Universidade do Minho
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A new era of space law: Future challenges of globalization and commercialization in spaceflight

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Master's Thesis
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Work done under the orientation of
Doctor Nuno Manuel Pinto Oliveira

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I wish to express my gratitude to my family, for the unlimited support.

Also to my Professor Dr. Nuno Manuel Pinto Oliveira, for all your kindness.

"It is difficult to say what is impossible. Yesterday's dream is today's hope and tomorrow's reality"

Robert Goddard

STATEMENT OF INTEGRITY

I hereby declare having conducted this academic work with integrity. I confirm that I have not used plagiarism or any form of undue use of information or falsification of results along the process leading to its elaboration.

I further declare that I have fully acknowledged the Code of Ethical Conduct of the University of Minho.

ABSTRACT

The current space law consists of the five international treaties at the core. It is also complemented by relevant resolutions, regional or bilateral treaties and customary international law, as well as legislations and practices of States and intergovernmental organizations as subsidiary means for the determination of rules of space law.

The fundamental legal framework of space law is composed of five international treaties (namely the Outer Space Treaty of 1967, the Rescue Agreement of 1968, the Liability Convention of 1971, the Registration Convention of 1976 and the Moon Agreement of 1979), and five sets of principles governing outer space.

Outer space including the Moon and other celestial bodies are global commons. Space law and the law of other global commons, such as the high seas, the International Seabed Area and the Antarctica, share the common character of obligations *erga omnes*. Interests deriving from the global commons belong to and shall be shared by all States and all mankind, with due regards to the need of future generations.

They shall be free for exploration and use by all States. But it shall not be neglected that all States have the shared obligation to protect them.

With regard the development of spaceflight, this mission became a complex task with many interacting systems and mission phases, and the private sector is working hard to became increasingly competitive in this new adventure into outer space.

Keywords: Fundamental legal, Mankind, Outer Space, Private Sector, Spaceflight.

Table of Contents

1. Introduction to a new era of the space industry

Human spaceflight mission planning is a complex task with many interacting systems and mission phases. Analog missions are Earth-based Science, missions, whose purpose is to help understand the complexities inherent in future human spaceflight missions.

The goal of performing an analog mission is to prepare crewmembers and support teams for future space missions in a low risk-low cost environment by repeatedly testing vehicles, habitats, and surface terrain simulators.

One of the overriding issues concerning private human spaceflight concerns how to properly regulate this specific new type of activity.

Nothing that in the discussion regarding regulation thereof usually the three distinct regimes of space law, air law and high-risk adventure tourism law are drawn upon to look for solutions, the present paper addresses the key elements of each of these approaches as they are to some extent already currently being applied and where, as a consequence, gaps and overlaps arise, as well as presents an effort to address the latter in a sensible, coherent, efficient and feasible manner.

Today, the USA commercial human space-flight industry is developing launch vehicles that will carry paying participants on suborbital flights. The Department of Transportation has granted permits to test this vehicle technology.

As commercial human space flight vehicles begin operation, some questions will need to be addressed such as: tort liability and risk management, Law applied.

Space transportation is inherently risky to humans, whether they are trained astronauts or paying tourists, given that space-flight is still in its relative infancy. However, this is easy to forget when subjected to the hype often associated with space tourism and the ventures seeking to enter that market.

Developing commercial spaceflight is both a challenge and a major opportunity for the insurance industry; as new risks and standards emerge, policies and procedures to minimize, mitigate and cover them yet to be designed.

Therefore the creation of a viable and affordable insurance regime for future space tourists, is a critical step in the development of a real space tourism market to address burning risk management issues that may otherwise ultimately hamper this nascent industry before it has a chance to prove itself. Space tourism risks.

Moreover, general issues like the challenge among the international law and national law still concern scholars, because is operation in many jurisdictions which several times, causing efficient operating more and more difficult.

They all agree that the national laws need to be clear and act with considerable accuracy to enable that the legal regime on air and space law to close the gap found and overcome the difficulties in some areas like “Non appropriation”.

After to 2004 when the first aircraft to entered in the outer space with the SpaceShipOne, of space becoming the pioneer in the spaceflight, others giant enterprises, including NASA, planned to join the commercial development as well.

Those enterprise saw it an infinity of possibility, beyond the space tourism commercialization, appeared also explorations and exploitations of resources in the space making this adventure an enormous commercial demand, for instance there are huge possibilities of mining of Helium -3 in space it will certain contribute and provide cleaner energy on the earth.

However, under the currently legal regime governing the activities of states in exploration and also Use of the Outer Space this include The Moon and Other Celestial Bodies, no one can to claim as sovereign territory the moon or any other celestial body.

Some scholars believe that is important to maintain the fundamental principal drafted in its original goal and purposes thus avoiding a chaos in the space.

2. The current framework of Space Law

Nowadays, the existing space law is international and national. Either legislation is adopted by private interpreters to deal with the continuing trend of space commercialization. The actual rules of the space law was established since 1980.[1]

Until space law actually began in 1957 with the launch of Sputnik - the first satellite to enter orbit, their legal status in outer space activities was merely speculation than an instrument for practical application. After that memorable moment, the development of space law had tremendous impetus.

For the moment that the space law was implemented, the international context of law was highly different from the current framework. The governamental bodies, as well known regulatory authority and Soviet Union, were the precursors in the space industry program. They had a primary aim and the military focus, and the first negotiations in the outer space law was peace and security

Moreover, after 1980´s with Ariane rockets experience, the focus towards commercial programs become stronger.[2]

However, in the face of military, political and economic matters regarding space activities arose it, the legal issues was provided by the international community. For several years appeared that the international agreements were sufficient to fuffil the all needs of spacefaring nations.

Moreover, because of the end of War Cold it seemed inadaquate to analyze the current status of space law at the international level, and regulating space operations at national levels have emerged as more attractive solutions in this new reality.

Under the new context, the national space law seemed better adequate for the kind of commercial space activities for these private enterprises. The international law would be more complex to adjust the needs of private enterprises.[3]

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1 Zhao, Y. (2018). Space commercialization and the development of Space Law. In *Oxford Research Encyclopedia of Planetary Science*.

2 Blount, P. J. (2011). Renovating space: The future of international space law.*Denv. J. Int'l L. & Pol'y*,*40*, 515.

However, national space law is the best instrument for regulating and controlling private space activities, it is important to mention that it is necessary to ensure that national space activities are in accordance with the principles of international law.[4]

Nevertheless, the evolution of space law will be taken very much into discussion.[5]

2.1. International Space Law: The original framework

The basic framework at space law came out first at the in international level. At the beginning of the space age when the government actors were the main in space law.

Most of the rules of space law have been established internationally. The United States and the Soviet Union had enormous implications for their role in developing the initial structure and policy of the legal space.

Hence, the power struggle came up among these two nations, and to minimise the tension they turned to the United Nations' law-making process, to develop multilateral treaties and international agreements. [6]

The fundamental decision of the main space powers, the United States of America and the Soviet Union to deal in a multilateral level was crucial for that this phase was based on public international level, thus, not causing strangeness that several international treaties was later adopted as Resolutions by the UN General Assembly.[7]

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3 Twibell, T. S. (1996). Space Law: Legal Restraints on Commercialization and Development of Outer Space. *UMKC L. Rev.*, *65*, 589.

4 Linden, D. The Impact of National Space Legislation on Private Space Undertakings A Regulatory Competition Between States. In: International Astronautical Congress, Date: 2015/10/12-2015/10/16, Location: Jerusalem, Israel. 2015.

5 Von Der Dunk, F. (2011). The Legal Framework for Space Projects in Europe: Aspects of Applicable Law and Dispute Resolution. *Contracting for Space: Contract Practice in the European Space Sector*, 357.

6 Op. cit. note 2

7 Hobe, S. (2010). The Impact of New Developments on International Space Law (New Actors, Commercialisation, Privatisation, Increase in the Number of Space-Faring Nations). *Unif. L. Rev.*, *15*, 869.

The majority of these treaties was established in the Unites Nations within the two decades after the successful launch of Sputnik. This was a remarkable space age that quickly developed into its first phase.[8]

These treaties are drafted to suit underlying societal and political realities.[9]

In general, these treaties are:

- Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies[10]
- The 1968 Agreement on the Rescue of Astronauts, the Return of Astronauts, and the Return of Objects Launched into Outer Space[11]
- Convention on International Liability for Damage Caused by Space Objects, 1 September 1972 or ('Liability Convention').[12]
- Convention on Registration of Objects Launched into Outer Space, 1976.[13] and
- Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, July 11, 1984.[14]

Each of the treaties sets out in the same proposal to promote and safeguard the peaceful use of outer space. This constitution was essential for the development and recognition of international space law. These treaties built the guidelines for all nations, and international support has shaped the central role.[15]

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8 Op. cit. note 3

9 Op. cit. note 6

10 Unoosa. (2008). International Committee on GNSS (ICG).

11 Christol, C. Q. (1985). The Moon Treaty enters into force. *American Journal of International Law*, *79*(1), 163-168.

12 Lyall, F., & Larsen, P. B. (2017). *Space Law: A Treatise 2nd Edition*. Routledge.

13 Christol, C. Q. (1980). International liability for damage caused by space objects. *American Journal of International Law*, *74*(2), 346-371.

14 Keefe, H. (1995). Making the final frontier feasible: A critical look at the current body of outer space law. *Santa Clara Computer & High Tech. LJ*, *11*, 345.

15 Quinn, A. G. (2008). The New Age of Space Law: The Outer Space Treaty and the Weaponization of Space. *Minn. J. Int'l L.*, *17*, 475.

The creation of these treaties was conceived by The Committee on the Peaceful Uses of Outer Space (COPUOS) and its subsidiary both established in 1959. Either with the same goal: "governing the exploration and use of space for the benefit of all humanity", with development of peace and security.

The Committee is composed only of representatives of member states with different needs. However, is important a unanimous vote to reach the General Assembly.[16] This make a clear hard international law.[17]

With progressive development in outer space, and in order to avoid the development of practices dictated strategic interests; this organization became aware on the extend legal studies and to implement a set of rules to cope with the exploration human activities in outer space.

To maintain the peaceful uses of outer space, the international community decided to contribute with the implementation of the regulations to deal with the problems arising from space activities and to provide space activities with an adequate legal framework.

In 1958 an ad hoc committee started to be called of Committee on the Peaceful Uses of Outer Space (COPUOS) with specific features of two sub-committees: one with legal matters and the other with technical issues.[18]

The principal focus of space law was binding to state and its subsidiary order, international organizations. The launching sector is kept up in a public sector. Thus, the questions are: private enterprise do not have the rights to adhere the treaties?[19] The fact is that the private entities have no obligations or any rights from these treaties. Consequently, this leads to a new context to space law and point out the urge to reform the law.

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[16] Quinn, A. G. (2008). The New Age of Space Law: The Outer Space Treaty and the Weaponization of Space. *Minn. J. Int'l L.*, *17*, 475.

[17] Op. cit. note 7

[18] Breccia, P. (2016). ARTICLE III OF OUTER SPACE TREATY AND ITS RELEVANCE IN THE INTERNATIONAL SPACE LEGAL FRAMEWORK. In *Proceedings* (No. 99).

[19] Op. cit. note 8

However, the international law is resistant to change in term of political and legal modification. When a nation has to agree on one thing, for a nation to sign an agreement can take a while before to get done. In order to occur a significative shift, unilateral action might be more interesting.

Supporting unilateral action can be a great precedent to apply to an international common area as outer space.[20]

2.2. The Outer Space Treaty of 1967: Main principles.

In this section, the first examined is the major multilateral and cornerstone of the international space treaties, with special focus on the private enterprises. The followed other treaties.

To start, there is The Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies (the "1967 Space Treaty") a remarkable principle in establishing broad guideline in outer space.[21]

When this treaty was written a commercial space-flights was a distant reality. The Soviet Union triggered the space race with the launch of Sputnik, at the time space activities were associated intrinsically to the political objectives and linked to the military matters of the two nations,[22] and show that the super powers dominated the space activities.

They had no profit and the they also have a genuine interest. The main concern was not to bring weaponization to space.[23]

This was before human activity in space became reality, before national space agencies such as SpaceX built rockets, Virgin Galactic, among others, became interested in space activities.[24]

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[20] Op. cit. note 3

[21] Op. cit. note 15

[22] Ferreira-Snyman, A. (2014). Legal challenges relating to the commercial use of outer space, with specific reference to space tourism. *Potchefstroom Electronic Law Journal/Potchefstroomse Elektroniese Regsblad*, *17*(1), 1-2.

[23] Op. cit. note 21

Nowadays, there are 193 member states of the United Nations (UN), its membership has more than quadrupled over the years. The outer space treaties are considered a great success.

The outer Space Treaty is considered a core substance of the international Space Law, establishing a jurisdictional link among a State and Space activities.

The outer space treaty was entitled a declaration of legal principles and these international declarations set up rules of law, and more that served a common interest.[25]

In international law, some of its original principles are outcome of the 1962 United Nations General Assembly Resolution on the Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space, and the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies 1967 (1967 Outer Space Treaty), thus, even some nations do not agree with the treaty, in light of the rules, the states can still be constrained by those basic principles.[26]

Follows the first important provisions: Freedom of exploration and use.

> *"Article I*
>
> *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, irrespective of their degree of economic or scientific development, and shall be the province of all mankind.*
>
> *Outer space, including the Moon and other celestial bodies, shall be free for exploration and use by all States without discrimination of any kind, on a basis of equality and in accordance with international law, and there shall be free access to all areas of celestial bodies.*

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[24] Op. cit. note 7

[25] Mainura, T. I. (2018). Outer Space Law in Retrospect. *The International Journal of Social Sciences and Humanities Invention*, *5*(5), 4661-4671.

[26] Op. cit. note 25

There shall be freedom of scientific investigation in outer space, including the Moon and other celestial bodies, and States shall facilitate and encourage international cooperation in such investigation."

The core content on international Space law is based in favor of peace to space and are equality important.

The exploration and exploitation refer discovery and unlocking the great potential that there is in Outer Space, when the legal regime was drafted, was purely scientific and only government are included and limited by the text. Private actors are not incorporated.[27]

The following part: "*for the benefit and in the interest of all* countries" is upheld under the leasing regime, that even commercial benefits is made through exploration, under this regime, is not allowed nations and private companies to reap their benefits from exploitation of outer space, the exploitation and exploration should be shared by all countries.[28]

The concept of the province of all mankind is a pioneer to the Common Heritage of Mankind principle and remain it, which will be more elaborated in the Moon Treaty.[29]

Nevertheless, it is interesting be highlighted, the Law of the Sea principle, is the same convention, but with limited scope, and in contrast to the Outer Space Treaty was toughly criticised its implementation in the Moon.[30]

There was a general acceptance of the Outer Space Treaty, even though containing undefined terms at the time, however impose obligations upon Nations.[31]

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[27] Blanchette-Seguin, V. (2016). Reaching for the Moon: Mining in Outer Space. *NYUJ Int'l L. & Pol.*, *49*, 959.

[28] Pershing, A. D. (2019). Interpreting the Outer Space Treaty's Non-Appropriation Principle: Customary International Law from 1967 to Today. *Yale J. Int'l L.*, *44*, 149, 159.

[29] Buxton, C. R. (2004). Property in outer space: the common heritage of mankind principle vs. the first in time, first in right, rule of property. *J. Air L. & Com.*, *69*, 689.

[30] Sundahl, M. J., & Gopalakrishnan, V. (2011). New Perspectives on Space Law Proceedings of the 53rd IISL Colloquium on the Law of Outer Space, Young Scholars Sessions.

[31] Frakes, J. (2003). The Common Heritage of Mankind Principle and Deep Seabed, Outer Space, and Antarctica: Will Developed and Developing Nations Reach a Compromise. *Wis. Int'l LJ*, *21*, 409

The lack of sovereignty was one the main reason to draft the Outer Space Treaty and implied a significant series of multilateral agreements.[32] Hence, appropriation in outer space is forbidden, and includes celestial bodies as indicated in Article II of the Outer Space Treaty.

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

At the moment that the Outer Space was originally drafted, was not considered ambiguous as much as in light of freedom of use of outer space or in terms of the actors can not be claimed.[33]

Such prohibition will be discussed in the context of the business exploration by private enterprises. In outer space the nations cannot appropriate parts of celestial bodies and also claim it as was in Europe in old century.

They are granted to control and have the jurisdiction over objects based on Article VIII. The property rights subsequent will be approached ins this dissertation.

A similarity of those principles and articles can be seen in High Seas Convention, this convention has a particularly article, followed:

> *"Article 2*
>
> *The high seas being open to all nations, no State may validly purport to subject any part of them to its sovereignty. Freedom of the high seas is exercised under the conditions laid down by these articles and by the other rules of international law. [Freedoms] shall be exercised by all States with reasonable regard to the interests of other States in their exercise of the freedom of the high seas."*

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[32] Cooper, N. D. (2008). Circumventing Non-Appropriation: Law and Development of United States Space Commerce.*Hastings Const. LQ*,*36*, 457.

[33] Op. cit. note 28

Meaning thus that the states have no jurisdiction and control over the field surrounding its ship, but in respect the vehicle and its personnel uphold the jurisdiction. As is the preamble in space law.

Consequently, maritime law and space are also analogous to each other, because both seek to promote free exploration and use by states on an equal basis and in accordance with international space law. This jurisdiction will be discussed in more detail in context to find a better solution to property rights.[34]

Another important principle also implies that states are responsible for conducting outer space activities in conformity with the provisions stipulated in international law.

> *"Article III*
>
> *States Parties to the Treaty shall carry on activities in the exploration and use of outer space, including the Moon and other celestial bodies, in accordance with international law, including the Charter of the United Nations, in the interest of maintaining international peace and security and promoting international cooperation and understanding."*

The application of this treaty is very large engaging individuals states and international organizations in space activities

> *"Article XIII*
>
> *The provisions of this Treaty shall apply to the activities of States Parties to the Treaty in the exploration and use of outer space, including the Moon and other celestial bodies, whether such activities are carried on by a single State Party to the Treaty or jointly with other States, including cases where they are carried on within the framework of international intergovernmental organizations. Any practical questions arising in connection with activities carried on by international intergovernmental organizations in the exploration and use of outer space, including the Moon and other celestial bodies,*

[34] Op. cit. note 25

The questions regarding the space activities, if this principle reaches to private individuals as well as to States still remain.

The most common approach is justified that the Outer Space Treaty and its prohibition of national reach to States as well as to private individuals. This argument is based on the fact of the absence of endorsement from a sovereign entity. We can see well written in Fabio Tronchetti's work:

> "*[T]here is a general consensus on the fact that both national appropriation and private property rights are denied under the Outer Space Treaty . . .*
>
> *Private entities are allowed to carry out space activities but, according to Article VI of the Outer Space Treaty, they must be authorized to conduct such activities by the appropriate State of nationality. But if the State is prohibited from engaging in certain conduct, then it lacks the authority to license its nationals or other entities subject to its jurisdiction to engage in that prohibited activity by the fact that the Outer Space Treaty."*

However, Article II can be viewed as broader jurisdiction regarding property rights. Coming back again to original language of the Outer Space, laid down that appropriation is not subject by means of use or occupation, or by any other means, therefore can proceed as a "means" for the government.[35]

2.3. Liability

Space activities are deemed an environment dangerous and with a lot of risks. Therefore, the importance is very stressed considering its growth. Since that the liability convention was drafted, has been an important element in terms of regulation.

This principle brings states liability for governmental and nongovernmental activities and also implies, several safeguards such as, control and supervision private space activities. There are two regimes regarding liability: Liability Convention together with the 1967 Space Treaty. But The Outer Space Treaty articles will be stressed here.

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[35] Op. cit. note 28

The 1967 Outer Space Treaty provides a more detailed and important regime to space activities.[36]

> *"Article VI States Parties to the Treaty shall bear international responsibility for national activities in outer space, including the Moon and other celestial bodies, whether such activities are carried on by governmental agencies or by non-governmental entities, and for assuring that national activities are carried out in conformity with the provisions set forth in the present Treaty. The activities of non-governmental entities in outer space, including the Moon and other celestial bodies, shall require authorization and continuing supervision by the appropriate State Party to the Treaty. When activities are carried on in outer space, including the Moon and other celestial bodies, by an international organization, responsibility for compliance with this Treaty shall be borne both by the international organization and by the States Parties to the Treaty participating in such organization."*[37]

The article VI of the treaty recognizes States responsibilities for space activities and also endorse responsibilities for non-governmental, in this sense makes a relevant clause in the international law.

Nongovernmental entities are not directed linked with private enterprises, but private companies are a good players in outer space, having a great involvement in space activities, with capacity supplier services and good in space.

So, it is important to mention that in this area state actions demand a certain influence, arguing that space activities should serve a public interest. In this sense, the article VI appeared to suggest to constitute a license regime and be supervised by the states parties.

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[36] Failat, Y. A. (2012). Space Tourism: A Synopsis in its Legal Challenges. *ILJ*, *1*, 120.

[37] Op. cit. note 10

Under international law in article VI, there is an obligation of authorisation and supervision by the "appropriate state. The states are responsible to authorise and supervise nongovernmental in its activities in space.

This become a high risk to state allowing private enterprise operates in space environment. However, these regulations are not clear, consequently trying to fill the gap that clarify the proper measures for compliance among international community and the Article VI.[38]

The system of responsibility followed by states, exercising its control over these space activities, impose a certain liability on the launching state. This recognition of authorisation and supervision involve certain legal issues, mostly because they may be liable at the international level.[39]

Normally these tendencies of authorization and continuing supervision happen for non-governmental actors.[40]

Private enterprise primarily wants the return of its investment and maximisation of profits in space activities, but this factor is opposed to military goals, that in the outer space should serve a security interest. This sort of realities will be later on explored.[41]

In case of launch or attempted of launched from a territory facility that country shall be considered to be internationally liable, no matter who procured the launch. If the launching is a result of illegal activity the state can be exonerated from liability. As the states should be legal control and a clear responsibility of private actors, this provision is not an inconsistent regulatory.[42]

"Article VII

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[38] Op. cit. note 6

[39] Masson-Zwaan, T., & Freeland, S. (2010. Between heaven and earth: The legal challenges of human space travel.*Acta Astronautica*,*66*(11-12), 1597-1607.

[40] Sundahl, M. J., & Gopalakrishnan, V. (2011). New Perspectives on Space Law Proceedings of the 53rd IISL Colloquium on the Law of Outer Space, Young Scholars Sessions.

[41] Op. cit. infra

[42] Op. cit. note 36

"Each State Party to the Treaty that launches or procures the launching of an object into outer space, including the Moon and other celestial bodies, and 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, including the Moon and other celestial bodies."

This principle has a very internationally basis liability and considerably an innovation.[43]

2.4. The Rescue Agreement of 1968

The Agreement on the Rescue of Astronauts, the Return of Astronauts and Objects Launched into Outer Space is laid down in the Outer Space Treaty.

This principle further explained on the definition of astronauts as envoys of mankind, facilitate the rescue of astronauts, guaranteeing them all assistance when in a hard moment.[44]

The "envoys of mankind" principle, derives from scratch that all astronauts involved in "working fundamentally for a greater public common good" and with the growth of space tourism in outer space deserve somewhat specify an expansion.[45]

2.5. The Liability Convention of 1972

The liability regime is established in the Outer Space Treaty is more elaborated in the Convention on International Liability for Damage Caused by Space Objects of 1972.

The Space Liability Treaty designed a more explored framework, expressing the intention to adequate a comprehensive liability regime.

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[43] Linden, D. (2016). The Impact of National Space Legislation on Private Space Undertakings Regulatory Competition Vs Harmonization (1), 3.

[44] Twibell, T. S. (1996). Space Law: Legal Restraints on Commercialization and Development of Outer Space. *UMKC L. Rev.*, *65*, 589.

[45] Mani, T. (2016). The Applicability of the Norms of Emergency Rescue of Astronauts to Space Tourists. *King's Student L. Rev.*, *7*, 30.

Definitions of liability:

"Article I

For the purposes of this Convention:

(a) The term "damage" means loss of life, personal injury or other impairment of health; or loss of or damage to property of States or of persons, natural or juridical, or property of international intergovernmental organizations;

(b) The term "launching" includes attempted launching;
(c) The term "launching State" means:
(i) A State which launches or procures the launching of a space object; For the purposes of his Convention:
(ii) A State from whose territory or facility a space object is launched;
(d) The term "space object" includes component parts of a space object as well as its launch vehicle and parts thereof.[46]

Based on this regulations, private actors will need to use the term "territory of facility" of a "launching state" to launch its object to space.

The international Law commission is clear when expand the principle of liability established by the Outer Space Treaty, confining the fact that the liability for damage caused by space objects stand totally with the launching states.[47]

"Article II

A launching State shall be absolutely liable to pay compensation for damage by its space object on the surface of the Earth or to aircraft in fight.

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[46] United Nations. Office for Outer Space Affairs. (2008). *United Nations Treaties and Principles on Outer Space: Text of Treaties and Principles Governing the Activities of States in the Exploration and Use of Outer Space and Related Resolutions Adopted by the General Assembly.* United Nations Publications

[47] Von der Dunk, F. G. (1994). Commercial Space Activities: An Inventory of Liability-An Inventory of Problems, 163.

"Article III

In the event of damage being caused elsewhere than on the surface of the Earth to a space object of one launching State or to persons or property on board such a space object by a space object of 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."[48]

In any event, the launch states operated within a specific legal framework, a national law, and legal order. The liability is also transferred to operator, that can be a private actor.

In the wording of article VI, it is possible two or more states have joint liability for any damage caused. State considered to be part of launch it will be possible to be sued.[49]

"Article V

Whenever two or more States jointly launch a space object, they shall be jointly and severally liable for any damage caused."

In international law the liability is equitable among states engaged or procured in launch by a space objects. Thus, the only away to that a state can be excluded from entirely liability is when specific conditions are found. To be exonerated from the liability, the damage should be a result of "gross negligence" or "an act or omission" without intension to cause damage by a claimant state.

This claimant can be juridical persons or privates one.[50]

"Article VI

Subject to the provisions of paragraph 2 of this article, exoneration from absolute liability shall be granted to the extent that a launching State establishes that the damage has resulted either wholly or partially from gross negligence or from an act or omission done

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[48] Op. cit. note 46

[49] Noyes, J. E., & Smith, B. D. (1988). State responsibility and the principle of joint and several liability. *Yale J. Int'l L.*, *13*, 225.

[50] Twibell, T. S. (1996). Space Law: Legal Restraints on Commercialization and Development of Outer Space. *UMKC L. Rev.*, *65*, 596.

with intent to cause damage on the part of a claimant State or of natural or juridical persons it represents.

No exoneration whatever shall be granted in cases where the damage has resulted from activities conducted by a launching State which are not in conformity with international law including, in particular, the Charter of the United Nations and the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies."

The liability convention also indicates that there is a compensation and for damage caused in space, and when there are more states involved in the damage, will be adjusted fairly.

The Liability Convention's will cover a full compensation in case of damage.[51]

"Article XII

The compensation which the launching State shall be liable to pay for damage under this Convention shall be determined in accordance with international law and the principles of justice and equity, in order to provide such reparation in respect of the damage as will restore the person, natural or juridical, State or international organization on whose behalf the claim is presented to the condition which would have existed if the damage had not occurred."[52]

This liability regime had a great benefit for the victims and the doctrine established that is suitable for the commercial flights and covers its space activities.[53]

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[51] Noyes, J. E., & Smith, B. D. (1988). State responsibility and the principle of joint and several liability. *Yale J. Int'l L.*, *13*, 225.

[52] Op. cit. note 48

[53] Op. cit. infra

2.6. Registration Convention of 1975

The concept of registration provides an important role in the liability regime. Under the registration convention it is possible to identify the damage caused by space objects and the liable states. Registration gives a valuable information to exercise jurisdiction and increase a possibility to a fairly compensation.[54]

The Registration Convention was treated uniquely in Outer Space, and before that was developed in the 1972 Liability Convention. This regime was seen as one major effort to improve the changes of identification of space objects and a considerable benefit to private actors.[55]

Article VIII (Outer Space)

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

The articles II provide the key word of the Registration Convention, containing the obligation to register all types of space objects, which reported:

"*Article II*

When a space object is launched into Earth orbit or beyond, the launching State shall register the space object by means of an entry in an appropriate registry which it shall

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[54] Von der Dunk, F. G. (2003). The registration convention: Background and historical context, 451.

[55] Op. cit.

maintain. Each launching State shall inform the Secretary-General of the United Nations of the establishment of such a registry.

Where there are two or more launching States in respect of any such space object, they shall jointly determine which one of them shall register the object in accordance with paragraph 1 of this article, bearing in mind the provisions of article VIII of the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, and without prejudice to appropriate agreements concluded or to be concluded among the launching States on jurisdiction and control over the space object and over any personnel thereof.

The contents of each registry and the conditions under which it is maintained shall be determined by the State of registry concerned."

Registration has an important role in the liability regime. Through registration in which is possible to coordinate launching and find out the state launching in case of damage and liability.

The national register is responsible for the content, maintenance. However, should be maintain registered in two or more registers: one in national register, and two the United Nations Office for Outer Space Affairs (UNOOSA).

Concerning private enterprise, is necessary maintain jointly the register? The meaning of the "launching state" cause divergence especially when is about private actors.

Moreover, regarding launching or procuring, there is no distinction among these two words. Become alarming in case of private activities are involved. As one state only one state should register its space object, thus this could lead a national competition.[56]

[56] Linden, D. (2016). The Impact of National Space Legislation on Private Space Undertakings Regulatory Competition Vs Harmonization.*Journal of Science Policy & Governance*,*8*(1), 1-17.

2.7. The Moon Treaty of 1979

The moon treaty in the beginning was a complete failure and in 1969 was drafted and codified Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, having the propose to apply to all "celestial bodies within the solar system". The space treaty was a landmark, becoming the first one to regulate space activities in an international level.

This new era and generation of space legislation brought a tough reality, representing division among Soviet Union and United State ideologies. Thus, its aim is guarantee an equitable distribution of natural space resource to all countries and protecting developing countries or minor space powers.

The moon treaty is seen as unquestionable exploration of space resources, bearing in mind the new era of industry. As was pointed out in article 11 – 5, of the Treaty:

> "*States Parties to this Agreement hereby undertake to establish an international regime, including appropriate procedures, to govern the exploitation of the natural resources of the Moon as such exploitation is about to become feasible."*
>
> This regime was drafted with the focus on the concept of "Common Heritage of Mankind". The moon and its resources should be available to all mankind and not to any particular enterprise or nation. But there are a lot of resistance in its ratification by part of super power nations. A better regime should be established.[57]
>
> *"Article 4*
>
> *The exploration and use of the Moon shall be the province of all mankind and shall be carried out for the benefit and in the interests of all countries, irrespective of their degree of economic or scientific development. Due regard shall be paid to the interests of present and future generations as well as to the need to promote higher standards of living and*

[57] Twibell, T. S. (1996). Space Law: Legal Restraints on Commercialization and Development of Outer Space. *UMKC L. Rev.*, *65*, 589.

conditions of economic and social progress and development in accordance with the Charter of the United Nations.

States Parties shall be guided by the principle of cooperation and mutual assistance in all their activities concerning the exploration and use of the Moon. International cooperation in pursuance of this Agreement should be as wide as possible and may take place on a multilateral basis, on a bilateral basis or through international intergovernmental organizations.'[58]

The Outer Space Treaty and the Moon Treaty is unclear, and a great definition of the of the common heritage of mankind is welcome.

The property regime is addressed in article 11:

"*Article 11*

The Moon is not subject to national appropriation by any claim of sovereignty, by means of use or occupation, or by any other means.

Neither the surface nor the subsurface of the Moon, nor any part thereof or natural resources in place, shall become property of any State, international intergovernmental or non-governmental organization, national organization or non-governmental entity or of any natural person. The placement of personnel, space vehicles, equipment, facilities, stations and installations on or below the surface of the Moon, including structures connected with its surface or subsurface, shall not create a right of ownership over the surface or the subsurface of the Moon or any areas thereof. The foregoing provisions are without prejudice to the international regime referred to in paragraph 5 of this article."

The moon treaty confers the status of *res communis omnium*, meaning free exploration and use by all states without any possibility of being appropriate, based on the non-appropriation principle of the Outer Space Treaty.

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[58] Treaties (UNOOSA)

The article II makes a clear mention regarding prohibition of sovereignty rights in outer space, preserving the peaceful activities and use of space in the name of all mankind.

But this prohibition of sovereignty drafted in the Outer Space treaty, was not enough keep the private appropriation away, considering the argument that in these articles does not make a specific prohibition.

Nevertheless, in general agreement, national appropriation and private property rights are not authorized under the Outer Space. Private entities are allowed to run space activities, but must be conducted by the appropriate state, but this is not enough to keep the desire of commercialization far way.[59]

2.8. More Elaboration regarding on the Common Heritage of Mankind Principle

This principle will be mentioned more often in this writing, and this part is entirely related to a more elaboration about the Common Heritage of Mankind Principle.

The concern about Common principle of humanity's heritage began with an important speech by the ambassador, saying that the seabed and the ocean floor should be used to exploited for peaceful and to benefit to all mankind.

More later during deliberations of the U.N Outer space Committee, was considered a new subject of international law, with a broad common property of outer space, relating this principle with the *res communis* idea. The *res communis* mindset submits that all property should be open to all.

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[59] Tronchetti, F. (2008). The Non–Appropriation Principle as a Structural Norm of International Law: A New Way of Interpreting Article II of the Outer Space Treaty.*Air and Space Law*, *33*(3), 277-305

The antecedents of the principles also propose the Roman law applied to the resources of the common space and, in parallel, to the fundamental religious and natural law.[60]

The concept of the Common Heritage of Mankind Principle remains controversy. Its implementation and development are twofold.

Firstly, the fundamental idea was adopted in the Outer Space Treaty and is binding only on the signatory countries, totally escaping the idea that it should be open to all.[61]

Several believe that these principles, originally, was drafted from the 136 of the Law of the Sea Convention.[62]

> "*Article136*
>
> *Common heritage of mankind*
>
> *The Area and its resources are the common heritage of mankind."*[63]

In which only the states parties are binding by the interpretation of the treaty.

But only states parties are bound under the condition of the treaty. And this implies to all treaties. The common heritage principle has inconsistent interpretations, and bearing in mind this contradiction interpretations, is it not totally accepted as a customary law.[64]

The principal of the common heritage of mankind should be a core to conduct all nations. But the reality is not the case, since that the non-signatories is not bound by it.

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[60] Noyes, J. E. (2011). The common heritage of mankind: past, present, and future.*Denv. J. Int'l L. & Pol'y*,*40*, 457.

[61] Bourrel, M., Thiele, T., & Currie, D. (2018). The common of heritage of mankind as a means to assess and advance equity in deep sea mining.*Marine Policy*,*95*, 3.

[62] Lee, S., & Kim, J. W. (2018). Applying the Principle of the Common Heritage of MankindAn East Asian Perspective. In *Global Commons and the Law of the Sea*(pp. 15). Brill Nijhoff.

[63] https://www.un.org/depts/los/convention_agreements/texts/unclos/part11-2.htm. Last accessed on 14.09.2019

[64] Owolabi, K. M. W. (2013). The principle of the common heritage of mankind.*Nnamdi Azikiwe University Journal of International Law and Jurisprudence*,*4*, 51-56.

The definition is quite vague and this way, leads disagreement among developed and developing states.

In this sense, there is no universal acceptance of definition or interpretation of the common heritage principle, but there are some basic elements that are preserved as follows:

a- the non-appropriation principle of space property. In the *res communis* property idea, there is non-appropriation of the property, belongs to all. No state can appropriate or make sovereign claim over, although the resources of the property will be available to all nation. Therefore, all would have free access and use.

b- International organization. There is a responsibility to assure a common management of the activities in the outer space. Therefore, the international resource management should serve to everyone and its sustainable management guaranteed not only for one state but to the all international community.

c- Sharing benefits. There is another important element, sharing benefits derived from activities in the Area. This institutionalise benefit sharing, bearing in mind that enterprises if want explorer and exploit, should be in a communitarian feature.

The exploration with some gain must be shared among the States Parties.

It is important to highlighted and that these resources shall be used for the benefit of present generations leaving a particular area in as great condition for the future generation to received it.[65]

This leads to the next matters, d- **Preservation for future generations**. Furthermore, the preservation for preservations for the future should be given a legitimate use and the relations among benefit sharing and conservations of the environment should have a major consideration. Its

[65] Joyner, C. (1999). BOOK REVIEW "THE CONCEPT OF THE COMMON HERITAGE OF MANKIND IN INTERNATIONAL LAW".

resources should be used in an equitable sharing way, taking into account the needs and interests of developing states.

e- Peaceful use of areas and resources. The area of outer space is exclusively used for peaceful purpose and for the benefit of mankind. This purpose provisions not depend of the economic degree or scientific development of the nation.[66]

The interpretation concerning The Common Heritage of mankind principle and its basic elements, may vary between countries. These different interpretations are due its imprecise legal requirements.

Like most international principles, states will have several interpretations. But some elements such as desire, needs may define these interpretations.

In international view there are two positions of interpretations, one by part of developed countries another by part of developing ones.

There is an uncomfortable discussion between developed and developing countries, when it comes to discussing the Area and its Resources.

The Developed nations interpret this principle as meaning that this Area should be for the common use of all, keeping the traditional of the freedom of exploration. This lead that all nations can exploit its resources weather they are in position to do so. This means that all nations can exploit their resources when they are in a position to do so.

This would later lead to equitable exploitation of resources. Developed countries would be responsible for having probably the economic and technological means to exploit these resources.[67]

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[66] Bourrel, M., Thiele, T., & Currie, D. (2018). The common of heritage of mankind as a means to assess and advance equity in deep sea mining.*Marine Policy*,*95*, 311-316.

[67] Buxton, C. R. (2004). Property in outer space: the common heritage of mankind principle vs. the first in time, first in right, rule of property.*J. Air L. & Com.*,*69*, 689.

In developing countries interpretations believe that the Area to the common heritage of mankind do not belong to any sovereign nation. Thus, resources exploited and the use should be to all mankind and hence shared internationally.

Furthermore, its needs and interests it is important to take into account, distributing with justice the sharing benefits.[68] To illustrate follows the Pardo´s thoughts:

> *"We wanted dignity for poor countries and an end to humiliating financial hand-outs, by giving even the poorest members of the international community the opportunity to obtain access to marine technology at a tolerable cost and to participate on a basis of equality in the management and development of very significant resources.*
>
> *Finally, we wanted radically to change the traditional law of the sea which, we believed, reflected the interests of only a few members of the international community. It certainly was not in harmony with the ever more urgent need of cooperation in addressing world problems, and for environmental sensitivity and sustainable cooperative development of world resources. In short, we wanted the common heritage principle to replace freedom of the seas as the foundation of international law of the sea."*[69]

In common heritage of mankind includes in its antecedents the so-called common property doctrine, more known as **The Trust Public Doctrine**. This doctrine proposes that a state actor maintain and manage trust in property for the benefit of all mankind.

While the trustee (State) holds the property, the use, rights to exclude and take benefit from this Area, could hence transmit this use of the property to its dwellers, in that case the private enterprises. Thus, would have the division among rights (state and individual). Either party uses it according to their needs, but the state's interest has preference.

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[68] Bourrel, M., Thiele, T., & Currie, D. (2018). The common of heritage of mankind as a means to assess and advance equity in deep sea mining.*Marine Policy*,*95*, 311-316. Buxton, C. R. (2004). Property in outer space: the common heritage of mankind principle vs. the first in time, first in right, rule of property.*J. Air L. & Com.*,*69*, 689, and Op. cit. infra note.

[69] Pardo, A. (1993). The origins of the 1967 Malta initiative.*International Insights*,*9*(2), 65-69.

In the article 1 of the Outer Space apparently demonstrate a public trust situation. Therefore, the states do not have sovereignty over outer space, that is important in the trust Public Doctrine. Before the any rights conferred to private actors, sovereign management over the property is needed.[70]

3. National Space Law

There are a considerable growing commercial and private activities in outer space. Hence, also increase an amount of national legislation. The existing body of international space law remains unaltered, but with this growing commercialisation of space activities the national space law started its sharp involvement.

This involvement derives in part from the exponentially expansion of private enterprises in the space industry. Being considered crucial for the expanding the business in a solid area.

Private undertakings and states are interested in this industry because lead to an incredible increase in economic activities such as: raises tax revenues, decreases unemployment among other advantages. As it is well known, the international space law does not fulfil these issues. Thus, the focus in a common denominator is crucial by private companies.

For now, the national space law may provide a regulation to adapted to the New-Space Industry.

In some parts of the countries, have their own program space and thus its legal differences. Each nation's space activities and needs result in varying rules.[71]

The nations have the awareness regarding the gain from outer space expansion and want to protect its interest and financial gain. In this sense the government want to bring investor and enterprises and subsequently to enact regulations required for regulatory competition to work.

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[70] Feris, L. (2012). The public trust doctrine and liability for historic water pollution in South Africa.*Law Env't & Dev. J.*,*8*, 1.

[71] Linden, D. (2015). The Impact of National Space Legislation on Private Space Undertakings A Regulatory Competition Between States. In *nternational Astronautical Congress, Date: 2015/10/12-2015/10/16, Location: Jerusalem, Israel.*, Morris, A. (2016). Intergalactic property law: A new regime for a new age. *Vand. J. Ent. & Tech. L.*,*19*, 1085.

Variety in national legislation provides an adequate basis for aligning with a country's legal framework.

The national law framework is formed and limited by general international law and also from international space law. In this sense, the national interpretation will define in which national space law can be developed. In case of no nationals, the state will have to adhere the international legal framework.[72]

As mentioned, each nation has a different view and understanding of the treaties. Different legal framework lead to dissimilar forms of national law.

Therein, distinct national law indicates different approaches.

In this sense, the different national law rules, could be divided in some distinct ways.

First: There are some nations, like the current American approach, that interpret the international law, believing that only the rules are applicable to nations parties and not being to its nationals.

Second: Others countries already extent the rules to its nationals.

The last one, academic writing, that want to abandon completely the existing international space law.[73]

These differences will be more evident in the next lines.

3.1. Is it possible the actual legal framework to corroborate with all these industry´s changes?

Previously, served to familarizing with the topic of New era of space industry and its legal context. However, is it possible the actual legal framework to corroborate with all these industry´s changes?

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[72] Op. cit.
[73] Op. cit.

It is possible for private sector move forward in this acutal legal framework? The Outer space was elaborated when the legislator can not even imagine private enterprise in Outer Space. As demonstrated above the private sector were never entirely covered in the international legal context.[74]

Nevertheless, private sector will be in conflict with the actual legal framework and private entreprises will find some legal issues ahead.

Some legal issues have already been demonstrated in the previous information and it was clear that current legal rules were not prepared to support these new challenges such as liability and registration regime.

To better understand if the current legal framework is adjustable for the private sector in Outer Space, we will address the legal issues faced. Thus, national space law will shed light on how these private companies can advance in this new context of challenges.[75]

Thus, space tourism, exploration industries will be discussed and will check whether these rules provide the potential to make national space law more interesting for the industry.

The existing context of international space law warns nations parties to adequate national space rules, in order to handle with their space activities and its new challenges .

However, it is important to mention. the possibility of regulatory competition came up, considering the growth of divergent national space law.[76]

[74] Op. cit. note 33
[75] Op. cit. note 55
[76] Op. cit. note 57

3.2. Exploitation Industry. Legal issues in particular industries

The exploitation industry is taking the central core, due private enterprises are each day became specialists in space mining. Private companies are hoping to exploit raw material from space and other minors planets. There many companies interested in asteroid mining.

Even the private companies eager to conquer of asteriods, there is a strong battle to commercially exploit it ahead.

The property aspects is an important issue in the exploration industry. Private companies want a legal certainty concerning the property of space resources they exploit. To be precise, they want the property rights in outer space.

The non-appropriation principle of the Outer Space establishes that there is no ownership in space or any of its parts, is the main block to overcome.[77]

This international principle is considered to be a barrier to the exploitation of space resources. Indeed, the article II of The Outer Space forbids the national appropriation by claims of sovereignty. However, some legal scholars opened a question if both states and private sector are subject to these provisions.[78]

States will point out these matters in some ways.

As mentioned earlier, nations differ in its applicability of international space law. In general speaking, there are three different approaches to the property rights. A hard, middle and a radical approach. And will vary of the aim, will choose to support their objective.

Whether there are different interpretations of the treaty, these questions will be solved by researching the report paper and to analyse their intentions. Another away of interpretations is

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[77] Hobe, S. (2010). The Impact of New Developments on International Space Law (New Actors, Commercialisation, Privatisation, Increase in the Number of Space-Faring Nations). *Unif. L. Rev.*, *15*, 869.
[78] Op. cit. note 56

looking the plain meaning of the text. Although, doing so with the treaty we can see clearly that is very conflicted.

The wording of this provisions is Intentionally ambiguous about Property Rights, because of a compromise between conflicting intentions of the United States and the Soviet Union.[79]

When the Outer Space Treaty was drafted between the tension of the Cold War, the capitalist and socialist ideas among political ideologies, economic models at the time dominated the negotiations. The conflict affected the implementation of the property rights in the Outer Space.

The context may thus explain the legal meaning of the wording. As known, there is no international agreement on the interpretation of the provision. And thus, also there is no perspective of the agreement arriving soon. So, it is very important to accompany the different national approaches. These approaches are based on political needs, aim of the nations, they are different from each other.[80]

3.3. The Exploitation area: A hard approach

As it was demonstrated, the rapid growth of commercial space mining has caused several legal problems and might to cause additional future issues subject to space regulation.

The patent legal problem is that the treaties provisions are not fully prepared to the boost of the space commercial. In order to clarify if the actual legal framework is ready to new space challenges, this phase will examine some legal problems faced.[81]

There are five elements generally considered central to the modern Common Heritage doctrine:

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[79] Op. cit. note 45

[80] Pastorius, C. (2013). Law and Land Policy in the Global Space Industry's Lift-off. *Barry L. Rev.*,*19*, 201. Chicago.

[81] Op. cit.

1) the area is not subject to national appropriation;

2) all states share in the management of the area;

3) the benefits derived from exploitation of resources in the area must be shared with all regardless of the level of participation;

4) the area must be dedicated to peaceful purposes; and

5) the area must be preserved for future generations.

The largest issue for commercial use is the third element: "the benefits must be shared with all regardless of the level of participation." As you can imagine, most of the developed nations desire a less direct interpretation of the idea of "sharing."[82]

"The United States put forth the developed nations belief that the Common Heritage Concept allowed appropriation and exploitation as long as it was done for peaceful purposes and mankind benefited in some way."

The developed nations prefer a reading that the province of all includes bringing those resources to the world at a fair market price, so all mankind benefits indirectly rather than directly, that is "in some way."

The developing nations, specifically those nations without the ability to explore or take advantage of space, favor an interpretation of the Outer Space Treaty that makes the common heritage, as well as the province of all, an equitable distribution not based on contribution or effort.[83]

Referring to it as a "common property" approach, less-developed nations assert that there should be common management of such areas, with a singular group possessing exclusive rights to exploit natural resources and distribute those resources equally to all nations, regardless of which nations actually funded the effort (either economically or by developing the technology or both).

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[82] Op. cit. note 62

[83] Op. cit.

Many developing nations might favor an equitable distribution of benefits reaped from outer space resources regardless of contribution, but have so far never considered this to mean the nations that do go to space are obligated to give up their technology, so that nations without this technology can go themselves.

Further, no nation can be blocked from using space for peaceful, scientific purposes, but once again, no one is forcing each nation to share knowledge gained from this scientific use. Perhaps an example of how the spacefaring nations practice the concept of the province of all mankind with each other is in order.

The International Space Station (ISS) Agreement, which recognizes all space treaties (with the notable exception of the Moon Treaty), does NOT state that the benefits belong to all nations equally, but that the knowledge gained in experiments on the station are the intellectual property of the nation whose module the research was conducted in, maintaining intellectual property rights.

So, although the ISS Agreement recognizes the Outer Space Treaty, discoveries aboard the International Space Station are not strictly the Common Heritage of Mankind, giving us some insight into what the major spacefaring nations conceptualize as the "province of all mankind."

No corporation (or other private business entity) would make a large investment knowing that, not only would there be little or no profit, but most likely the undertaking would lose the bulk of its investment to non-contributors.

So, for private appropriation to work, first we must assume, as I did earlier, that like technology and knowledge, the benefits will be peacefully obtained and shared with humanity in a less direct, more commercial form. Just like certain benefits that have been gained from other forms of technological innovation, the human race benefits from space exploration by having products that have been properly licensed and then marketed to the public.

"In sum, the 'Common Heritage' to be enjoyed by all mankind may be seen modernly as a hybrid of: equitable access for all, some equitable benefits for all (excluding non-peaceful purpose technology), and equitable rights to peace in space."[84]

The radical approach, a huge number of legal authors consider the non-appropriation principle one of the major concern to the exploration of the outer space, and these authors consider some negative points to a radical approach. It´s interesting to mention that the radical approach it´s only a theoretical movement without none position of state.[85]

The radical approach, based on the original Outer space treaty laid down the broad principals, refused the non-appropriation principle in its full essence. It violates the current idea of property jurisprudence.[86]

The all these theories should the rejected, bearing in mind the lack of a consistent legal basis and the current economic mores is the right indication by the lack of support this approach.

The current agreement regarding the exploration and use of outer space, are based on the theory on international co-operation. Currently, there are a number of companies seeking to gain reserved access to space for many reasons. And the theoretical having the idea that the government will not be able to meet the commercial demand. However, the Nation that refuse such treaties have mentioned that the acceptance of this treaty would be neither equitable nor practical.[87]

Furthermore, the Outer Space Treaty and Moon Treaties gave rise to the cornerstone of the first and principle instrument to take out all opportunities of national sovereignty in outer space with

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[84] https://www.peacepalacelibrary.nl/ebooks/files/35550927X.pdf written by BRYON C. BRITTINGHAM* * Teaches Business, Law, and English for a Specific Purpose (ESP) courses in various countries to professionals and at overseas universities. J.D., Ohio State University Moritz College of Law; B.A., Political Science and Economics, University of Oregon. Last acessed on 01.08.2019.

[85] Keefe, H. (1995). Making the final frontier feasible: A critical look at the current body of outer space law. *Santa Clara Computer & High Tech.*

[86] Op. cit.

[87] Tronchetti, F. (2008). The Non–Appropriation Principle as a Structural Norm of International Law: A New Way of Interpreting Article II of the Outer Space Treaty.*Air and Space Law*, *33*(3), 277-305.

the broad language. In this sense, no state person or group has determined the international common heritage.[88]

Thus, states are prohibited from enforcing sovereignty by the means of utilizing non-state entities to accomplish their goals. This is a conflict to the potent investor or producer that there is no result for their efforts.

On the other hand, this prohibition was considered by the drafters of the Outer Space Treaty the best guarantee for preserving outer space for peaceful activities only and for stimulating the exploration and use of the space environment in the name of all mankind.[89]

3.4. Common heritage of mankind principle

The radical approach is pointed out as barriers of the Common heritage of mankind principle. This approach assumes that this principle will prevents commercial undertakings even developing countries to invest all its efforts without equality returns.

All countries will realize the same monetary benefit as those that invest lower in space exploration. Hence award to Outer the Status of *res communis omnium* for free exploration and use to all States without the possibility of being appropriated. In this sense is preferable for them to continue in the same manner.[90]

The future lack of resources and uncertain of law, may develop a black market to space exploration.

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[88] Keefe, H. (1995). Making the final frontier feasible: A critical look at the current body of outer space law.*Santa Clara Computer & High Tech. LJ*,*11*, 345.

[89] Tronchetti, F. The Non-Appropriation Principle under Attack: Using Article II ofthe Outer Space Treaty in its Defence. PROCEEDINGS OF THE FIFTIETH COLLOQUIUM ON THE LAW OF OUTER SPACE.

[90] J. THOMAS, "Privatization of Space Ventures: Proposing a Proven Regulatory Theory for Future Extraterrestrial Appropriation", *Int'l L. & Mgmt. Rev.* 2005, (191) 206-208.

The radical approach believes, in certain way, that in future the humans will be able to share and work together for the common good. These assumptions at present are unrealistic based on the current law.

But we have an example, in the Western word applied the *res communis* has been failed.

On the other hand, in other societies *res communis* ideology, has been obtained more success, such as Africa, the Australian Outback. In indeed in particular societies the res communis has been little more success but rational to assume that will have some results in modern societies.[91]

Nonetheless, is it hard to assert that shift to capitalist ideas can change successfully to a *res communis* ideology. This because these societies have different values and points of views. And such things can sometimes fail. In the end return to the individual ownership system from the which them came.

Thus, property rights in space commercialization may become very disputed if demonstrated that there are substantial advantages and profits.[92]

The challenge to maintaining and realizing outer space security, has gained significance,

bearing in mind the contradiction that arises in two points of views.

First the globalist point of view is based on establishing and maintaining the outer space environment as a global common, and that all countries will recognize the importance for preserving the outer space and alter their national space activities to adjust to this ideal.

Second point of view, geopolitical, the insight of state involved in outer space activities

of what are adequate compromises to its outer space activities to conform to that ideal must be analysed concerning how it will affect their national security.

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[91] Op. cit.

[92] Op. cit.

Indeed, to ensure outer space security, norms of behaviour for outer space need to be established. Traditionally, majority norms for outer space activities and security is laid down in the area of legally – binding treaty that sets out basic norms of responsibility and behavior the precepts of which have been codified into the domestic space laws and activities of signatory states.

However, treaties used to address outer space issues have fallen in disadvantage, especially between states who have more developed space programs and depend on outer space for their national security.

In Most nations refuse to ratify and sign the Moon treaty indicating the impracticability of the treaties and hence, develop nations are reluctant to split the benefits of the exploration and the use of its resources.[93]

The radical approach would suggest abandoning or amending, the current legal framework of the Outer Space treaty, and replace it with the argument that it has kept the status of customary international law and allowing the titles of property rights in outer space.

However, this theory not only clash with the elementary principle of space law, specifically the non-appropriative nature of outer space, but is likewise dangerous.; this huge change implies an indispensable alteration of circumstances.[94]

This sort of alter, would increase the tension and conflicts among the all nations involved, bearing in mind that the states involved and private operators would start competing with each other due to get property rights. And the integrity of treaties should be treated with very great care.

This principle is carried out in the Section 3, Termination and Suspension of the operation of treaties: Article 62. Fundamental change of circumstances.

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[93] M. J. LISTNER, "It's time to rethink international space law", *The Space Review* 2005, http://www.thespacereview.com/article/381/1, last accessed on 15 July 2019.

[94] Tronchetti, F. (2009). *The exploitation of natural resources of the Moon and other celestial bodies: a proposal for a legal regime*(Vol. 4). Martinus Nijhoff Publishers.

1. A fundamental change of circumstances which has occurred with regard to those existing at the time of the conclusion of a treaty, and which was not foreseen by the parties, may not be invoked as a ground for terminating or withdrawing from the treaty unless:

(a) The existence of those circumstances constituted an essential basis of the con sent of the parties to be bound by the treaty; and

(b) The effect of the change is radically to transform the extent of obligations still to be performed under the treaty.

2. A fundamental change of circumstances may not be invoked as a ground for terminating or withdrawing from a treaty:

(a) If the treaty establishes a boundary; or

(b) If the fundamental change is the result of a breach by the party invoking it either of an obligation under the treaty or of any other international obligation owed to any other party to the treaty.

3. If, under the foregoing paragraphs, a party may invoke a fundamental change of circumstances as a ground for terminating or withdrawing from a treaty it may also invoke the change as a ground for suspending the operation of the treaty.[95]

This principle, *rebus sic stantibus,* is considered a traditional concept in legal doctrine and as well part of customary international law. At the hand to applied in relation in international space law and for to produce its effects the shift needs to be done.[96]

Lastly, the animus to set up a feasible regulations are based on the current circumstances, the focus was to agree upon common guidelines.

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[95] Vienna Convention on the law of treaties (with annex). Concluded at Vienna on 23 May 1969. https://treaties.un.org/doc/Publication/UNTS/Volume%201155/volume-1155-I-18232-English.pdf Last view in 16.07.2019.

[96] 68th International Astronautical Congress (IAC), Adelaide, Australia, 25-29 September 2017. Rebus Sic Stantibus and International Space Law The Evolution of the Space Treaties in the Next Fifty Years . Last acessed on 16.07.2019 https://swfound.org/media/206029/stefoudi_d_manuscript.pdf

Nowadays, overall, the space treaties were concluded since a legal framework was needed to rule the newly introduced activities in outer space.

Nonetheless, even if the changes were found of fundamental character and capable of impacting the intention of the States, withdrawing from or terminating a space treaty is an ineffective way to tackle current deficiencies.

In the place of general provisions, there would be no provisions at all, while the difficulty of reaching international consensus would remain challenging.[97]

3.5. The middle approach

We can find a less radical approach on the property rights in the recent practices of the United States. They get the minimum approach among the radical and loyal approach.

This middle approach seems to have ambiguities regarding the property rights in international legal context.

The questions are: Whether the international space law recognizes property rights to private actors. National level is interpreted firmly arguing the prohibition of the appropriation by sovereign states is blocked, meaning that the states will have to be guided by international legal framework. However, it appeared that non-governmental could require property rights in outer space.[98]

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[97] 68 th International Astronautical Congress (IAC), Adelaide, Australia, 25-29 September 2017. Rebus Sic Stantibus and International Space Law The Evolution of the Space Treaties in the Next Fifty Years Las view in 16.07.2019 https://swfound.org/media/206029/stefoudi_d_manuscript.pdf.page 6.

[98] Commercial Minig IN SPACE PROPERTY RIGHTS AND LEGAL FRAMEWORK, last view 17.07.2019, D. SARNACKI, "Property Rights in Space: Asteroid Mining", *Tex. A&M J. Prop. L.* 2014, (123) 137.

This loophole left it a split debate among courts and scholarly around this issue. The principle argument referred by non-government entities is that they should not tied in the Treaty bearing in mind are have not signed it.[99]

This kind of interpretation, appears to be possible to server a National sovereignty over a territory in Outer Space, which is strongly forbidden which is not directly dealt with in the Outer Space Treaty.[100] The other side to counter that these private enterprises are subject to sovereign power and with a sovereignty to require responsibility for their actions.[101]

In the original treaty, the conflicting points should be so solved by looking to the simple meaning of the text, the intention of the actors, the treaty in general. Thus starting from the point that property rights can not be addressed in domestic legal regime, the ambiguity should be solved by the word of the text.

However, these ambiguous questions of property rights in the International Law remains highly in discussion.[102]

In the lack of further international treaties negotiations, it can be expected that solution will depend on the occasions.[103]

A national case law in the United States, allowed that the disputes among international space and national law to leave open the opportunity the commercialization of space law. The United States policy has frequently encouraged and has admitted of creating property rights of celestial bodies. As can be noted in this interesting case occurred in 2001, as follows:

In the Nemitz v. United States, Gregory Nemitz sued NASA, claiming property rights of a large asteroid 'Eros', because he registered it with the Archimedes Institute, an online platform where anyone can claim ownership of a celestial body.

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[99] Sarnacki, D. (2014). Property Rights in Space: Asteroid Mining. *Tex. A&M J. Prop. L.*,*2*, 123.

[100] V. BLANCHETTE-SÉGUIN, "Reaching for the Moon: Mining in Outer Space", *N.Y.U. J. Int'l L. & Pol.* 2017, 965

[101] Op. cit. note 99

[102] Pastorius, C. (2013). Law and Land Policy in the Global Space Industry's Lift-off.*Barry L. Rev.*,*19*, 201.

[103] See Law and Land Policy in the Global Space Industry's Lift-off, supra note.

The Court rejected the application under the argument that the United States policy of supporting the commercialization of space conferred any property right on Nemitz bearing in mind has difficulties to support his claim and the ability to control what he claimed.[104]

The court determined the ratification of the Outer Space and the rejection of the Moon Treaty for Nemitz had no base to support his property claim at the time.[105]

In 2015, by President Obama´s Policy, the initial Asteroids Act proceed to be amended.

In relation the Space Resources Exploration and Utilization of the initial Asteroids amendment, for by a seemingly broad definition of outer space resources and a subsequent matter that assigned private property rights only to resources extracted from an Asteroids.[106]

This shift in language is highly important. Instead of granting the ambiguous "property rights.[107]

The US. Policy toward the commercialization of space law. In this sense will have an extra weigh to benefit the defending in case of property rights.

Nevertheless, even President Obama seems to have recognized the middle approach affirming the central tenets of the Outer Space Treaty, thus the National Space Policy remained under the Principle:

> *"As established in international law, there shall be no national claims of sovereignty over outer space or any celestial bodies. The United States considers the space systems of all nations to have the rights of passage through, and conduct of operations in, space without interference.*

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[104] Gilson, B. (2011). Defending your client's property rights in space: A practical guide for the lunar litigator. *Fordham L. Rev.*, *80*, 1367.

[105] See "Property Rights in Space: Asteroid Mining"

[106] Blount, P. J., & Robison, C. J. (2016). One small step: The impact of the US Commercial Space Launch Competitiveness Act of 2015 on the exploitation of resources in outer space.*NCJL & Tech.*,*18*, 160.

[107] See Blount, P. J., & Robison, C. J. (2016). One small step: The impact of the US Commercial Space Launch Competitiveness Act of 2015 on the exploitation of resources in outer space.*NCJL & Tech.*,.

Purposeful interference with space systems, including supporting infrastructure, will be considered an infringement of a nation's rights.

The United States will employ a variety of measures to help assure the use of space for all responsible parties, and, consistent with the inherent right of self- defense, deter others from interference and attack, defend our space systems and contribute to the defense of allied space systems, and, if deterrence fails, defeat efforts to attack them."[108]

In line with international law, the United States there are no prerogative to claim property rights in outer space. Meaning that all nation to have the rights of manager and conduct activities without interference in its pass through and otherwise the interference, will be considered infringement of nation right´s.

Moreover, The United State assume the responsibility of employ measure to guarantee the due use of all responsible parties. Therefore, deter and counter-attack from the interference coherent with the right of self-defense all to defend our space system.

Thus, The United State confirms its engagement with the national non-appropriation principle.

However, with regard to private enterprise, the United State policy deviates from the use of "nations" instead, using the term "responsible parties," giving the understanding that could related to them.

This purposeful shift, reinforce that the US, supports the middle approach with acceptance of private ownership.

Nevertheless, this sort of language used could be further related to anti-satellite and space warfare linked with China than the United States' stance on the treaty interpretation.

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[108] See Law and Land Policy in the Global Space Industry's Lift-off, supra note

For example, one leader in the People's Liberation Army made some revealing statements about China's military space applications:

China's Air Force will begin to develop "offensive operations" in space . . .

People's Liberation Army (PLA) Air Force Commander Xu Qiliang said on Sunday that space militarisation, or the development of weapons and defensive technology in outer space, was a "historic inevitability" and that "competition between military forces is moving towards outer space." He said "some developing countries," in addition to "major air force powers", were changing their military strategies to improve their space capabilities, a remarkable analysts said was likely directed at India and the United States.

However, The United State is concerned with China´s preparations for Space warfare, these concerns are reminiscent of the intent of the parties in the negotiations of the Outer Space Treaty under the influence of the Cold War.[109]

The continuing commercialization can be viewed to many factors, there are advancements in technologies, merging capacities among others.

The US government has, for decades, pursued a generally consistent national policy of enabling and fostering the development of a robust commercial space sector. Hence, reflect in federal and series of laws. For instance, the Commercial Space Transportation Competitiveness Act of 2000 and the Commercial Space Launch Competitiveness Act of 2015, with the purposes to benefits enterprise in outer space.

On 25 November 2015, US President Barack Obama signed into law the US Commercial Space Launch Competitiveness Act of 2015.

"§ 51302. Commercial exploration and commercial recovery

''(a) The President, acting through appropriate Federal agencies, shall—

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[109] Pastorius, C. (2013). Law and Land Policy in the Global Space Industry's Lift-off. *Barry L. Rev.*, *19*, 203.

''(1) facilitate commercial exploration for and commercial recovery of space resources by United States citizens;

''(2) discourage government barriers to the development in the United States of economically viable, safe, and stable industries for commercial exploration for and commercial recovery of space resources in manners consistent with the international obligations of the United States; and

''(3) promote the right of United States citizens to engage in commercial exploration for and commercial recovery of space resources free from harmful interference", in accordance with the international obligations of the United States and subject to authorization and continuing supervision by the Federal Government."

The United Stated, with this document seek to encourage private actors the opportunity to explore outer space providing a legal document that supports their activities, bearing in mind that the current international space law has a loophole on the subject.

There is another part from the same sections, as followed:

''A United States citizen engaged in commercial recovery of an asteroid resource or a space resource under this chapter shall be entitled to any asteroid resource or space resource obtained, including to possess, own, transport, use, and sell the asteroid resource or space resource obtained in accordance with applicable law, including the international obligations of the United States.'' [110]

This title initially appears to disagree the original text of non-appropriation principle from Article II of the Outer Space Treaty of 1967, which illustrates that "*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*".

[110] https://uscode.house.gov/statviewer.htm?volume=129&page=721. Last accessed on 24.07.2019.

However, this title grants private actors commercial rights to go into space, to explore and to appropriate space resource with legal certainty regarding ownership. Since it is not explicitly forbidden.

It is worth it mentioned, that in Article I of the Outer Space Treaty, the second paragraph puts highlight on the right of free exploration and use, without any sort of discrimination and on the basis of equality.[111]

Furthermore, while the Space Act of 2015 entitles the US citizen to *possess, own, transport, use, and sell the asteroid resource or space resource obtained in accordance with applicable law* it does not confer exclusive rights to do so and in fact acknowledges that the provisions of the Space Treaty of 1967prohibits this:

> *"SEC. 403. DISCLAIMER OF EXTRATERRITORIAL SOVEREIGNTY It is the sense of Congress that by the enactment of this Act, the United States does not thereby assert sovereignty or sovereign or exclusive rights or jurisdiction over, or the ownership of, any celestial body."*

In conclusion, these mining rights will need to be defined within of the international law governing the territory, such as the Moon, to which sovereign rights do not apply under the Space Treaty.[112]

In addition, the currently president of the USA, remains the focal point in private enterprise signed the space Policy Directive 1 in December 11, 2017, instructing NASA to return United States astronauts to the Moon, followed by human missions to Mars.

Luxembourg shares the same concern that of the United State, regarding establishing clear regulation asteroid mining. Following the US, Luxembourg's recently, 2017, enacted Space

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[111] Pershing, A. D. (2019). Interpreting the Outer Space Treaty's Non-Appropriation Principle: Customary International Law from 1967 to Today. *Yale J. Int'l L.*, *44*, 149, 159.

[112] Beldavs, V. (2015). Prospects for US-China space cooperation. *The Space Review*.

Resources Act, with this act aspires to become the pioneer in the field of Space law, declaring these resources "capable of being appropriated"

Even similar to the US act, giving private companies the rights of exploration, Luxembourg´s does not require a company's major stakeholders to be based in the country to enjoy its safeguards.

However, there are some requirements established:

First: only entities that have applied for and received a license for their space mining activities may assert an ownership interest in the resources extracted.

Second, the Luxembourg statute does not include a nationality clause. Any corporation, limited partnership or limited liability company established under Luxembourg law, or any European company with a registered office in Luxembourg, may submit an application for accreditation and licensing.[113]

The amendments to the new Luxembourg Law on the exploration and use of space resources that entered into force, and the increasing assimilation of this Law with the approach taken by the US Commercial Space Launch Competitiveness Act only serve to demonstrate that the legal uncertainty regarding the relation between the international and national legal framework however remains.[114]

3.6. The Safeguarding Approach

In conclusion the approaches to the property rights issue, the most widespread will be explained.

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[113] https://fcilsis.wordpress.com/2018/12/12/the-luxembourg-space-resources-act-and-international-law/, https://www.orfonline.org/research/if-space-is-the-province-of-mankind-who-owns-its-resources-47561/ http://www.thespacereview.com/article/3355/1. Last acessed on 20.09.2019.

[114] http://www.thespacereview.com/article/3355/1. Last acessed on 03.08.2019.

This approach decides to stay close to the non-appropriation principle, keeping loyal at the common heritage of mankind doctrine. In relation the other Outer Space Treaty clauses and the Liability Convention, regarding "appropriation by any other means" are deemed in sense of that would indicate that private enterprises under national jurisdiction are included.

Hence, there is absolutely no sovereignty in relation private actors or governmental in Outer Space Treaty.

This approach values the great legal significance of the non-appropriation principle contained in Article II of the Outer Space Treaty and should be considered a basic principle of space law followed by states. They consider it vital to preserve the principles advanced by Outer Space, being the best protection for maintaining peace and order for the safe management of outer space.

Otherwise, whether not respected the original principle, would originate a chaos and would difficult the commercialization

Thus, every single change should be made in consensus by states, without unilateral action. And always keeping in mind the common heritage of the principle of humanity.[115]

It is interesting that the safeguards supporters to understand that there is problem in for the foreseeable future which the lack of sovereignty is has an important role.

They believe, that the current issues are developed by some enterprise who has a premature concern and who fear for the ability to invest.

And still believe, alongside the government, it should have ensured proper enforcement so as not to set an illegal precedent.[116]

Therefore, definitely is not easy to anticipate what to wait in a hostile as the space environment, and follow a similar path would be a good begin.

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[115] https://iislweb.org/docs/Diederiks2007.pdf last acessed on 02.08.2019., and Pershing, A. D. (2019). Interpreting the Outer Space Treaty's Non-Appropriation Principle: Customary International Law from 1967 to Today. *Yale J. Int'l L.*, *44*, 149.
[116] Op. cit. supra

3.7. The Space tourism and transportation

After the elaboration regarding legal problems of private enterprises in the Outer Space and the exploitation industry. Now we are going to focus on the Space Tourism. This industry embraces several elements such as: accommodations and feeding. But our focus will be human transportation.

This concept of space tourism is growing in popularity, and the experience of space travel is becoming a form of private commercial activity. This sort of travel, refers into to space for several purposes such as: recreational, space explorations, personal fights or commercial human space flights. Thus, there are space tourism companies that want to provide suborbital spaceflights.[117]

This desire began after Dennis Tito travelled to space in 2001. Since then, the interest of the public every day has increased to embark on this new adventure.

In order to provide the space tourism, private companies like Virgin Galactic, SpaceX among others, offer space holidays, but only a small group can afford the ticket. The space tourism companies have made efforts to open a cheapest ticket to reach more people and become more economic.[118]

The private space-fight requires a legal regime designed to address these new and revolutionary commercial activities and adapt of this development.

What Follows is an elaboration regarding legal problems that the private sector will face in these commercial activities.[119]

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[117] https://www.wired.co.uk/article/spacex-blue-origin-space-tourism, https://www.revfine.com/space-tourism/ last accessed: 27.09.2019.

[118] Failat, Y. A. (2012). Space Tourism: A Synopsis in its Legal Challenges. *ILJ*, *1*, 120.

[119] Op. cit. supra

3.8. The Classification of Suborbital Flights

There is some reason to take airspace into consideration. There is uncertainty around the space tourism regarding if suborbital fights could fall into the scope of air law as well as into the scope of space law.

For the simple fact that there is no clear separation point among airspace and outer space. To be clear, in case of suborbital fights are fights that go up in a very high altitude in which orbital velocities are not achieved.[120]

The legal regime problem here is the uncertainty and inconsistency if suborbital fights could be guided taking into account the current framework of space law regime or air law regime.

No one areas fit completely, they do not have a clear definition for space objects or a clear definition of separations point.

Both regimes address these questions in different manners and neither have an adequately regulate suborbital flights.

However, in air law there are elements that make the air law regime more attractive, one of them is a source of legal configurations that might make the air law regime has a clear advantage in face of space law, for instance: direct claims by individuals.[121]

How long the uncertainty and no clear remain, national law will continue regulate suborbital flights.[122]

To transportation of space tourism activities, liability regime become of major interest to these operations. Companies and the investors become very concerned with these matters of

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[120] Tingkang, A. (2011). These Aren't the Asteroids You Are Looking For: Classifying Asteroids in Space as Chattels, Not Land. *Seattle UL Rev.*,*35*, 559.

[121] Wollersheim, M. (1999, April). Considerations towards the legal framework of space tourism. In*Proceedings of the Second International Symposium on Space Tourism* (pp. 21-23).

[122] Op. cit. note 115

liability. Because they need measure their potential risks. In the actual transport of tourism to space, this is essential.[123]

In case of spaceflight accidents caused, the responsibility is due of states, private enterprises and will involve different countries. To avoid confusion towards launching states, the private actors could favour from legal clarity.[124]

There is no express international space transportation liability regime for private sector. The liability Treaty and the Outer Space Treaty as we can see is targeted to international actor, for instance launching states. In case of space accident and damage will be hard to say whom is responsible to pay compensation, because of the lack of legal instruments for enforcement.[125]

In the actual liability jurisprudence exclude space tourism. Its efforts are directed by states and international non-governmental organizations. No provision is established to private enterprises.

But we can not say the same to aviation operations. Liability regime is very closer of the aviation law. This regime adopts notions similar in case of damage caused, airplane crash.[126]

A relevant aspect is probably the release of liability that should be signed by all space tourists. As this are of space law does not support self-regulation and to private sector to escape of liability an informal method, should be used to establish more protection to private enterprise in case of potential damage occurred into space by space tourists. The only way that private space-fight business has to escape of liability is through the liability form signed by space tourists.[127]

This form limitations grants the operator to process without legal concerns. this waiver of liability clause should be signed in advance of space activities. This sort of attitude could intimidate

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[123] Hobe, S. (2007). Legal aspects of space tourism. *Neb. L. Rev.*, *86*, 439.

[124] Op. cit. note 116

[125] Op. cit. infra

[126] Schaefer, M. (2015). The Need for Federal Preemption and International Negotiations Regarding Liability Caps and Waivers of Liability in the US Commercial Space Industry. *Berkeley J. Int'l L.*, *33*, 223.

[127] Failat, Y. A. (2012). Space Tourism: A Synopsis in its Legal Challenges. *ILJ*, *1*, 120.

potential customers. There is a proposal that the consent should be replaced by compulsory insurance. Thus, this consent form could gradually disappear it.[128]

Although, some states are starting to attend the needs of private sector. They for instance grant limited immunity to commercial launch service providers, and thus limiting the liability of entities engaged in commercial spaceflight activity.[129]

Even the states taking the liability for damage but bearing in mind the financial impact, aerospace insurance is the most important requirements to private enterprise. Because the states want the repayment. There is no international requirement, but some states always ask it.

There is some case, for example: United Kingdom, France and United States. However, there is some case that the states have more flexible regime is the case of Netherlands, but is determined on a case by case basis.[130]

As mentioned, there is still a lot of uncertainty around the space-fight. The safety is inherent to all traditional format of human transportation and in the space business is no different.

Therefore, a solid legal regime for private actors will be the key in establishing stable safety, take into account that space travel involves a significant security risk.[131]

The safety risks are very real concern and is very important to take into consideration, bearing in mind that any state can be taken as a launching state for private enterprises. In sense that each nation will exercise its power over private enterprise and always in their own path and in accordance with its own aims, ideas and governmental policy plans.

Without a transparent legal regime, safety will be affected is the launching nation do not to fulfil the supervision or if do not have the liability policies.[132]

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[128] Op. cit. note 121

[129] Mineiro, M. C. (2008). Law and regulation governing US commercial spaceports: licensing, liability, and legal challenges.*J. Air L. & Com.*,*73*, 759.

[130] Linden, D. (2015). The Impact of National Space Legislation on Private Space Undertakings A Regulatory Competition Between States. In*International Astronautical Congress, Date: 2015/10/12-2015/10/16, Location: Jerusalem, Israel*.

[131] Op. cit. supra

[132] Schaefer, M. (2015). The Need for Federal Preemption and International Negotiations Regarding Liability Caps and Waivers of Liability in the US Commercial Space Industry.*Berkeley J. Int'l L.*,*33*, 223

In Space tourism, there are risks in space travel for all mankind not just for them which is under the legal jurisdiction of the launching state. The reverse happens in case of international fights, where each nation has the liability in its point of departure and arrival.

Thus, own nation regulates their risk in that momentum. Therefore, in sense of this, the space activities demand an international regulatory standard with measures well established.[133]

For the success of the space companies, passenger safety is the key to guarantee their success and future profitability. Would be beneficial for both nations-states and privates enterprise work together combining efficiently and effectively the safety of commercial spaceflight. sector. In this way, insurance companies would gain more confidence, being more supportive and aiding in its growth.[134]

4. What is the future of the private industry? Suggested legal solutions.

The legal doctrine suggested some ways to treat with the issues caused by the new development of space activities.

This proposal should regulate space mining and certainly provide the international community and private actors with clear rules to minimize risks and continuously encourage industry. Providing a durable solutions and guidance for the future space resources regime.

As well written by Catherine Pastorius:

"States should endeavor to proactively address the issues regarding property rights in outer space rather than attempt to establish rules once controversies arise." This affirmation should be

[133] Pastorius, C. (2013). Law and Land Policy in the Global Space Industry's Lift-off. *Barry L. Rev.*, *19*, 201.

[134] Op. cit. supra

taken into account, because in a land framework of uncertain property rules, the international community and investors will be less prone to finance the space activities.[135]

In the United Nations Committe on the Peaceful Uses of Outer Space is special interesting platform. Because the Committee, every year, in view of proposal the solutions to space law, analyse all international cooperation. This meeting is especially to deal with legal issues that show up in the exploration of outer space. But a consensus of rules is needed, in order not be blocked.[136]

In addition, also there is another organization and serve to the same proposal and that generating statements and conferences like the International Institute of Space Law ("IISL")[137]

From now on, we are going starting to give an overview relating the interesting proposal which could be followed by states. And will be distinguished in three main movements. First one believes it is interest to maintain the existing international framework. Second one, also believe that the creation of new space treaty seems reasonable. The last one, think that amend the existing treaties should be a good start.

4.1. Maintain the existing International concept of Space Law

Some states are afraid of having a new treaty-related space. Their reluctance is due two factors. Firstly, states want prioritize their national security and do not want to limit its activities and strategic advantages. Secondly, states want to have the opportunity to verify the compliance of others. But this verification can be basically impossible.[138]

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[135] Durrani, H. A. (2018). Interpreting Space Resources Obtained: Historical and Postcolonial Interventions in the Law of Commercial Space Mining.*Colum. J. Transnat'l L.*,*57*, 403.

[136] UNITED NATIONS. GENERAL ASSEMBLY. COMMITTEE ON THE PEACEFUL USES OF OUTER SPACE. Report of the Committee on the Peaceful Uses of Outer Space. United Nations Publications, 1986.

[137] Op. cit. note 138

[138] BLOUNT, P. J. Renovating space: The future of international space law.Denv. J. Int'l L. & Pol'y, v. 40, p. 524, 2011.

Hence, they believe that the existing legal regime and the actual treaties are appropriate and practical. This current regime will provide legal development and in this view, will preserve their interest in a strategic manner.[139]

States continue to adhere the current regime and this prove that is the best choice.[140]

A considerable part of international space law seems come in the form of soft law ideas. Soft law is gaining progressively international acceptance but this quasi-legal instruments have no legal force like the traditional hard law. For instance, declaration, guidelines and other resolutions.[141]

These instruments, even having no legal force is followed by states. There is a simple reason behind this: The lack of the international law opened the opportunities to states develop its own interpretations. Thus, as exist a flexibility around this framework, there is no need to change the existing international space law.

International law contains no specific interpretation of the provisions of the treaties, therefore have to be done through to the Vienna Convention on the Law treaties.

As follows: *Article 31.*[142]

"General rule of interpretation

1. A treaty shall be interpreted in good faith in accordance with the ordinary meaning to be given to the terms of the treaty in their context and in the light of its object and purpose.

2. The context for the purpose of the interpretation of a treaty shall comprise, in addition to the text, including its preamble and annexes:

(a) any agreement relating to the treaty which was made between all the parties in connexion with the conclusion of the treaty; (b) any instrument which was made by one or

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139 Gorove, S. (1997). Aerospace object-legal and policy issues for air and space law.*J. Space L.*,*25*, 101.

140 Op. cit. infra

141 Blount, P. J. (2011). Renovating space: The future of international space law.*Denv. J. Int'l L. & Pol'y*,*40*, 527.

142 Druzin, B. H. (2017). Why does Soft Law have any Power anyway?. *Asian Journal of International Law*,*7*(2), 361-378.

more parties in connexion with the conclusion of the treaty and accepted by the other parties as an instrument related to the treaty.

3. There shall be taken into account, together with the context:

(a) any subsequent agreement between the parties regarding the interpretation of the treaty or the application of its provisions;

(b) any subsequent practice in the application of the treaty which establishes the agreement of the parties regarding its interpretation; (c) any relevant rules of international law applicable in the relations between the parties.

4. A special meaning shall be given to a term if it is established that the parties so intended."[143]

Some parts was highlighted by author of this dissertation.

The Vienna Convention is considered the most authoritative rule of international law regarding the interpretation of treaties, and its first interpretation method in this provision is aiming its clear plain meaning. If the most part of states apply a treaty in the same way, it might became a treaty practice.[144]

An adoption of the soft law would be interesting to make easier a robust standards of interpretations. Soft law agreements can be done in a way less binding way with declarations for example. Another example of the international initiate is European Union's Draft Code of Conduct for Space Activities.[145]

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[143] https://www.oas.org/dil/Vienna_Convention_on_the_Law_of_Treaties.pdf. Last accessed on 03.10.2019.

[144] Jakhu, R. (2005). Legal Issues Relating to the Global Public Interest in Outer Space.

[145] Op. cit. note 144

The objective is increase technical safety and sustainability of activities in outer space. These agreements allow the states to work more comfortable pursuing its goals without binding risks and this sense to build confidence among states.[146]

As there is no fixed international legal framework established regarding space law, the focus on national law is due as well as regulatory competition of National Space laws. National space laws for several is used to solve the existing legal issues. The international legal framework gradually pushes the states to produce its own national space law to fulfil the increase demand of space activities.

Hence, the private sector desire that national legal support it instead the current international legal, taking into account that is not supportive enough to accomplish its goals.[147]

whether states singly provide their national space law framework to private sector that desire to attract, the states consequently will start to compete. Thus, the most attractive national legal regime will probably be chosen.[148]

States will want to attract the increase private sector giving to these private enterprises a specific benefits.

Others states and the space law of the overseas states can affect indirectly the national space policies.

In principle, for competition to be open up, some elements are required. Such as:

Firstly, private sector needs to be able to access the regulator market, and the private enterprises need choice which states regime they want to work to. The increase trend of globalisation has agitated the regulatory competition and the mobility has been crucial in this area.

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[146] Op. cit. supra

[147] Hobe, S. (2010). The Impact of New Developments on International Space Law (New Actors, Commercialisation, Privatisation, Increase in the Number of Space-Faring Nations). *Unif. L. Rev.*, *15*, 869.

[148] Linden, D. (2015). The Impact of National Space Legislation on Private Space Undertakings A Regulatory Competition Between States. In *nternational Astronautical Congress, Date: 2015/10/12-2015/10/16, Location: Jerusalem, Israel*.

Secondly, the promotion of information flows is needed of the overseas regime for private enterprises. With advanced technology these days, will easy to get the required information and will need the opportunity to impact the decision making.

But the regulating state will want to see the advantages to enter in this legal competition. In the way, private sector will to impact the economic activity in the state. Although, can as well influence the state policies and have a social effect.

The proponent of regulatory competition affirm that will stimulates in a beneficial way. These dynamics of competitions would be excellent for both states and private sector. The national space law also would be more competitive.

When dealing with regulatory competition, the theorisations raises concern about it, they have warned regarding "race to the bottom". This is occurs when state in order to be more attractive, reduce its regulatory standards. Hence, the other states who have lost their businesses, in response is obligate to act with lowering of their own standards.

However, to not create a cycle of systematic of diminish of the regulatory standards, it should possible to regulate a "race to the bottom", with the centralized policy and implementations of harmonization of the regulatory standards.[149]

It is very clear, when states and private enterprises work together should be positive for both parties.

This is better for states that need of an orientation for its future space law. A preferred National Space Law.

The national space law to advance regarding space activities, it is important to have focus on authorisations, supervisions, registrations and liability and safety regime tied with insurance.

Even though that the national legislation will be important and that is mostly treated with

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[149] Linden, D. (2016). The Impact of National Space Legislation on Private Space Undertakings Regulatory Competition Vs Harmonization. *Journal of Science Policy & Governance*,*8*(1), 1-17.

national interests, the states should endeavour for international cooperation and collaboration, as to expand the benefits coming from space activities in the interest of all mankind.

In order to be more significant in outer space, private sector should be in collaboration with national space legislation, this surely would avoid overregulation and would be boost the increase of the industry.

The introduction of an authorisation controlled by management organization should be installed and accompanied with the propose to handle with authorisation and supervision.[150]

A special attention and have an overview it, is very important in its different phases of all space activities. The clear definitions in the authorization system, should be offered with the maximum attention in the technical, national security, international responsibility, foreign policies, and public safety.

Moreover, to avoid duplication in the authorisation and supervision procedures, private sector should be encouraged to act within of the its regulatory framework. With regard the length and cost of the process of authorisation should be short in order to adjust the needs of private enterprise.[151]

In respect insurance should be complete for the entire space activities, and also should be compulsory for private enterprises. The insured amount should be a clear format regarding the reimbursement duties by private firms.

This regime would be beneficial to states when there is needs to pay for all damages caused.[152] With regard registrations, should be a national law regime and should be use the same format.[153]

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[150] De Man, P. (2017). State practice, domestic legislation and the interpretation of fundamental principles of international space law. *Space Policy*, *42*, 92-102.

[151] Linden, D. (2015). The Impact of National Space Legislation on Private Space Undertakings A Regulatory Competition Between States. In *International Astronautical Congress, Date: 2015/10/12-2015/10/16, Location: Jerusalem, Israel*.

[152] Op. cit. infra

[153] Op. cit. note 154

To finalise, it is advised to extend the freedom principle of the Outer Space Treaty to private enterprises, this would encourage and develop their national space activities. These rules would do states to make access to space and of private sector comply with safety regulations, national interests, among other restrictions.

4.2. Amending the Existing International Concept of Space Law

Another group resists completely abandoning the existing international legal regime. But they do not find a real solution for these issues, instead they have a proposal, that could be accompanied by a sort of a new language that would incorporates the existing the existing legal framework.

Yet, the original meaning of the existing international legal framework of space law is totally unlike that the current commercialisation of space activities that was drafted. However, there are a useful text concepts of the Outer Space Treaty that are true to these days.[154]

However, as there is difficult to measure a real benefit to amending the existing international legal concept of space law, states still resist to embrace the new space law. As mentioned before, the principal reason for this resistance are the considerable risk by removing current protections. Such as: limiting their national security.

Minimising the potential strategic advantages. Yet, they want that respective authority must have the opportunity to revoke the authorisation in case of non-compliance with the due terms of national space law.[155]

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[154] Failat, Y. A. (2012). Space Tourism: A Synopsis in its Legal Challenges. *ILJ, 1*, 123.

[155] Vedda, J. A. (2017). The Outer Space Treaty: Assessing its Relevance at the 50-Year Mark. *Center for Space Policy and Strategy Policy Paper for Aerospace Corporation*, 5.

Thus, the international space law should be in accordance with this new era of space law, bearing in mind the actual development of this industry. The major candidate for this updated are Outer Space Treaty and the Moon Treaty.[156]

In case that the soft law does not to bring confidence, the amendment of the space law would be welcome.

According the Outer Space, the agreement is open to amending.

> "*Article XV,*
>
> *Any State Party to the Treaty may propose amendments to this Treaty. Amendments shall enter into force for each State Party to the Treaty accepting the amendments upon their acceptance by a majority of the States Parties to the Treaty and thereafter for each remaining State Party to the Treaty on the date of acceptance by it.".*[157]

The amendment would be very attractive, firstly because the enterprise and investors would control and protection regarding fixed property regime. With regard nations, would have access to space.[158]

All concern is mainly regarding non appropriation principle. Probably this article II should be the first to be amended. Amending to a new appropriation regime would have a real impact to all articles of the treaty.

In this sense, the new appropriation regime would give the desired access to outer space to all nations. Giving all states an equal vote in permitting access. This regime would take into account the use of the property rights and would be free from harmful interference.[159]

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156 Op. cit. note 154

157 United Nations. Office for Outer Space Affairs. (2008).*United Nations Treaties and Principles on Outer Space: Text of Treaties and Principles Governing the Activities of States in the Exploration and Use of Outer Space and Related Resolutions Adopted by the General Assembly.* United Nations Publications.

158 Twibell, T. S. (1996). Space Law: Legal Restraints on Commercialization and Development of Outer Space.*UMKC L. Rev.*,*65*, 638.

159 Op. cit. infra

Regarding amending the Moon Treaty, could be followed the same approach, but as already mentioned earlier, states seem to be neutral in negotiating a new space law.[160] The states was reluctant to adopt a new legal regime due the introduced of the concept of the common heritage of mankind principle.[161]

It is preferred to work with amendments instead create a new legal regime, in order to offer more acceptable regime that could be implemented with the international body. As followed the Article 17 is quite similar of the article XV of the Outer Space Treaty

> *"Article 17*
>
> *Any State Party to this Agreement may propose amendments to the Agreement. Amendments shall enter into force for each State Party to the Agreement accepting the amendments upon their acceptance by a majority of the States Parties to the Agreement and thereafter for each remaining State Party to the Agreement on the date of acceptance by it."*

The article 17 of the Moon Treaty grants the amendments by a majority of the state parties, it is not different of the Outer Space Treaty.[162]

Both suggestions offer more attractive, consistent and uniform amendments to the principle of the common heritage of mankind.[163]

The Moon treaty approach the issues of property and the exploitation and its resources, but these matters are opened up to negotiate until today.

Private enterprises in the space activities are supported by international space law, and of implementations of this obligation would be more significant in terms of certainty.

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[160] Blount, P. J. (2011). Renovating space: The future of international space law. *Denv. J. Int'l L. & Pol'y*,*40*, 524.

[161] Baca, K. A. (1992). Property rights in outer space.*J. Air L. & Com.*,*58*, 1041.

[162] Gilson, B. (2011). Defending your client's property rights in space: A practical guide for the lunar litigator.*Fordham L. Rev.*,*80*, 1403.

[163] Op. cit. note 164

In addition, this mechanism would give the opportunity to developing access the outer space. In this sense they should be helped in their efforts to access and exploit the outer space, giving all nations the same opportunities than the developed countries.

The equitable sharing and peaceful would be clear for all nations.[164]

4.3. A new International Concept of Space Law

The last approach, the radical movement who wants the new one space law. Firstly, to reach this, is necessary to abandon the current international space law.

The fact is, a new scope of space law should be drafted to eliminate all concerns regarding legal activities. For this new process, the common heritage of mankind principle needs to be clarified and the harmonization of national space law achieved. Some academics believe that is a creative idea.[165]

But to deal with these issues is needs to entirely abandon the current regime one. They want to induce the abandonment of the Outer Space individually consenting to ignore the non - appropriation principle. Rule of law have to agree.[166]

However, in unilateral action there is an interesting point. In case of agreement among many nations is much faster than decision taken in a domestic level, all this because the rapid evolutions in the space activities. Making unilateral actions a great solution.[167]

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[164] Gruner, B. C. (2004). A new hope for international space law: Incorporating nineteenth century first possession principles into the 1967 space treaty for the colonization of outer space in the twenty-first century.*Seton Hall L. Rev.*,*35*, 327.

[165] Twibell, T. S. (1996). Space Law: Legal Restraints on Commercialization and Development of Outer Space.*UMKC L. Rev.*,*65*, 640.

[166] Op. cit. infra

[167] Thomas, J. (2005). Privatization of Space Ventures: Proposing a Proven Regulatory Theory for Future Extraterrestrial Appropriation.*Int'l L. & Mgmt. Rev.*,*1*, 218.

On other side, just abandoning the Outer Space Treaty and non-appropriation provision would put the states in a negative position in relation another states. It is important to have a nation´s cooperation bearing in mind the enormous investments made.

There a proposal to a new legal framework in order to benefit a free market, in which is based approach based on a capitalist regime. This solution was tested and has orientated the mankind for a long time.

The traditional regime allows all nations to participate in Outer Space market having for basis the followed elements: Discovery, claim and possession.

In addition, this regime was attempted, but the existing unjust distribution of wealth still exists, and to reverse this fact, developing countries needed support to be on the same level.[168]

4.4. Harmonization of National Space Regime

In general, many nations deal with national law when obligations arise in relation international space law. Regulatory competition is due when compete with each other and cause often in a contrast of the legal norms. Therefore, create unbalanced competitive conditions. Naturally, lead to a decrease in quality standards, which will negatively affect citizens.[169]

In summary, regulatory harmonization create a standardization of space law to all nations.

There is positive point in regulatory harmonization. The centralized regulation counteract a negative aspect: the race to the bottom, which is particularly dangerous in the level of tax law.

Also, detrimental side effects can be found in environmental standards. When industry lowers its environmental standards in an effort to attract the private sector, this diminishing

[168] Op. cit. infra

[169] Op. cit. note 152

reduction can be detrimental to the environment, so the former state will pay it. If there is an international cooperation, this probably will not happen.

Moreover, the reduction of transaction costs can be reduced in a drastic way. The needs of cooperation across jurisdictions should bring advantages but could have impact in different areas of law.[170]

There is peculiar way of regulatory competition, example: vertical competition. With regard this particular form, the actors can choose among local rules or centralized. In this sense could take advantage in a positive aspect such as: market pressure, political responsibility, and innovation.[171]

As mentioned before, with the growing trend of commercialization, there is an emergence of the space law to adapt of the new international legal framework. As it is well known, nations have its own interpretation regarding international law provisions and its own wording.[172]

All this due each nation has their all rules, history, economy and goals. Given in these inherent risks of space activities, different space law will result a lot of legal uncertainty and different treatment. Because of dynamic of the globalisation an uniformization of space law will be place.[173]

In the sense, regulatory harmonization can adjust this.[174]

Regulatory harmonization of space law opened up the possibility of cooperation, stimulates innovation and simplifies business for private sector. To give to them an uniform legal and administrative requirements.[175]

Regular competition gives some advantages to private enterprises. Creating companies in order to avoid strict supervision, bearing in mind that some national space law is little a bit less

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[170] Op. cit. infra

[171] Op. cit.

[172] Hobe, S. (2010). The Impact of New Developments on International Space Law (New Actors, Commercialisation, Privatisation, Increase in the Number of Space-Faring Nations). *Unif. L. Rev.*, *15*, 880.

[173] Op. cit. infra

[174] Vereshchetin, V. S. (2010). The law of outer space in the general legal field (commonality and particularities). *Revista Brasileira de Direito Aeronáutico e Espacial*, *93*, 43.

[175] Linden, D. (2015). The Impact of National Space Legislation on Private Space Undertakings A Regulatory Competition Between States. In *International Astronautical Congress, Date: 2015/10/12-2015/10/16, Location: Jerusalem, Israel.*

strict than others and could attract attention of private enterprises by this fact. Because of the high risk of space activities, everyone has the interest to maintain the highest level of the standard. This, harmonization would be solve this question.

The most important aspect, aforementioned arguments mentioned, in national space law could serve to the space operations as base of the harmonization. Specially with regard safety, insurance, registration been the best choice instead regulatory competition.[176]

In relation to technical safety, we can see two different interest contrasting: First, states seek to be liable in an international level and also search procedures to prevent damages. On another hand, private sector wants less regulation in order to avoid disproportionateness.

A high quality goals standard, should be developed by standardization organizations, for instance, European Cooperation for Space Standardization, and should be drafted in national space law or when harmonizing.

Yet the regulatory competition can be particularly dangerous specially to safety and environmental standards, in case of race to the bottom happen.[177]

Other important point is the insurance. The differences in insurance requirement could lead to a forum shopping. This generally occur bearing in mind the high cost and hence the private enterprises will consider the amount when choice a state to set their business up.

Likewise, the registrations of the space object are another important element. Having the registrations of space objects in regulatory harmonization, would benefits everybody. With this harmonization would obligate the states to maintain the information and parameters always adequately updated. In addition, it is important as well national space law as international space law to keep due registered.

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[176] Op. cit. infra

[177] Op. cit. note 178

At last, would be ideal to make reference in case of definitions and terms regarding international space law rules and national space law. Because when the national use its distinct terms and interpretations in the implementations of the treaties in their own words, would be counterproductive. Thus, maybe the soft harmonization, would prevent future issues about interpretations.[178]

5. Harmonization in Europe.

Harmonization in the European Union has been well done, but not in space activities, but in other areas. The Europe could make use the its previous effort to regulate the space law of its members states.

Regulated space activities could leave the Europe Union in great position with regard its space members.[179]

Space activities involve more than one jurisdiction, in international level. The recent entry into force of the Treaty on the Functioning on the European Union (TFEU) as followed:

> "*Article 4*
>
> *3. In the areas of research, technological development and space, the Union shall have competence to carry out activities, in particular to define and implement programmes; however, the exercise of that competence shall not result in Member States being prevented from exercising theirs".*[180]

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[178] Op. cit.

[179] Op. cit.

[180] European Union. (2010) *Consolidated Versions of the Treaty on European Union and of the Treaty on the Functioning of the European Union: Charter of Fundamental Rights of the European Union.* Office for Official publications of the European Communities.

Thus, the Space activities is mentioned in this article and seems that there a shared competence among Europe and its member states. The space competence is mentioned in the *article 189* of the Consolidated version of the Treaty on the Functioning of the European Union.[181]

> *"1. To promote scientific and technical progress, industrial competitiveness and the implementation of its policies, the Union shall draw up a European space policy. To this end, it may promote joint initiatives, support research and technological development and coordinate the efforts needed for the exploration and exploitation of space.*
>
> *2. To contribute to attaining the objectives referred to in paragraph 1, the European Parliament and the Council, acting in accordance with the ordinary legislative procedure, shall establish the necessary measures, which may take the form of a European space programme, excluding any harmonization of the laws and regulations of the Member States.*
>
> *3. The Union shall establish any appropriate relations with the European Space Agency.*
>
> *4. This Article shall be without prejudice to the other provisions of this Title".*[182]

Therefore, they have the competence to offer support and conduct space activities, but can not prevent others from performing their activities. Thus, this leads to not a shared competence but a parallel competence.[183]

The principle of subsidiarity and proportionality should be considerable in case of exercising its competence. In this context the member states can individually regulate its competence. Being a point of departure to Europe Union to have a joint initiatives.[184]

There is a crucial added the sentence in the Article 189 he Consolidated version of the Treaty on the Functioning of the European Union that *"excluding any harmonization of the laws and*

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[181] Op. cit. note 182

[182] Masson-Zwaan, T. (2010). Regulation of sub-orbital space tourism in europe: a role for EU/EASA?.*Air and Space Law*,*35*(3),268.

[183] Von der Dunk, F. G. (2011). The EU Space Competence as per the Treaty of Lisbon: Sea Change or Empty Shell? 382.

[184] Op. cit.

regulations of the members". This demonstrate that they will not give up their sovereignty in the space activities. Hence, the member states have the opportunity to develop a national space law and establish its priorities.

Therefore, this seems a good point for the European Union, bearing in mind leaving leeway for decision-making.

On the other hand, there are an implications in leave leeway for decision-making. This opens a key questions. What "necessary measures"? This leaves opportunities to take other initiatives and to seek for alternatives for a hard harmonization. This negative side, can perhaps to lead a decentralized regulatory regime for space activities.[185]

On the contrary, soft law should be followed. In this case could lead a compatibility among the members states.

There is some fundamental principal of the European Union should be safeguarded such as freedom of establishment, movement of service and goods.

Yet, a mutual cross border can be beneficial to European Union achieve harmonization. In this way, there is no need to require for authorisation by another state, if the other part had adequate authorization in place. In the article 189 gives openness for this.[186]

Even before of the explicit space activities enacted in the article 189, the European Union has been active in the space industry. The community and space have a joint competence and ambition and these include such as: telecommunication, the environment, research among others.

For instance, the project Galileo, whose aims was to bring a coordinating and facilitating activities. All this is based on the trans-European Networks competence.[187]

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[185] Op. cit. note 186
[186] Op. cit.
[187] Op. cit.

Furthermore, there is enhanced cooperation, that was applied before, which aims is facilitate the process of integration. It was the case of, for example, the implementation of the Monetary Union.

As well, there is other way to use the soft harmonization. Article 114 and 115 of the Consolidated versions of the Treaty on the Functioning of the European Union. Could guarantee the property functioning of the internal market. Namely "approximation of law". The article 114 and 115 reads as followed:[188]

"Article 114

1. Save where otherwise provided in the Treaties, the following provisions shall apply for the achievement of the objectives set out in Article 26.The European Parliament and the Council shall, acting in accordance with the ordinary legislative procedure and after consulting the Economic and Social Committee, adopt the measures for the approximation of the provisions laid down by law, regulation or administrative action in Member States which have as their object the establishment and functioning of the internal market."

"Article 115

Without prejudice to Article 114, the Council shall, acting unanimously in accordance with a special legislative procedure and after consulting the European Parliament and the Economic and Social Committee, issue directives for the approximation of such laws, regulations or administrative provisions of the Member States as directly affect the establishment or functioning of the internal market."[189]

These articles can be invoked if there is obstruction of the fundamental freedom and differences among the members states. They can use as legal basis to prevent future issues that could block the trade.

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[188] Op. cit.

[189] Op. cit. note 183.

In the past, the article 114 was invoked to initiate the harmonization and was dealt with the "Radio Spectrum Decision".

In the article 352 is also possible to ensure the appropriate measure. Follows:

"1. If action by the Union should prove necessary, within the framework of the policies defined in the Treaties, to attain one of the objectives set out in the Treaties, and the Treaties have not provided the necessary powers, the Council, acting unanimously on a proposal from the Commission and after obtaining the consent of the European Parliament, shall adopt the appropriate measures. Where the measures in question are adopted by the Council in accordance with a special legislative procedure, it shall also act unanimously on a proposal from the Commission and after obtaining the consent of the European Parliament.

2. (...)

3. Measures based on this Article shall not entail harmonization of Member States' laws or regulations in cases where the Treaties exclude such harmonization.

4. (...)"

Lastly, the intergovernmental policy mechanism "Open method of coordination" (OCM) is the final way that could be used to achieve the soft harmonization.

Follows the definitions take from the Eur-Lex - Access to European Union law:

The open method of coordination (OMC) in the European Union may be described as a form of 'soft' law. It is a form of intergovernmental policy-making that does not result in binding EU legislative measures and it does not require EU countries to introduce or amend their laws.

"The OMC has provided a new framework for cooperation between the EU countries, whose national policies can thus be directed towards certain common objectives. Under this intergovernmental method, the EU countries are evaluated by one another (peer pressure), with the Commission's role being limited to surveillance. The European Parliament and the Court of Justice play virtually no part in the OMC process.

The OMC takes place in areas which fall within the competence of EU countries, such as employment, social protection, education, youth and vocational training.

The OMC is principally based on:

jointly identifying and defining objectives to be achieved (adopted by the Council);

jointly established measuring instruments (statistics, indicators, guidelines);

benchmarking, i.e. comparison of EU countries' performance and the exchange of best practices (monitored by the Commission).”[190]

This instrument has the aim to guide the member states through mutual learning process and in this sense, there is no binding measures. Thus, the members keep their autonomy being possible to establish the coherent common practice between member states.

To finish harmonization in Europe.

Harmonization could not be a good choice regarding space law in the European Union. As mentioned before in the international space law. There are differences among the members states, the no uniform market should be taken into account.

States have optional powers such as licensing, export, control among other aspects. Space activities are sharply binding in the national level, bearing in mind of the exclusion of the harmonization.

Another point against harmonization is regarding the diversity of the internal market. Most of them would not to work without make a profit.[191]

[190] https://eur-lex.europa.eu/summary/glossary/open_method_coordination.html. Last acessed on 13.10.2019

[191] Op. cit. note 182

Conclusions

Bearing in mind the sharp growth of the space private enterprises, named Newspace age, news challenges regarding of the legal consequences into space law is raised also.

The Outer Space Treaty set out core relevance and aims that are still remains at the heart of international space law.

The currently set of international treaties framework is not clear and hence legislation at the national level highlight as another feasible route for the regulation of space activities. Albeit some doubts and concern still remain.

It is important that the law adapt to the current circumstances and in this sense does not impede to the New Space era.

Hence there are some fair thoughts mentioned solutions.

Therefore, maintain the current framework opens the opportunity up to the individual state keeping the protections of common interests, in other words, provides the chance to develop. The second thought ensure the importance to fit into the customary international law.

The third one argues that drafting a new one expanding the convergence of different and reach the harmonization of national interests and international common interest. In all of them the explorations and the use of outer space should be consistent with aims and values of space law and always based on equitable sharing of benefits between all nation states.

In this sense, is vital to preserve principles laid down in Outer Space Treaty in its original context, thus a great protection against powerful nations who frequently drive according to its own interests over space thus avoiding a chaos in space.

The International community should to act faster regarding an amendment to the treaty and consequently providing legal certain for all involved and guarantee of State cooperation. Avoiding, once again be driven by economy shift.

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