treaty regime for the manned spaceflights with limitations to the existing laws and regulatory bodies.[275] Besides, there is also a draft model for commercial human spaceflights.[276] Apart from these deliberations, there are discussions on the states' code of conduct while conducting outer space activities.[277] However, it is well-accepted that the ICAO holds firm promises to manage space transportation and related issues such as STM, liability, safety and security, environmental protection. The mandate conferred under the Chicago Convention and restrictions placed under the space treaties for a new organization for the STM hinders the way for ICAO assuming the role of a regulatory body for the CHS. It is also highlighted that the UNCOUPS has not delivered as per the expectations, especially for commercial activities in outer space. Thus the CHS, for smooth response by the legal fraternity to the technological advancement, needs a new treaty-based mechanism solely dedicated to space transportation, as we have for the air transportation in the form of the Chicago Convention.

Conclusion

The deliberations on general international law and international space law reveal the inadequacy of legal regulations for the commercial human spaceflights. Certain

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273 Paul B. Larsen, *Space Traffic Management Standards*, 83(2) J. Air L. & Com. 359 (2018).

274 *Id.*

275 Karl-Heinz Bockstiegel et al., *Draft for a Convention on Manned Space Flight*, 40 ZLW 3 (1991).

276 Ricky J. Lee & Sarah L. Steele, *Models for Codifying International Rules for Jurisdiction, Liability, Safety and Accident Investigation for Commercial Passenger Spaceflight*, 83(3) Nord. J. Int'l L. 251 (2014).

277 Sergio Marchisio, *The Draft Code of Conduct for Outer Space Activities*, UN/Thailand Workshop on Space Law (November 2010) (Aug. 8, 2021), available at http://www.unoosa.org/pdf/pres/2010/SLW2010/02-10b.pdf. *See also* Draft International Code of Conduct for Outer Space Activities (May 2015) (Aug. 8, 2021), available at https://papersmart.unmeetings.org/media2/7650867/annex_draft-code-of-conduct_may-2015.pdf.

fundamental international law principles are relevant to the CHS, even in the absence of explicit provisions. The specific treaties on outer space reveal certain underlying ambiguities in the existing legal regime to address CHS's needs adequately. The basics of all the five treaties and the principles contained therein suffer from significant limitations regarding the CHS.

Popularisation of the human adventurism to space has immensely stressed the existing space laws. Such legal challenges needed to be adequately accommodating and support affirmatory to the technological advancement in this regard. The CHS has stormed into various areas of laws in general and space law in particular. Different challenges broadly categorized into two parts: definitional issues; and concerning issues need a specific solution. As argued by some, the ICAO, in its present form with some tinkering with the Chicago Convention, can regulate the SATV and, in an extended role, could manage the CHS issues, especially of the STM. However, the apprehension is that this patchwork could not do so because of the fundamental problems of sovereignty claims. The ICAO manages the civil aviation that takes place within the territory where states exercise jurisdiction, whereas the outer space is beyond the subject of sovereign claim. Therefore, this same organization established under the Chicago Convention is not appropriate for regulating the space. Likewise, the UNCOUPS has not adequately addressed the emerging need of different nature of outer space activities.

Hence, it is concluded that there should be a separate new treaty for the CHS. A similar body like ICAO should be established for the CHS. This body would regulate the various aspects of the CHS, such as STM, Safety and Security, Licensing, Liability, Environment, etc.

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