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“COMMERCIAL OUTER SPACE ACTIVITIES”

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Abstract of the work

Even if the outer space challenge started only a few decades ago, man has already destroyed a number of physical and technical barriers and great scientific improvements have taken place in order to explore (and exploit) what was once an uninhabitable and unusable environment for humans.

Since the very moment in which science, astronautics and other advanced technologies, found a way to leave our planet, the accessibility of outer space has proven to be full of opportunities and potential for the social, scientific and economic progress and benefit for all mankind.

To date, looking back, those early days of space exploration, concentrated on experimental space missions, were the first stage of human involvement in space. At this initial stage, in the middle of the cold war, space exploration was mainly carried out by only a couple of nations, basically motivated by considerations of national and military prestige.

Over the last 60 years, nonetheless, as a result of different factors, namely the huge technical developments of the last decades, this original involvement in outer space has changed to become much more multifaceted.

The main elements involved that have influenced changes in the global space exploration community and have brought about the evolutionary process towards the commercial use of outer space have been the following:

- Development of various space transportation systems facilitating scheduled travel to outer space. More generally, a higher degree of technical maturity of space technologies.
- The introduction of commerce in space-related activities as a by product of the progress in logistics connected with routine access.
- The rise of potential space applications through progress made in space technology and other related sciences have led to many different activities and an enormous increase in profits.
- Further development of space applications gained through practical experience.
- Increased and concerted use of the outer space's potential by a growing number of states and communities that are developing space programs and this includes developing countries such as Nigeria, Brazil, and Eastern European Countries.

The abovementioned factors, together with other less evident elements, have contributed to an decisive change in the concept itself of utilization of outer space: from pre-operational, experimental, and scientific-oriented activities to operational activities carried out by space agencies for an ever-growing number of application purposes in the commercial and pacific uses of outer space.

No one doubts and we must be well aware of the still considerable amount of military space projects (for which, by the way, most of the abovementioned developments are equally relevant and which led to a comparable shift towards application), however, it is not the objective of this work to evaluate the military aspects of outer space exploration and development.

Now that space programs and space agencies have become a part of our everyday existence, and which are now in the operational and application phase, all the above developments, synthetically considered, have added another important element that is the central theme of this paper, namely, the commercial uses of outer space.

Commercialization has assumed today a very important role as a catalyst for further space exploration and development. In fact, if on the one hand, commercial activities are the result of the various abovementioned elements and which form the constituents of the stage shift in space utilization, on the other, the commercial revenues of space activities reciprocally influence further developments in this evolutionary process. This trend is the basic subject of our interest, to the extent that it gives rise to legal questions and practical problems.

The aim of this work is to assess the current status of space activity regulation (in the main fields) against the background of aspects of progressive commercialization and vice versa. On the basis of the outcome of this research and the legal implications resulting from applying this analysis to practical space utilization, the perspective scope of my effort is to provide at least one insight into the legal questions regarding space commercialization, an aspect almost neglected in the Italian academic landscape.

The conclusions of this paper take into consideration the fact that the basic (and substantially unique) legal framework was established when competitive space agencies were still in their infancy and basically experimental, a critical evaluation of its principles appears, not only overdue, but also appropriate.

An overall report on the juridical implications and relevant practical problems might, moreover, form a basis for new legislation to facilitate the ongoing process of progressive space utilization. Such a development would consequently influence the pace of the future space activity evolution through which commercial advantage is becoming one of the most forceful factors.

For the purpose of analyzing the numerous legal and practical issues surrounding the growth of commercialization in space activities, this work has been divided into chapters to deal with each specific aspect.

I. First Chapter – The History of the Law of the Space

The first chapter introduces the reader in the field of space law, giving a brief

historical report on the development of international space law legislation, in the framework of a global cooperation in space-related sectors. It is here shown an intense and progressive activity in international law-making during the past decades (during the first years of the space age).

The attention is finally focused on the problems encountered in reaching global agreements in the field of space activities, problems arising due to the strategic and geopolitic significance of the space in relation to national security as well as the will to exploit in the most profitable ways this new resource.

Finally, the chapter contains a list of the major governmental and non-governmental organization within the United Nations family with the specification of their respective fields of action in the space sector.

II. Second Chapter – Commercial Space Actions under the conditions of the *Corpus Juris Spatialis*

The second chapter affords in general terms the issue of the commercialization of space activities *per se* and its position within the terms and possibilities of existing international space law. It is evident that the acceleration impressed by the technical development and commercial potentialities in space imposes the need for an update of the current juridical framework: nonetheless this chapter gives an overview of the existing international space law in order to assess whether its principles - which were established at a time when space policies appear to have been based on quite different motivations and while those principles were focused on the early expectations of a brand new sector and environment and thus focused on the establishment of basic legal requirements – are now fit to accommodate the trends in space endeavour and particularly to the commercialization process in general.

Two crucial points have to be examined: (i) if the Outer Space Treaty permits commercial space activities and, if so (ii) if the Outer Space Treaty, in its present form

is capable of dealing adequately with the legal consequences of commercial space activities. The examined legislation demonstrates in the first place a general permission to undertake commercial activities in outer space. Nonetheless, the too basic framework of public international space law does not provide adequate regulation when commercial aspects are involved. Therefore, once again there is need for new international legislation (treaties) to provide a safe and legal basis and framework for such activities.

III. Third Chapter – The law of space, private enterprises and private property

The third Chapter deals with the striking phenomenon of the commercialization process taking place in space ventures represented by the increasing role played by private enterprises in various fields of space activities. Although the commercialization of space conducted by private enterprises is substantially a matter of national legislation, directed by national Legislator and implemented by national/regional regulation, nevertheless it effects space law at all levels.

Actually, international agreements declare that no government can claim outer space or celestial bodies in outer space as its own, while private companies and business operators wishing to invest in potential space enterprises frequently point out that such provisions constitute one of the major obstacles to the future commercial development of space.

The fact is that the lack of an adequate protection of property rights truly prevent the potential investors from obtaining adequate funds, hindering the protection of the relevant investments and depriving them of the assurance that they can appropriate income from their investment. In other words, the absence of whatever sovereignty in space, compromises the ability to make profits from private investment, since the private sector will not undertake the risk to develop the technology and invest the resources if it cannot be assured the benefits of its labour.

The Chapter describes how the utilitarian (and anti-militarization) nature of the so-called Outer Space Treaty, signed more than 50 years ago, is still preventing a precise

individuation of what is permitted and what is not in outer space. An objective analysis of the Outer Space Treaty (and of the Moon Treaty) shows that property rights exist, but not to the extent that many business player would desire. The two treaties recognize sovereignty over properties placed into space, property produced in space and resources removed from their place in space, but prohibit any claims of sovereignty by the States. On the other hand, international law extends this ban to individuals. The so called Moon Treaty calls for “equitable” sharing of benefits among all states, but is clear that the technological advanced countries oppose a fierce resistance at having to give up their expensive and hard-earned benefits.

The chapter also deals with the involvement of private enterprises in space, showing how a passage is occurring from the indirect involvement of the very beginning of space age (when the private enterprises were engaged as contractor of the governments or the agencies which directly acted as a player in space) to a scenario in which the private sector is directly involved in space activities. Through the examination of the Articles 6 and 9 of the Outer Space Treaty, we can affirm that also non-governmental entities can be potential player of the outer space activities and, more precisely, no prohibition on participation by private enterprise in general can reasonably be voided. Nevertheless, this affirmation has to be tempered with the acknowledgment (though opposed by a minor school of thought) that activities conducted by private entities are governed and consequently also limited by the same general conditions and restrictions provided for by the Outer Space Treaty with regards to the Member States.

IV. Fourth Chapter – Communications via satellite

The fourth chapter affords the theme of space satellites communications, pointing out how this is currently the first and most successful space application in terms of commercial prospects and by-products on the earth. Many issues relating to this aspect of space law are discussed against the background of international regulation by the International Telecommunications Union (ITU) and the United Nations Committee

for the Peaceful Uses of Outer Space (UNCOPUOS).

The chapter provides an overview about the international regulatory framework dominating specifically this technical field of space ventures, taking into account the close relationship between the international space law and the regime of international telecommunication law. I will introduce the two main international bodies dealing with the regulation of telecommunication via satellite which are: the International Telecommunications Union (ITU) and the United Nations Committee for the Peaceful Uses of Outer Space (UNCOPUOS).

The chapter illustrates also the legal regime of the so-called GSO (geo-stationary orbit): the ever increasing use of the geostationary orbit for satellite communications, on one side, and the assurance for a fair and equitable sharing of it by the different countries of the world, on the other side.

It will be also examined another aspect that arises in connection with space communication services provided by satellites located in the geostationary orbit concerns the danger of damages deriving from radio interferences.

V. Fifth Chapter – Space Transportation

Although private enterprises within Europe, Asia and United States has become more and more involved into space activities such as telecommunications and remote sensing, until now only the government has provided transportation into outer space. To date, however, this scenario is changing, because all the major governments are withdrawing from the commercial space transportation market. And as private players will step into the void left by such governmental withdrawal, the regulatory framework which will govern private space transportation services will become very important. This chapter provides for a definition of “space transportation” (which, in example, does not include the space transportation operations performed for transportation purposes from one point on earth to another) explores space

transportation and the derivative juridical issues, on the background of the perspective of existing regulation and present (as well as anticipated) practical developments. Controversial questions are scrutinized and areas of specific concern are identified. Among these: the legal regime of space transportation on earth's surface as well as the legal regime of the high seas in comparison with the legal regime of airspace. In the context of the legal regime of airspace, the thorny subject of the definition/delimitation of outer space has been also broached. Moreover, the chapter deals with the examination of the legal regime of Outer Space. Finally, a special paragraph is dedicated to the study of the issue of the state responsibility and state liability for national activities in outer space, imposing this responsibility equally upon governmental activities as well as on activities carried on by non-governmental entities.

VI. Sixth Chapter – Intellectual Property Rights and Outer Space Activities

This chapter discusses the basic issue of intellectual property rights protection in the context of space endeavours. Though this issue received only minor attention in the past years, copyrights and rights on invention in relation to space activities are expected to play an important role in the further development of space commercialization. It is clear that the process of develop and innovate ideas in space sector continues to supply mankind with ever increasing possibilities to utilize the specific opportunities offered by the space environment. However, seen from the point of view of the player involved in this sector, it is necessary to provide individuals with sufficient incentives to mobilize their full intellectual potential. In the light of the above, intellectual property rights relating to space activities are gaining substantial importance, and provisions for their adequate protection will be taken. With the intensification of international travel and trades, the need arose to establish a legal system to deal with the international protection of intellectual and industrial property rights. Therefore, in parallel with the creation of national rules, interstate cooperation has agreed upon a body of international regulation with respect to these

areas of law (Berne Convention, 1886; Geneva Universal Copyright Convention, 1962; Rome Convention on neighbouring rights, 1961; Geneva Convention, 1971, Paris Convention, 1883; Washington Patent Cooperation Treaty, 1979).

Taking into consideration the perspected development of commercial space activities, combined with the increasing interest of private enterprises make it necessary to investigate whether further measures must be taken on an international level to secure adequate protection for intellectual and industrial property rights related to space endeavour. The chapter deals with various issues related: (i) to the application of satellite communication technology (problems with unauthorized interception and use of information and data; (ii) rights on inventions, including datas intangible product (US are very concerned with this point, also to encourage private contractors who have business relationship with NASA); (iii) remote sensing.

VII. Seventh Chapter – Commercialization of Outer Space and Insurances

In this chapter I tried to give an overview of a brand new insurance sector, setted on the needing of of space missions and its practical and legal aspects in the light of increased space commercialization. Recent commercialization trends in the space sector have made space insurance a focal issue, which in its turn largely influences the future commercialization of space endeavour. Generally speaking “space risks” can be defined as the uncertainty regarding losses derived from a space activity.

We moved from a scenario in which the Governments involved in space activities were originally able and willing to take on the legal responsibilities and financial risks involved in space endeavour, at the present time budgetary restraints imposed on States systems due to the economic recession create a scenario where risks and liabilities are covered through insurance arrangements. On the other hand, private industries and corporation – being more and more directly involved in space participation, is even more inclined to resort to insurance cover in order to minimize risk factors in this high-risk field of business. All the mentioned causes, generated a

new sector in the insurance market. Instigated by the advantages of risk-pooling and risk-spreading, insurance seems to be the ultimate answer to make economically viable each kind of space activity, *per se* always high risk characterised. The chapter analyzes the following categories of insurances: (i) property Insurance - subdivided in a) pre launch insurance, b) launch failure and initial operation insurance, c) satellite life insurance; (ii) liability insurance; (iii) product liability; (iv) personal accident insurance of space crews. Finally, some mention is made to the general space insurance market, and how badly it reacts to the specific characteristic of its relevant field of operation.

VIII. Eight Chapter – Final Remarks

The world's attention for outer space ventures increased hugely at the beginning of the so called "space race", as exciting results were achieved by the two competing superpowers, the Soviet Union and the United States. This enthusiasm reached his peak with the 1969 moon landing. Since then, the space went out of the focus of the media and of the public, and only spectacular events continued to be covered by the press and noticed by the people. Nonetheless, we now experience that the non-exciting developments are those which changed and still are trying to change our life. Actually, many developments for space exploration and the exploitation of outer space made our civilisation absolutely dependent on activities carried on in outer. To name just, reference can be made at: the raise of satellites for communication, television, Earth monitoring, weather forecasting, navigation and - what is even more unknown by the public, but changed life at least as significantly – the so called "spin off technologies", with the Personal Computer being the most prominent one. Such important changes in our lives happened widely unnoticed by the public and, as a consequence, in an almost complete lack of a legal framework..

The factual starting point of this work is that outer space is, also now, a market with an impressive potential, not only because of the growing potentialities in to-date existing applications like navigation and communication, but also due to a large potential in emerging applications (i.e. spacetourism) and in future applications (i.e. mining on the moon). Many innovations related to space travel and to the use of outer

space made and still make our culture totally dependent on outer space activities. Reference is hereby made to the development of satellites for communication, television, Earth monitoring, weather forecasting and navigation to name just a few.

We experienced a sort of deceleration since the times of the “space race”. Looking back on existing international space rules as they were envisaged and drafted within the UN, and especially studying the principles of space law, one cannot but be impressed by the foresight, the courage and the confidence shown by those early Fathers of the space law.

The creation of a regime of freedom with sovereign States as the subjects, “in accordance with international law”, without a sovranational authority to enforce the new set of rules, risk the raise of conflicts and tensions among States and private entities, as nowadays there is no equal opportunity (which means: “no equal capability”) to use (and manipulate) the concept of “freedom to explore and use the outer space”. It enlightens once again the reknown problem of an equal or at least equitable participation by all States in space activities as well as the issue of the distribution of the “wealth of space”, in this case an equal (or equitable, economic and efficient) sharing of the benefits of the exploitation of the natural resources of outer space.

The lack of sovereignty on a “national territory” in outer space law, and the specific provision of (the concept of) “all mankind” in positive space regulations, and of nationality only with regard to the national jurisdictions over space objects (the State of registry), make it feasible to improve new kinds of cooperation under mainly “technical” public legislation, since it exists the possibility to apply present rules of international private law in space. One of the starting points should be the permission, under the existing international space law, to institute a number of limited, functional property rights in outer space.

The ultimate aim should be to create a “level playing field” for all the entities (public and private ones) to be active in outer space: equal chances, equal capabilities, shared “access rules” to the wealth of space for privates and companies who desire to expand

their burdens of business into outer space. Close to this, and even more important is that the highest commission of the society of the States is to have all States benefit from such space activities on an equitable and widely shared legal basis.

To date, however, the current legal regime of outer space is more and more fragmented and inappropriate to face the challenges of the intensifying commercial use of space. It consists of several basic but still very general principles stated in a restricted set of space treaties adopted since 1967 (the so called “*Corpus Iuris Spatialis*”) and a weapon controlling treaty, together with general international law and the practices of the spacefaring nations. The legal framework also contemplates a number of agreements covering the commercial utilization of outer space, such as rights to use the geostationary orbit or agreements incorporating intergovernmental organizations (for instance, the Intergovernmental Agreement on the International Space Station, the International Telecommunications Union, the International Civil Aviation Organization, and the World Meteorological Organization).

Nonetheless, just as the pushing interests of industry have played a major role conditioning the development of the law of the sea, in the same way the interests of industrial and commercial parties will heavily influence policy in space. Since the private parties will have a preminent role in the creation of a new legal framework for the commercial exploitation of the outer space, it could be worthy to agree on a set of common, widely shared, principles. Increasing commercial economic activity in space should be facilitated, for instance, by the introduction of a code of ethics or a sort of *Lex Mercatoria Spatialis* for the businesses involved, something that is now quite a commonplace among business operators. It should cover the most various areas such as environmental stewardship of space, the promotion of honest dealings, making safety an important concern, ensuring a free-market economy and disclosure of conflicts of interest or political contributions.