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Regulatory Recognition of Commercial Space Flights

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Abstract
The author of the research article raises current legal issues regarding the regulatory challenges associated with the commercialization of outer space, with a particular focus on space tourism. The study aims to solve the legal dilemma of the lack of a legal framework that would define commercial spaceflight because this problem creates ambiguity in the understanding of the phenomenon of space tourism and raises concerns about the regulatory way of space exploration by private companies. The methods of analysis consist of the benefit of theoretical aspects of international space law for the designation of a mutual understanding between commercial interests and the principles of space exploration. The obtained results of the study lead to the conclusion that the main factor that inhibits the implementation of proper legal regulation of commercial space activity is uncertainty in the application of one or another law to regulate flights with space tourists, which, in the opinion of the author, should be eliminated employing regulatory direction on the proper legal regime, a clear definition of the boundary between outer space and air space, the weight of the norms of international law as opposed to the applications of states regarding the expediency of the norms of national law. The author's solution is the initiative for the governance of the unsettling areas through contractual arrangements. This idea is due to the results of the study about the predictability of the potential loss of relevance of international space law for the regulation of commercial space flights, therefore the auxiliary role of contract law is delivered. For its implementation, the author emphasizes the prospect of maintaining a regulatory course on (i) management of property rights, (ii) management of space resources in the direction of prohibition of appropriation and commercial colonization of celestial bodies; (iii) provisions for liability in the event of flight anomalies, safe rescue accidents, and the return of space tourists.

Keywords: *space tourism, non-astronauts; principles of outer space exploration; state claim of jurisdiction; United Nations Treaties on Outer Space; contractual partners.*

Нормативне визнання комерційних космічних польотів

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Анотація
У статті розглянуто актуальні питання правового регулювання проблем, пов'язаних з комерціалізацією космічного простору та феноменом космічного туризму. Метою дослідження є вирішення правової дилеми відсутності законодавчої бази, яка б визначала комерційні космічні польоти, що породжує неоднозначність у міжнародному праві щодо розуміння космічного туризму та викликає занепокоєння щодо дослідження космосу приватними компаніями. Методи аналізу полягають у використанні теоретичних аспектів міжнародного космічного права шляхом зіставлення комерційних інтересів і принципів освоєння космосу. Зроблено висновок, що основним фактором, який гальмує реалізацію належного правового регулювання комерційної космічної діяльності, є невизначеність у застосуванні того чи іншого права для регулювання польотів з космічними туристами, яка має бути усунена шляхом належного регулювання правового режиму, чіткого визначення межі між космічним і повітряним простором, використання саме норм міжнародного права на противагу заявок держав щодо доцільності слідування нормам національного права. Перспективою подальшого дослідження є ініціатива врегулювати проблематику через конткратні відносини між сторонами-учасниками комерційних космічних польотів, яка пов'язана з прогнозованістю за результатми дослідження потенційної втрати релевантності міжнародного космічного права для врегулювання комерційних космічних польотів, тому передбачена допоміжна роль контрактного права. Для її реалізації пропонується спрямувати регуляторний курс на: (і) управління правами власності, (іі) управління космічними ресурсами з метою заборони привласнення та комерційної колонізації небесних тіл; (ііі) положення щодо відповідальності у разі аномалій польоту, аварій з визначенням безпечного порятунку та повернення космічних туристів.

Ключові слова: *космічний туризм; неастронавти; принципи дослідження космічного простору; претензії держав на юрисдикцію; договори ООН з космосу; контрактне партнерство.*

Introduction

Merely states that documented space companies trustworthy for offering private space flights are accountable for the space activities of non-astronauts. United Nations (UN) treaties are obligatory for the signatory

states. This does not imply that commercial companies are excused from relenting with the regulatory procedure since when the legal framework for space flights was founded, these activities were exclusively viewed as state one, and the idea of proffering every citizen the opportunity to travel to space was inconceivable. Due to the scarcity of defining a commercial space flight in international law commonly known as space tourism, throughout the research, the author of this research refers to those flights that encompass a range of stirs with non-astronauts on board, likewise, orbital and suborbital space flights, human space flights, space flights to the International Space Station (ISS), Moon, and Mars, round trip space flights, flights into outer space, private and commercial space flights, space tourism, and other human-manned space activities with non-astronauts. This reference is submitted to find out the theoretical approaches to the notion.

Marietta Benkö et al. [1] plead back the definition of space tourism and assert that the notion can singularly be used informally since it lacks legal backing. They propose that suborbital regular human flights to the ISS, Moon, and Mars be evaluated under the launch projects that offer to transport people to outer space destinations and have already been partway executed. Regardless, the absence of international legal constraints and liability standards for such service providers is a noteworthy matter. The authors express crises about the contemporary launch projects wording those as akin to a children's playground remarking that the exploitation of outer space by private companies goes against the fundamental principles of space exploration. They argue that just because something is technically feasible does not necessarily mean it is legally justifiable. The authors, therefore, suggest reconsidering these agendas radically and eliminating any gaps in their law. Furthermore, Frans G. von der Dunk [2] scours the concept of flights with non-astronauts and analogizes it to space tourism from the standpoint of private assignments. The author places three key facets – the purpose of the flight, financing, and ownership – to clarify private space flights. The examination reveals that there is no reliable tourist terminus because the spacecraft is funded and owned by private entities such as Virgin Galactic, RocketPlane, and XCOR [3]. Accordingly, the author appropriates that private space flights could be defined appropriately as human flights to enter space, financed by private individuals or entities, and conducted by specific private companies without government expenses.

On the other hand, Lits et al. [4] do not express criticism of the growing endeavor and do not classify it as either private space flights or any other related commercialism. Instead, the authors refer to the picture of any human space flights that are not explicitly declared in the legal records and give

them a broad element as "any possible". This expansive meaning is because SRLM (The Outer Space Treaty (OST) (1967), Rescue Agreement (1968), The Liability Convention (1972), The Registration Convention (1975), and The Moon Treaty (1979)) do not disown "other space activities", which indicates that any form of space flight that is not explicitly banned by international law acceptable to be. Notably, the study does not uncover a meaningful contrast between the conceptions of human space flight and layouts of "other space activities". Regardless, the authors do imply that the terminological shape of space tourism causes logic to be the "other space activities".

In Francot-Timmerman's work [5], the idea of commercial space flights is portrayed by three features: legal basis, risk, and the relevancy of other branches of law. The author proposes that the notion should be accurately depicted using the global space ruling. It is accentuated that the regulatory direction for space tourism will motionless be international space law (ISL) conforming as an essential factor. The second element of the concept is the risks entangled. According to the writer, by counting on the class of risks that lead to unavoidable adverse consequences, it is feasible to articulate roughly the relevance of a distinctly legal framework besides space law. Hence, annexes of law will also devote challenging flights as well and the notion itself may entail additional practices relevant to international law.

Finally, in the publication by Kuluyev & Khalilov [6], a reasonable intro to human-manned commercial space flights is exemplified. The authors interrogate the relationship between modern space getaways and space tourism drawing on the vision of transnational tourism to discern findings. Relatively, they propose to define space tourism as a type of tourism that involves passengers traversing on a spacecraft to observe outer space operating technology, and eventually accessing space. According to the authors, such breakouts cannot be compartmentalized as a self-sustaining constituent, but rather should be governed by the system of ISL. Nonetheless, their discoveries are not exceptionally advantageous as there is ambiguity about the application of the legal conditions of international travel law relevant to the space tourism phenomenon since travel law does not guide ISL. Furthermore, the sources of international space law do not enclose the ruling of international travel law. These resolves will indeed be subject to further scrutiny.

Literature review

Reconcilements of a commercial segment with the space exploration principles

Although the international community has not yet exhaustively discoursed human experience in outer space, the space drive has been gradually

privatized by companies such as Virgin Galactic and RocketPlane deeming all-out control and sponsorship of space vehicles. National legislation in the US and Luxembourg authorizes commercial enterprises with the right to perform shiftings in outer space, and despite such companies do not possess complementary rights or obligations under ISL. Virgin Galactic has enlisted the service of legal professionals to enhance liability laws and address legal issues relating to commercial human space flights in the name of safeguarding commercial interests. Hence, space tourism is forcefully tied to its commercialization.

Hereinafter, the dispute centers around the tension between commercial interests and the principle of open access to space as designated particularly in the OST. Article 1 of the Treaty states that outer space, including celestial bodies, is open for exploration and use by all states, without discrimination, and under international law. Although scientific quests are encouraged, the Treaty does not explicitly cite space flights with a commercial segment. A scholar Jonckheere [7] agrees that the Treaty foremost allows states to run activities in space and commercial entities are not coated under the principle of freedom to access. At the same time, the author explains that commercial space activities can be viewed as a subset of private technological progress, therefore, it is not explicitly discoursed in the Treaty. Consequently, the lack of vivid words about commercial space activities in the Treaty institutes ambiguity and raises questions about the relevance of international law to such activities.

The examined concept of human spaceflight is based on two mutually important elements: the launching state and the commercial segment. This has led to back-and-forths between public and private affirmations of power. And, as an effect, the launching subject means that the spaceship is cast from a certain land of a launching state but with the involvement of a private attribute. The study advises that legally reasoned terminology, such as non-governmental space operation, could be used to pilot the conception of the state that undertakes the breakout with non-astronauts. Although such activities are overseen by private companies and not by the government regime itself, they have still thought of space activities in phrases of OST.

Also, the research bears watch to the study of R.H. Henry et al. [8]. Scholars provide a thorough analysis of the principles established by the United Nations Committee on the Peaceful Uses of Outer Space (UNCOPUOS) and spotlight that these covenants primarily focus on the exploration and use of space, rather than on elongation itself. Though, they emphasize the extent of responsible behavior and the absence of a site for the private sector, unless it is united to non-governmental conditioning and supervised

by the state. Afterward, the authors advocate human-manned flights as non-governmental activities that align with the principle of common use and exploration. They note the representation "commons" is not explicitly mentioned in any space treaty, and is solely employed as an adjective in preambles, such as the "common interest" in the OST and Liability and Registration Conventions, and "common heritage" in the Moon Agreement. The authors acknowledge that this language is broad, but it is frequently exploited in serials such as those by the US Department of Defense and NATO workshops. The authors further ascribe that the word should not be misconstrued as a way to avoid control by a superpower, but relatively as a mechanism to elevate non-state products under state supervision. Prevalent, the authors endorse commercialization in space as it is distinct from superpower control and aligned with the canons of UNCOPUOS.

In the scholar's study of Sarah M. Mountin [9] concentrates on the commercial use of satellite signals and its implications for human space flights, especially regarding location tags. She argues that in accumulation to ISL, the powers of international humanitarian law are also relevant when civilians are on board, predominantly in the circumstance of armed conflicts. The researcher cites the Geneva Conventions and the Additional Protocols (1977) as substantial documents for restraining risky scenarios of warfare affecting spacecraft. And, she contends that the principles enshrined in the ISL on commercial use of satellite signals are insufficient for comprehensive regulation. Those views manage the subject by implicating not only the rudimentary principles of space use but also the raw principles of international humanitarian law together with the customary international law, such as the principles of non-intervention and proportionality as well as the specific dogma of the satellite signal is correspondingly critical for the security spacecraft monitoring that voyage civilians. Although her work is mostly focused on conflicts stemming from the commercialization of outer space, it is meaningful to comment that the part of human-manned flights shall not be biased toward warfare.

Implication of legal regimes

In 2012, Wheeler [10] surveyed the UN Space treaties and their impact on the commercialization of human manned space flight. The author stressed the problems faced by businesses due to the uncertainty of space treaties and criticized the legal regime standing reforms that are necessary to pre-empt prospective regulatory courses. The writer urges that international law should adhere to the outer space treaties with a concentration on the call for revision and adoption of national strategies. One of the contentious topics is the business side of the quarrel for the "traveler" standing credit which is the concession of humanity. However, due to the shortage of

an evident commercialization regime for human space activities, there is a need for boundary locks to avoid martial ambitions, and, therefore, scholar proposes a definite regime under a peaceful agenda. In 2013 E. Bohenc [11] tackled the question of whether there is a demand to specify the international law that will apply to the human manned space environment and indicated the dependability of space law to the relevance of commercialization. Bohenc extrapolated that private companies, operating under the auspices of ISL, are exclusively reasoned to the public domain. Furthermore, the space law regime is headed under the model of SRLM encompassing, among other things, the five most distinctive and absolute acts. The author acknowledges that any space activity must adhere to these acts. However, due to the evolving nature of space exploration, SRLM is not adequate to hold the subjects of human-manned space flights. Therefore, Bohenc means to modify the UN Treaties based on the modern commercial course on space questioning, either by devising guidelines or embracing a mint act to preach the respect of related space tourism matters.

Philip Morris [12] supports the opinion about the SRLRM sample of lodestar the international legal regime of commercial flights. The author also provides a critical analysis of the legislation of the US and the Netherlands, whose laws are the most progressive in restraining the regime of centered flights at the nationwide grade. However, Morris criticizes these directions from the standpoint that both the US and Dutch laws consolidate the appropriation and monopolization of space intimately. They strive to originate private businesses for the advantage of the domestic economy and space governance while bypassing the bars of international law with the public aspect of the space quest. The research investigation sheds light on the potential conflicts between national and international laws due to the commercialization of space and emphasizes the starvation for international cooperation and adherence to the old-hand principles of ISL to guarantee the amicable and equitable maturation of space shifting. Similarly, Santos & Rapp [13] refer to the US measure of a non-appropriation constraint that sets restrictions for the commercial sector. Accordingly, private space companies before practice shall obtain permission from the Ministry of Commerce. In this way, the Ministry is competent to monitor activities and procedures, and in the affair of noncompliance has the capacity to impose restrictions, for example, on the collection of certain data. Nevertheless, as one of the ways to solve the abuse of the commercialization segment, it is beneficial to have a contract with the government, thereby representing the goods willingly to offer space tours to civilians.

At the same time, in 2010, Meyer [14] steered a direct review of the set of legislation for all space activities, arguing that there is no necessity to

abandon the already established ISL regime. Instead, Meyer submitted a solution about the relevance of the extant non-specific laws. Through a method of historical composition check, Meyer halted that the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies (TPGASEUOS) and the Moon Agreement drive it apparent that space can merely be explored by nations, rather by private holds. Hence, human-manned space flights should not stand under the auspices of screened companies citing distinguishing pictures of 'all mankind' and 'common heritage of mankind' means the international regime should take pre-eminence. Yet, differently, Alexander Simmonds [15] finds it difficult to determine the lawful regime due to the increased legal ramifications and pluralism. They counsel that it is attainable to find legal implications to govern the possession privilege aspect through the categorization of space tourism according to key players: (i) private companies and non-government organizations, (ii) special assignments by entrusted power that are not covered by the territorial jurisdiction of states, and (iii) a party with jurisdiction management wherever States have the right under international law to influence space exploration through commercialization. To this extent, Claudia Pastorius [16] raised a significant question about the sense of lawful power implication with affection to the ownership approach to find answers through a comparative analysis of the Roman spatium doctrine of liberum, nullius, communis. According to the author, the authority of commercial space flights should correspond to the foremost one of the ensuing classes where: (i) complete freedom (in both private and public space activity) cannot be restricted by anyone; (ii) the outer of space should not be subjected to any private or public activities for any purpose, however, at the same time, this does not mean that it cannot be occupied; (iii) there should be no private or public getaways; only flights of society for the nation's enjoyment without further appropriation are appropriate. The idea preferably instructs the principles of freedom, occupation, and enjoyment, - since the private privilege with the ownership stakes is not the right way to forward. This course would confirm an unbiased evolution of space activities with anticipation to profit all nations including separate individuals.

Confrontation of boundaries between space and air laws

The issue of whether to apply air law or space law to commercial space flights continually remains controversial and unresolved. A scholar Fitzgerald [17] discusses the difficulties in involving a type of legislation appropriate to space planes used for private and commercial intentions. The author notes that the air sphere creases under the regulation of the

International Civil Aviation Organization (ICAO), while outer space weaves under the purview of the Office for Outer Space Affairs (OOSA), believing that only these two UN bodies are qualified to regulate technology beyond Earth within their respective domains. However, the author does not delve deeply into this matter delivering an incomparable all-around synopsis of the relevancy of regulatory policies. The results of the study insinuate that it is ambiguous when air law or space law should be applied, though it is evident that both directions can be practical to spacecraft. Furthermore, the primary criterion for determining relevance is not the commercial or private nature of activities, but rather whether the spacecraft is factually entering outer space. At this point, the work of Masson-Zwaan & Steven Freeland [18] infers that space law should be the appropriate regulation because the vehicle is designed solely for outer space travel, including orbital and suborbital flights. The authors, paired with Fitzgerald, advise that the resolution of the air and space law dilemma should be solved through the designation of the transportation pursuit. In other words, the determination about the rightful law to devote should be founded concerning the technology functionality intention in the atmosphere. Since aircraft do not typically have space missions and are designed solely for airspace carriers, on the other hand, spacecraft are designed specifically to approach space lift and a subject to space law. Consequently, the primary criterion for demarcating relevancy is whether the spacecraft is prepared for outer space or airspace ride.

Dempsey [19] has a similar perspective on the issue and suggests that a vehicle with both air and space characteristics should be regarded under the jurisdiction of ICAO since it starts its journey from the air. The main legal end, therefore, is not its functionality or purpose but the start-up landscape of the technology. This finale is based on two basic legal criteria: (1) rationale logic, which defines the transport point to answer whether it is in outer space or air, and (2) rationale materiale, which looks at the nature of the vehicle. And, since the spacecraft conceives in the airspace, the rules of air law choice apply. On the other side, if the spacecraft is directed to return to Earth from outer space, then space law prevails on its way back. In other words, the double relevance reached as follows: when the destination is outer space, air law applies, and when the destination is Earth, space law applies.

Alexandr Simmonds [15] also highlights the gap regardless of the air zone ending and the commencement of outer space. As soon as this designation is defined, the commercial space flight regulation shall be forced from that fact. The research has shown, according to the Center of Science Education (UCAR) [20], the end of the stratosphere is 50 km/30 miles above the

Earth's surface. However, the author urges that a customary international law rule should define the zone of space as starting at 95-110 km. The contentious matter is the determination of horizontal take-off and vertical take-off launch spaceport facilities for space flights. It is potential to resolve the problem by obeying the German Aviation Code, which covers space vehicles, rockets, and similar flight objects as aircraft as long as they are in the air zone.

Louis de Gouvon Matignon's article [21] also presents relevant discussions on the legal boundary between air space and outer space. Unlike the previously mentioned researchers, the author suggests resolving the issue through international negotiations between states and the UN. However, the main retard in negotiations is the disagreement about sovereignty over the demarcation due to the argument of recognition of sovereignty in the air citing civil aviation law. For example, the Convention on International Civil Aviation, or known as the Chicago Convention, admits exclusive dominion over the airspace up to a governmental territory as per Art. 1. In contrast, international space law provisions allow for the liberty of state motions and acknowledge no sovereignty over celestial bodies. Matignon also highlights discrepancies in national laws that directly prescribe the territorial effect. For instance, an Australian law, the Space Activities Act of 1998 defines the legal determinant line of outer space starting at an altitude of 100 km. In the US, the Space Flight Liability and Immunity Act defines suborbital flights above 62.5 miles from Earth's mean sea level, while the state of New Mexico defines space as "any location beyond altitudes of sixty thousand feet above the Earth is sea level". Furthermore, X-Prize announced that participants of commercial space flights must reach a minimum of 100 km above Earth to qualify at the necessary space level.

Consequently, the research calls for an international hand to resolve these discrepancies and come to a consensus on the demarcation between airspace and outer space due to explored conflicts between state laws and companies' visions.

National vs international

The scholar Weeks [22] in 2012 did a study on the commercialization of space flights and the influence of private companies on international regulation. The author argues that private companies' policies have become a priority over legislation resulting in an expansion of outer space commercialization. This has put pressure on the US legislative course to develop specific regulations for human-manned spaceflight. The author believes that proliferation foreknew brings benefits to progress, but also underscores the need for structured codes of conduct towards

commercialization and the development of international law. While the author does not criticize national laws but acknowledges that international regulation apart from the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, has not been well enforced. Therefore, a country administration regime with a boost of business paradoxically might rule over international acts. In 2018, Goehring [23] supported this view and argued that the US should hold outer space legislation not only for international respect but also for national legislative interest and joint policy safety inquisitiveness. At the same time, the author notes that Congress should avoid broad interpretations of the scope of activities for oversight, and also mentions that overly narrow interpretations could be equally illegitimate. Thus, Goehring believes that the broad and narrow nature of international legislation, aside from initiatives, could negatively impact commercial space flight welfare. The US course might be a relevant model overall to guide but without overburdening it with red tape.

In 2019 a study by Isabel Feichtner [24] examined the national legislation of Luxembourg, which, like the United States, has specific regulations on human spaceflight. Feichtner stresses that while the US covers more issues related to space resources, in Luxembourg the interpretation of international law allows it to use its jurisdiction to elevate commercial space and attract entrepreneurs. The author argues that national regulations of those in Luxembourg, are exemplary, as the private sector is not denied. Feichtner notes that the Moon Agreement only constitutes a moratorium for its parties and does not stop private companies from exploiting space resources. Luxembourg, which is not a party to the Moon Agreement, prompts personal resource exploitation and asserts that such actions are not in violation of Art. 1 of the Outer Space Treaty. Thus, the author provides examples of how Luxembourg legislation directly references international space law and confirms compliance with outer space resource rights by giving priority to progress commercialism rather than the interest of national law. On the other needle, Paul B. Larsen [25] raises a debatable question of whether international UN Treaties give States the right to authorize national flight operator providers to rule of conduct in outer space and argues that the UN Space Treaties provide a directory of human-manned spaceflight where States are bound to concatenate the terms of these treaties to all domestic non-governmental commercial operators. The author also cites the example of Luxembourg legislation, which grants power to conduct operator flights and provide overall space resources, and highlights the need to comply with international law, even if US law restricts such activities. Using the example of traffic congestion in moving objects, the author suggests that the UN Treaties are customary international law.

On the other side, there is a risk of devoting international agreements as "the Supreme Law of the Land".

The emergence of space tourism has created a need for the reasonable regulation of human space flights, and the Antarctic Treaty system provides valuable insight into the jurisdictional issues that may arise in cases of violations of territory. Specifically, Art. 8 of the Antarctic Treaty establishes that individuals are subject to national law rather than international law and recognizes concerns related to tourism in contrast to OST. As such, the Antarctic law system as an example for regulating space tourism violations is proposed by several authors. A scholar Hardenstein [26] examining the Antarctic Treaty System found similarities between the regulation of the Antarctic and outer space, particularly in terms of jurisdictional issues. Both regulations are aimed at promoting the peaceful use and freedom of exploitation, as stated in Antarctic Treaty Art. 1 and Outer Space Treaty Art. 1. Similarly, human activities in both areas are intended for scientific investigation, as stated in Antarctic Treaty Art. 2 and Outer Space Treaty Art. 1, and both allow for free access to resources, as outlined in Antarctic Treaty Art. 7 and Outer Space Treaty Art. 7. Moreover, both regulations do not establish the territorial sovereignty of states or allow for the appropriation of territory. At the same time, Rosario Avveduto [27] compares the Outer Space Treaty and Antarctic Treaty when both regulate human activity in areas without a native population. The author notes that while both Antarctica and space are being exploited for profit, the difference lies in the fact that Antarctica has not been colonized, commercialized, or used for asteroid mining. Therefore, while these conventions may share similar principles of application, they differ in their actual implementation.

Materials and Methods

1. The lack of a clear definition and legal framework for commercial space flights poses significant challenges. The concept of space tourism lacks a legal basis, and there are concerns about the exploitation of outer space by private companies. While there are different interpretations of what constitutes commercial space flights, there is a consensus that they should be defined by international space law. However, there is also relevancy that other branches of law may apply, depending on the category of risks involved in the flights. Overall, the research material is needed to clarify the legal and regulatory framework for commercial space flights, taking into account the evolving nature of the industry.
2. The privatization of the space industry and the increasing investment in space tourism have led to struggles in reconciling commercial interests with the principles of Outer Space exploration. The lack of explicit recognition of commercial space activities in the Outer Space Treaty has created

ambiguity and raised questions about the applicability of relevant law to such activities. The vise versa method is applied to highlight, for instance, when some scholars argue that commercialization in space aligns with the principles of UNCOPUOS and promotes non-state development under state supervision, others lead to responsible behavior and state supervision in non-governmental activities.

3. The legal regime for human-manned commercial space flight is still a topic of discussion among scholars and experts. The current legal framework is based on the UN Space treaties and the Space Law Regime Model aiming to regulate space activities and ensure peaceful and equitable development of space exploration. However, there is a lack of clarity on the commercialization segment, ownership consideration, and potential conflicts between national and international laws. Some scholars suggest modifying the existing treaties or concocting guidelines to address these concerns, while others propose alternative approaches based on the principles of freedom, occupation, and enjoyment.

4. The delineation of boundaries between space law and air law remains a complex and unresolved issue, and the research proposes chaotic approaches to resolve the dilemma. While some suggest that the primary criterion for relevance determination should be the transportation environmental purpose, others argue about the geographical launch of the technology. Additionally, there are discrepancies in national laws that prescribe the territorial effect. Hence, the boundary demarcation between space and air laws requires further exploration and international negotiation to find out relevant regulations for space flights with a commercial segment.

5. The commercialization of outer space has led to a need for specific regulations of space tourism. The current national laws, for example in the US, in some scholars' work have been prioritized over international laws, leading to the need for structured codes of conduct towards commercialization aspects in the international agenda. While the US has specific regulations on human-manned spaceflight, the relevance of other branches of law varies among nations, as seen in the ownership matter of Luxembourg legislation toward rights to space resources even though the States are obligated to follow the terms of UN Space Treaties to all domestic non-governmental commercial operators.

Results and Discussion

The governance of commercial space activities

Art. VI of the Outer Space Treaty addresses state responsibility, indicating the need to license private commercial space operators and establish a robust regulatory framework for their activities. This broad burden illustrates the weight of the responsibility that State Parties expect each

other to shoulder in space activities [28, p. 22]. If a State Party merely permits its territory to be used for launch, it is culpable for the object launched [Ibid]. However, the practical implications of this provision may differ. Likewise, the US obligation under the OST to authorize and supervise its commercial space activities has been questioned. A scholar Goehring [23, pp. 102-103] cites the Laura Montgomery Testimony of March 2017, former counsel for the Federal Aviation Administration. She testified before the House Committee on Science, Space, and Technology. She recommended that Congress not regulate new commercial space activities based on the perceived legal obligation under Art. VI of the OST. Montgomery argued that Art. VI gives the U.S. the discretion to choose which activities to authorize and supervise, and it has no domestic effect since it is a non-self-executing treaty provision. Furthermore, she stated that most obligations in the treaty apply to states, not private enterprises. Montgomery's main point is that Art. VI does not require the U.S. to regulate its commercial space activities. However, Goehring [Ibid.] is a rejoinder to the message that Congress should have a true understanding of the U.S. international obligations under the Outer Space Treaty before setting a course for regulating near-future commercial space activities or not regulating them, as the case may be. Once established, the real question for Congress ought to be how the obligations of Art. VI can be satisfied for commercial space activities, not whether such obligations even exist. Montgomery attempts to argue the latter. Upon closer examination, however, none of her arguments withstand scrutiny. Congress is not well-served by advice that is not only unsound but also serves to undermine the U.S. long-term national security interest in encouraging responsible behavior in space. Consequently, the commitment under OST Art. VI does not directly apply to private entities. Instead, it lies indirectly to private entities through States. Article VI guarantees that the parties cannot evade their international obligations by running space activities through non-governmental entities. This contains the application of the harmful contamination provision under Article IX, despite that, the U.S. did not acquiesce this provision to commercial operators as relevant.

The research goes further and demonstrates for the model the new Space Law introduced in Sweden [29] where both state and private space activities are subject to permits. Potential exemptions from the permit requirement for space activities conducted by the Swedish state would be given by the government appropriately. At the same time, the Swedish National Space Board shall investigate issues connecting to permits. Afterward, the authority shall consult with the Swedish Armed Forces, the Swedish Security Service, and the Swedish Inspectorate for Strategic Products on matters involving Swedish security or other foreign, defense policy interests in each permit matter. Importantly, the Swedish National Space

Agency shall maintain a national register of space objects. Additionally, an environmental provision willpower to guarantee that space activities are accomplished in sustainable ways and the use of space in the long term. The research especially stresses the provisions regardless of individual permit matters to conduct space activities as per the report Betänkande av Rymdlagsutredningen [Ibid., 43]. According to that, the supervisory authority must check that this law, regulations which have been announced in connection with the law, and the permit decision are obeyed. To accomplish its mission according to § 3, the supervisory authority has the right to, on request, receive the information and documents needed for supervision and gaining access to areas, premises, and other spaces, however, not housing, where space activities are conducted. Notably, a decision on an injunction may be combined with a fine. Hence, a permit to conduct space activities may be revoked or permit conditions changed, if (1) the permit holder has violated conditions in the permit decision, (2) the licensee has provided incorrect or misleading information, (3) the licensee conducts space activities that are inappropriate about Swedish security or defense policy interests, or (4) the permit holder has been assigned a warning without the conditions which caused the warning has been corrected. It means for the research, that modern Swedish space law offers the next steps forward for those interested in leading commercial space flights:

1. Get permits for both state and private space activities.
2. Confer on matters conveyed to Swedish security and defense policy.
3. Register space object.
4. Provide proof that space activity is in name of sustainable and attractive for long-term space exploration.
5. Need to comply with the Swedish space law, permit conditions, and regulations, as supervised by the relevant authority. Otherwise, non-compliance may be directed to fines, injunctions, permit revocation, or changes in permit prerequisites.

Furthermore, international space law does not provide specific guidance for the establishment of a system of authorization for space tourism activities [30, p. 268]. However, States typically incorporate minimum requirements to address basic legal issues such as the provision of relevant information, consent requirements, training, and security measures [Ibid.]. For instance, the 2018 UK Space Industry Act (s. 17) governing private space flight contains a condition of informed consent. At the same time, with relevance to the Member States of the European Union (EU), it is believed that the EU has the authority to utilize its legislative and regulatory powers to establish harmonization among the space regulations in the Member States.

This regulatory intervention would offer the advantage of strengthening Europe's global position about space partners and competitors demonstrating independent capabilities in all significant areas of space to be on par with other space-faring states or regions with relevance to harmonization proposed by Linden [31]. According to scholars, the space sector can be affected through regulations in the context of other policies that have a relation with the space sector, as has been done in the past (e.g. through the Trans-European Networks competence); and, the use of these connected policy domains may enable the EU to harmonize regulations that impact space, despite Art. 189 (2) Treaty on the Functioning of the EU. The negative side of this is that it may lead to a confusing and decentralized regulatory regime for space. Significantly, Member States may opt to use the enhanced cooperation mechanism, creating a European institutional framework with competence in space, much like was done with the Schengen Area and the Economic and Monetary Union.

On the other hand, the research offers the results of Hertzfeld et al. [8, p. 22] that space is undefined, and nongovernment, nor any combination of selected governments or non-governmental organizations has the power or ability to set rules and regulations to establish and maintain a commons. This statement is endowed by the next points of thought. First, is important to note that the most significant problems facing the drafters of the treaties were establishing state responsibility, liability for terrestrial damage, and keeping the use of outer space peaceful and free of weapons of mass destruction. Governments (at first only the United States and the Soviet Union) were the only entities that had the technology to access space, and therefore the key provisions of the treaties focused primarily on launches and orbital locations. Today's new issues of private sector investment and activities in space, as well as activities requiring maneuvering ability in orbit, were all hypothetical issues and largely ignored by the treaty regime. Second, space is considered to be territory without national sovereignty and specific borders. It is to be used for scientific discovery and the benefit of all nations. Some have translated this into simple terms such as space as a global commons. However, space itself does not fit the criteria of being a commons. It does not have a specifically defined border where outer space begins. It is many things, ranging from orbits to planets to asteroids to stars and even being just an undefined very large area with little or no gravity. Some of them do have borders and definitions while others do not. Third, the existence and viability of terrestrial commons depend on the oversight and regulatory power of a sovereign. Most common arrangements on Earth have not survived throughout history due to economic pressures and/or governmental changes. This leads to the conclusion that a terrestrial model of a commons is not a model that can easily be applied to outer space.

While it is factual that space is an undefined area and lacks specific borders or a governing body to establish and maintain a commons, however, as the private sector and activities in space have emerged, the study assumes the commercial space flights phenomenon is those activities hosted by the appropriate state where the space object launched (with relevant state registration) and headed by respective commercial and/or private formation, and therefore, regard space a shared area governed by international fundamental space law rules with further commercial and/or private sector commitment to minimizing the risk of overexploitation or environmental damage.

Additionally, the analysis also offers to govern commercial space flight through a contract. Hence, to address the relationship between space operators and potential tourists, it is suggested to apply the principles of contract law. Besides, because prospective participants of space flight might be of different citizenship, the research suggests having extra clauses, for example, to address flight anomalies and accidents due to the need to ensure the safe rescue and return of space tourists to Earth in the event of incidents. While the Moon Treaty regulates the rescue and return of employed astronauts, it does not apply to participants who pay (but not to those who have been paid) for their space experience. Therefore, it is necessary to specifically outline these provisions in the contract to safeguard the rights of space tourists. At the same time, the research idea overlooks situations where a potential space passenger and the space flight operator belong to different countries' jurisdictions. For instance, under the European legal framework, it is appropriate to grant customers the right to choose the applicable law for contract performance. Nevertheless, a dilemma arises when, for instance, most flight operators would be under the jurisdiction of the US, making it impractical to conform to the legal systems of each customer's citizenship.

Furthermore, the research deems a contract between government agencies and private commercial space flight contractors. Likewise, SpaceX in 2012 and then Orbital Sciences in 2013 signed a contract with NASA to become a private launch service provider. SpaceX and Boeing in 2018 concluded contracts about an obligation to supply crew to the ISS under the CCDev project.

Liability is something that will have to be heavily regulated because of the intense nature of commercial space flights. The point of view differs in when vehicle operators should establish contracts with satellite owners to address all potential risks and maintain communication during the government licensing and supervisory processes. At the same time, the regime only provides for a comparatively weak compliance component in terms of

transparency, monitoring, and enforcement [32, p. 253]. Considering the zero-sum nature of (monetary) benefit-sharing, weak compliance components may be insufficient for correcting behavioral misincentives on the side of operators [Ibid.]. Through its sponsorship system, matters of operator compliance and liability are partially delegated to contracting parties, which are accordingly required to provide under their domestic legal and regulatory frameworks for compliance measures that apply to their sponsored operators [Ibid.]. Moreover, as a rule, states are responsible if a spacecraft is launched from their territory. According to Freeland and Martin [30, pp. 274-275], concerning damages connected with a space object(s), the Liability Convention may not necessarily devote to passenger liability, depending on the specific circumstances. Liability for damage to passengers may, however, be established by contract. Although the Liability Convention applies to damages to third parties, it only directly applies on an inter-State basis. However, States may still have recourse against their nationals under the relevant national law, in terms of the conditions that might have been applied to the relevant license approval. It will also be necessary to place the case of exclusion of liability (for example, in a case of negligence) and the characteristics for a cross-waiver of responsibility between the participants. In short, the regime of liability under international space law does not appear to apply adequately to space tourism activities, including the circumstances as to when a launching State will be liable in case of damage.

Ownership is more than the investment of the damaged space satellite and it should also include the liability of human life beyond Earth's atmosphere. Hence, the liability from injury by a service provider of flight wherever point in Space shall be cracked since even states aren't able to provide liability protection for non-astronauts. That is because most service travel space providers are American companies, and therefore the gap between international law, state, and federal laws might be solved under contractual terms and conditions. A relative study of the demand for the enactment of a special accomplishment about safety during human manned space flights could be carried out, similar to an extreme type of tourist activity, such as regulation of parachute jumps, high-altitude ascents to a mountain, etc.

The governance of private interests

The research delves into the discussion of property rights in space and argues that international space law is inadequate for the emergence of human-manned space flights necessitating a comprehensive overhaul. The research stresses that private companies are progressing faster than the existing legal framework and allows for requiring a governance foundation of ownership through revised laws before advancing human extra-terrestrial

space exploration. Thus, the expansion of existing legislation by presenting special rules for property rights in space is necessary. The proposal further suggests that any nation, company, or individual should only be allowed to claim a portion of a celestial body that they can effectively control. Hence, there is a proposal to adopt a law on property rights in space with respect to three matters: (i) the first bloc discusses the concept of ownership in space, and (ii) the second bloc focuses on the relevant governance measures to celestial bodies.

The ownership approach

A substantial sight of Wrench [33, p. 460] for space law of how it approaches land ownership based on the prior appropriation doctrine: underlying land is available for use not because it is unowned but because it is owned by a community who has the right to make productive use of it. Because the community owns the land, claimants should use the land properly and the government is responsible for stewardship. This framing fits neatly with proponents of the idea that outer space is collectively owned by the international community. Regardless, stewardship and government ownership do not necessarily displace the potential for productive use. Parties do not violate the non-appropriation principle simply by extracting – or as here, diverting – resources from the land. At no point does extraction equate to a sovereign claim over the land. In instances where non-productive use or the like violates those principles, property rights disappear. Furthermore, the OST encourages the idea that outer space is to be used to benefit the broader international community. The prior appropriation doctrine illustrates that parties can establish and transfer robust property rights in resources independent from landownership while promoting beneficial use. At the same time, a less recognized challenge with the economic and legal management of a defined area is the concept of the anticommons [19, p. 19]. When there are too many owners holding rights of exclusion, the resource is prone to underuse—a tragedy of the anticommons [Ibid., 20]. We cannot characterize all of outer space and its various activities and usages as a single type of economic good that requires a single type of management structure [Ibid., 23].

The ambiguity in property space regulation creates challenges for future commercialization. The OST Art. VI opens the door for private companies, as it mentions international responsibility applying to non-governmental entities. The ownership operations during human-manned commercial space flights could potentially be attributed to commercial and private companies, including non-governmental ones.

Also, according to the OST Article II, outer space, including the moon and other celestial bodies, is not subject to national appropriation by claim of

sovereignty, through use or occupation, or by any other means. Yet, the guide is the creation of unified rules for all formed activities involved in space resource extraction, allowing for future claims of ownership. The research is conditioning a rule about granting protection from interference with a claimed object to anyone who arrives on a space planet (with commercial interest) and/or resides there for a specific period (a year let's say). After this period, the person can return to Earth while retaining exclusive rights to appropriate resources and the ability to sell real property. This approach expects to encourage private space exploration. Accordingly, responsible ownership would mean the preservation of the accountability of states and commercial space flight activities would be limited by the responsibility of their sovereign entities.

According to the OST Art. VIII, ownership of objects launched into outer space, including objects landed or constructed on a celestial body, and of their component parts, is not affected by their presence in outer space or on a celestial body or by their return to the Earth. Such objects or parts found beyond the limits of the State Party to the Treaty on whose registry they are carried shall be returned to that State Party, which shall, upon request, furnish identifying data before their return. Hence, in the event of claim ownership concerning commercial space flights, there shall be in mind these stages:

1. Register the object with the State Party to the Treaty on whose registry it is accepted.
2. Land the object in outer space or on a celestial body through a commercial spaceflight provider or by obtaining the necessary permits and licenses for private space exploration from the State.
3. Verify evidence of ownership by providing records with descriptions that show your privilege to the thing of a claim.
4. Employ legal backing to compass the complexities involved in claiming ownership in outer space.

Also, the Moon Treaty in Art. 11 heightens the principle of non-appropriation by delivering that the moon shall not be subject to claims of sovereignty or occupation; and the structure of facilities or modules does not create any property right whatsoever in the adjacent area. Unlike the Outer Space Treaty, the prohibition to establish property rights on the surface or subsurface of the moon extends to non-governmental entities as well as natural persons [27, p. 219]. Notably, the Moon Agreement has only been signed by a few countries and fails to address the ownership rights of non-signatory nations. This situation enables companies from non-member countries to make claims of full ownership over lunar resources. Accordingly, tangible and intangible space ownership is crucial

in formulating space law. The proposal suggests classifying spacecraft and satellites as movable property, while lunar bases or sections of celestial real estate would be considered immovable property. However, categorizing celestial bodies such as planets, asteroids, and comets is more challenging due to their inherent movement. Regardless, von der Dunk [34, pp. 90-91] noted about interesting condition that the Moon Agreement itself already excludes from its scope extraterrestrial materials that reach the surface of the earth by natural means. While resources extracted by mining companies do not reach the surface of the Earth by natural means, the distinction already made here between celestial bodies and extraterrestrial materials is noteworthy. The asteroids targeted by the space mining companies would likely be magnitudes smaller in size than the celestial bodies usually addressed under that heading, such as the Moon and planets. Landing on a celestial body would constitute a rather different mission than landing on an asteroid, which may come much closer to capturing extraterrestrial materials. The distinction made in the Moon Agreement may provide further justification for the argument that the prohibition of celestial bodies under Art. II of the Outer Space Treaty does not extend to extraterrestrial materials, the latter also referring to something magnitudes smaller than the classic celestial bodies.

The research goes further and points out an influential relationship between the state from which the spacecraft was launched and the state procuring the launch. This assembles a dual crisis when companies drive a domain territory to transmit people to space, as the state can be held liable for losses even if it does not have ownership or rights to the object. This lets companies exploit the territory and evade the greatest responsibility. And, the outcome is a situation where the vehicle owner and satellite operator are from different states. In such models, a contract between the parties may not play a significant role in claims against the state by third parties. This raises the option of a design where an operator provider from State A offers a satellite owned by an organization from State B, which is registered in State C. If impairment materializes on the territory of State C, both States A and B are jointly answerable. However, if damage happens to State C spacecraft in orbit, liability is determined by fault.

The state orientation of international space law as a juncture of departure for the international legal regime for private spaceflight is also reacted by the concept of state liability, as per Art. VII of the Outer Space Treaty and the Liability Convention. The former law already provided for state liability for damage caused by space objects attaching to a state fundamentally involved in the launch of the space object in question. To assume, the registered space object is the main link for the onset of liability and the

choice of the correct settlement. This is also important since this mode depends on the type of vehicle itself, which is applicable either for suborbital human-manned commercial flights with non-astronauts or for space flights in general. Another instance, this one of speculative nature, can be offered to better exemplify the issue of obtaining exclusionary rights on an orbital route [Ibid., p. 239]. The AMC-14 Satellite case showed that orbital patents may be leveraged to restrain competitor activities and that their powers may extend beyond the realm of the patent law [Ibid., p. 241]. Therefore, antitrust might be another device to avoid or rectify the consequences of de facto orbital appropriation through patents [Ibid.].

Asteroid mining claims

Diagnosing the activities of commercial space companies from a legal perspective and categorizing it as a non-governmental activity and permissible under UN Treaties, – it is crucial not to solely concentrate on this specific type of activity, but also look at the interest in asteroid mining. Commercial asteroid mining is private, profit-driven in character, and arguably distinguishable from the more wholly scientific objectives of sovereign space agencies like NASA [35, pp. 203-204]. For instance, the policies of Planetary Resources and Deep Space Industries align with the prospecting, processing, harvesting, and manufacturing course. In this regard, the critical questions are: If manned space resources are obtained, does this mean that all the resources acquired by a company should be shared on the world market? Or should commercial companies be required to share the profits derived from these resources?

There is the essence of the private sector in the ownership of asteroid resources and, accordingly, there is a proposal about fixed percentage division. Asteroid mining is perhaps a more fleeting occupation than a permanent colony, but if the asteroid mining industry becomes a fully mobilized component of the new space economy, the degree of extraction and use would far exceed the scattered lunar samples in terms of volume, making those a tenuous precedent upon which to rely [Ibid., 193]. The viability of asteroid mining depends on a space economy to which asteroid mining companies can sell fuel and metals: the lack of a current market in asteroid resources should resolve itself when the space population hits critical mass, demanding infrastructure [Ibid.]. Accordingly, several authors have extensively discussed the sale of space resources to other space actors by companies such as Planetary Resources, Deep Space Industries, Shackleton Energy, iSpace, and Kepler Energy and Space Engineering LLC [36, p. 10]. These companies are intending to explore and exploit asteroid resources primarily driven by the commercial harvesting of valuable materials such as iron, nickel, platinum, and water, which can be sold on

Earth. These resources, which have no Earthly analogy possess potential value in electronic and life support systems in outer space, and attract significant interest from companies. For example, Planetary Resources have created 3 different types of satellites i.e. the Arkyd Space Telescope Series, with each satellite contributing at a different stage in the process [37, p. 89]. Yet, as claims reduce the number of available near-Earth asteroids, and asteroids in the asteroid belt remain too costly to reach, competition will increase as investors remove their rose-tinted glasses and see that it will not be easy to make a phenomenal profit [38, p. 16]. As vessel payload capacities will be known, the volume of resources that are transferred back to Earth, as well as their approximate market values, could likely be estimated with reasonable accuracy [32, p. 254]. There is thus only limited scope for operators to shirk their obligation to share parts of their realized commercial profits without being found to be in noncompliance [Ibid.].

The point put forth is that while the Outer Space Treaty explicitly prohibits countries from appropriating these resources, it does not extend the same rule to private entities. It is because the law regarding the extraction of space resources is largely seen as analogous to the law of the high seas, which allows international waters to be fished and its seabed to be mined [Ibid., p. 11]. However, the potential illegality of asteroid mining according to international space law discourages participation in this new venture due to supplemented risk and uncertainty. Regardless, Heins [38, p. 17] provides insights that asteroid mining, like traditional mining, would allow for claim jumping to occur, just a slightly different version. In the context of asteroid mining, claim jumpers could still use force to either destroy or knock off mining operations from asteroids. Likewise, one could begin mining an asteroid that had a rival mining operation on it already, thus decreasing the available resources for the original party that laid the claim. While this action could be seen as simply economic competition, it might also qualify as claim jumping. Claim jumping has been illegal since at least the California Gold Rush and the practice should be no less illegal in outer space. Assuming an organization had legally claimed the asteroid, a conflict would occur if another party also began mining the same asteroid. The newcomer would be illegally violating the founding party's claim and decreasing the available resources for the founding party. This would diminish the economic incentive to mine asteroids if the legal claim to an area could be usurped by any other party's arrival. As even scattered reports of claim jumping would spread, organizations would likely feel the need to protect their investments.

Hereinafter, it is visible the model to adjust the utilization of natural space resources during commercial space flights by enforcing the US

General Mining Law of 1872. This law grants property rights not only to the extracted subsurface resources but also to adjacent property. Consequently, the successful claimant must:

1. For mining claims, demonstrate a physical exposure of a valuable (commercial) mineral deposit (the discovery) as defined by meeting the Department Prudent Man Rule and Marketability Test.
2. For mill sites, show proper use or occupancy for uses to support a mining operation and be located on non-mineral land.
3. Have a clear title to the mining claim (lode or placer) or mill site.
4. Have assessment work and/or maintenance fees current and performed at least $500 worth of improvements (not labor) for each claim (not required for mill sites).
5. Meet the requirements of the Department's regulations for mineral patenting as shown in the Code of Federal Regulations at 43 CFR 3861, 3862, 3863, and 3864.
6. Pay the required processing fees and purchase price for the land applied for.

It is important to recognize that the Mining Law would not cover each unique feature of an asteroid mining law [39, p. 165]. Two of the more obvious additional considerations are a provision codifying the common-law doctrine of possession and a more detailed definition of the scope of minerals covered by the asteroid mining law [Ibid., p. 166]. On the other side, international law relies on cooperation among states, for treaties do not even become law unless countries choose to bind themselves to it [40, p. 668]. When one nation acts unilaterally, absent any sort of agreement, it could lead to conflict [Ibid.].

According to the first block, the posed idea is to incorporate the principle of first possession into legislation granting ownership and associated rights to those who first explore and claim a territory, yet, there shall be an indication to redefine the legal concept of asteroids from celestial organs to movable property (chattel) to prevent private companies from smoothly commandeering sovereignty over land plots. This would help prevent conflicts arising from disputes among companies from different countries fighting for resource supremacy. In the context, for instance, the US national regulation, the Commercial Space Launch Competitiveness Act, specifically Title IV, is dedicated to Space Resource Exploration and Utilization. By comparing this act with the Outer Space Treaty, the research has identified key aspects regarding the value of asteroids in the ruling of human-manned space flights. Firstly, there is a prohibition on the appropriation and commercial colonization of celestial bodies. Secondly, it is ambiguous wording 'benefit of mankind' and its potential variation due to

commercial operations. Thirdly, the issue of liability materializes. To whom will these companies be held accountable? Is it reasonable to adhere to national legislation when space resources should be seen as the collective business of all humanity? The concern is that if further nationalization occurs, international space law may lose its relevance in governing space activities, potentially leading to international conflicts and political disputes over territories. Hence, it is urgent to make changes to international space law that would affect the legality of such governance and provide the necessary safeguards.

Finally, the study forecasts various approaches to private property management that may prevail in outer space, including the right of first possession, tradable development rights, and asteroid mining systems. Competing interests, coupled with the lack of uniform regulation, would likely prompt private entities to develop defense strategies – because of the heightened need to deter interference from other actors – and cause other entities to do the same [38, p. 19]. As a result, private companies might discourage potential attackers by building up their offensive and defensive capabilities and possibly going so far as to retaliate against others if interference ultimately occurred [Ibid.]. Hence, the research underlines the need for strong management supervision to prevent the exploitation of space resources, misappropriation, and conflicts arising from contentious actions by participants of commercial space flights, thereby ensuring fairness and justice. The defined course would involve allocating specific sites, resources, and production schedules to each country, promoting fairness in resource exploitation by both states and private entities while imposing limitations.

Conclusions

While outer space is not a lawless frontier, activities in space are not strictly supervised or policed [28, p. 53]. Hence, the emergence of commercial space flights has created a need for reasonable regulation for peaceful sharing. While the three rights (free access, exploration, and service of outer space) give States a wide ambit for activities in space, they are not unlimited [37, p. 94]. Therefore, there is a demand to balance the different approaches to appropriate regulation by the relevancy of norms to regulate commercial space flights effectively and shall be regarded by analogy to contractual relationships. There are several key aspects that regulatory courses on contractual solutions should address to restrain commercial space flights. Firstly, it is crucial to safeguard the legitimate interests of parties and define property rights affirmations. Secondly, it is important to take a long-term contract view and consider the development of terms and conditions relevant to the conditions of commercial space flights and rights posed and

demark commercial interests throughout the entire partnership process and place liability weights. The benefits of cooperation can be maximized by guaranteeing an efficient resource portion. Also, the full utilization of the space domain, including asteroids, natural space resources, and the moon, should be pursued with the well-being interests of all nations in mind. While some states may not directly benefit from the partnership, in the long run, such teamwork can be advantageous for all partakers involved.

The study underscores the matter of contractual collaboration to govern the increasing wave of space commercialization and privatization due to the weakness of international space law shielding the exclusive settlement of commercial space flight and the risk of relevancy loss. Thus, the author shows expectations that, for instance, the contract between the commercial space flight operator and carrier service, commercial space flight service provider and participants, etc., would move on consent annex, rights, liability, compensation, insurance, disciplinary policies, and else relevant assessments. However, it is worth noting that many non-space countries face limitations in penetrating areas of interest due to technological and regulatory impediments. This might interfere with the headway of sustainable regulation. Accordingly, an uncoerced and comparable international alliance is critical to stimulate the all-around participation of the representatives from the international community and the development of encyclopedic state-of-the-art for an inclusive ruling of space tourism. Here, it is essential to prioritize a contractual model that protects rights, documents the way out from predictable and nonpredictable risks, effectively assigns resources, and lets the participation of all citizens in the domain of space evolution under the sameness approach.

The contractual regulatory course posed by the author has foreknew a relevant key since it specifies the perimeter of governance for contractors, subcontractors, and clients, trusting the track of commercial space flights activity and aids the transparent understanding about from whom to ask for the liability (with further clauses, for example, a waiver of liability as a prerequisite of its consensus with the space tourist) as well as the respective rights and obligations under the designations of the contractual conditioning would theoretically unravel specific circumstances that international space law worthless to fix but strong enough to drag fundamentalism for a mutual pact in developing distinctive contacts. In addition, given the private contractual nature – between the operator and the tourist – by which most space tourism activities will take place, it is highly likely that carefully crafted exclusion of liability clauses for death and injury will be included in the space tourism services agreement, although the domestic law principles in each State will dictate the extent to

which such provisions might be enforceable [30, p. 280]. Hence, as with all space activities, a careful balancing of interests is required in determining whether, and if so, to what extent the space tourism operator should be required to pay for the privilege of conducting that commercial business, recognizing also that any such costs will inevitably flow down and be passed onto the customer in the contract price [Ibid., 282].

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