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## **From Startups to Leaders: How Commercial Projects are Transforming the Space Industry**

*Effective mechanisms for controlling the activities of private companies in space have been identified to avoid legal collisions and ensure compliance with ethical standards.*

Commercial projects are fundamentally transforming the space industry by introducing innovations, flexibility, and dynamism that were previously unattainable for state programs. In particular, private companies are actively developing areas such as satellite launches, space tourism, research, and the development of new technologies for space exploration, significantly accelerating progress in the industry. These changes pose new challenges for legal regulation, as traditional legal frameworks designed for state players are not always suitable for managing commercial structures operating in a global and often international environment.

We have identified three areas that are currently the most commercially attractive and rapidly developing.

The first area where successful commercial projects are being implemented is telecommunications. The International Telecommunications Satellite Organization (INTELSAT) was established as an intergovernmental organization that launched the first commercial global satellite communication system in 1965. In 2001, INTELSAT was reorganized and became a private company. This process of privatization has also occurred with other telecommunications enterprises, including the European Telecommunications Satellite Organization (EUTELSAT) and the International Maritime Satellite Organization (INMARSAT). Thus, the commercialization of telecommunications services has existed for over 50 years and is an example of the successful development of commercial space activities.

The second area is remote sensing, which is also no longer monopolized by states. Even those state or semi-state organizations that own satellites provide data on a commercial basis. For example, the RapidEye satellite, owned and operated by Planet, was launched on August 29, 2008, along with a group of five identical satellites. The goal of RapidEye was to provide a range of Earth observation products and services to a global user community.

The third area is navigation, where space technologies like GPS and GLONASS, which were initially developed for military purposes, have long been successfully used in almost all areas of public life. For example, GPS is a space-based radio navigation system owned by the U.S. government and operated by the U.S. Air Force (USAF). It can accurately determine three-dimensional position to within a meter and time to within 10 nanoseconds worldwide and around the clock.

Thus, the use of space technologies in navigation also demonstrates the successful commercialization of space activities.

It is necessary to emphasize that space activities remain extremely costly, making the financing of space projects a constant issue. In light of this, the International Institute for the Unification of Private Law (UNIDROIT) [5], with the aim of modernizing and harmonizing private and commercial law, took the initiative to adopt an international convention on the financing of high-value mobile equipment. The Convention on International Interests in Mobile Equipment (Cape Town Convention) was adopted in 2001 and should be used in conjunction with protocols specific to certain types of equipment. According to the provisions of the Convention, the types of high-value equipment include aviation equipment, railway rolling stock, and space assets. The issues of financing space projects are outlined in the Protocol to the Convention, which was adopted in 2013. Thus, considering space equipment as high-value and recognizing that large funds are necessary for its acquisition, the aforementioned unified rules on financing and leasing were adopted for member states.

Therefore, efforts are being made at various levels (global, regional, national) to reduce the burden on state budgets and to maximize the use of other sources of funding whenever possible. A report by noted analyst Morgan Stanley predicts that the global space economy will reach \$11 trillion by 2040, with the share of government spending in the global space economy decreasing from 25% to 17%. However, not all scientists and politicians share the view that intensive space exploration will bring great benefits to humanity. For example, in an interview published in the Harvard Business Review, O'Sullivan says that the space economy is thriving, but to talk about an \$11 trillion economy, enormous resources must be spent, for example, on asteroid mining and the extraction of resources, not to mention interplanetary existence. In this way, he criticized Morgan Stanley's position.

We agree with Professor Larisa Soroka that both authors are correct. Morgan Stanley rightly pointed out the increase in the commercial sector's share of the space economy based on the development of satellite technologies, where the private sector shows the best results in the commercialization of space activities. O'Sullivan correctly notes that significant financial resources are needed for the commercial extraction of space resources, and therefore, this type of space activity cannot do without state support. Summarizing all the above, it is worth emphasizing that for the sustainable development of space activities, it is necessary to combine all available legal, financial, and organizational mechanisms and to use the opportunities of both the public and private sectors. Moreover, with the increasing number of countries joining the "Space Club," international space law is no longer able to fulfill its regulatory mission due to the diverse interests of countries in space activities. Especially since no conventions or treaties have been adopted under the auspices of the UN since 1979, only "soft" law documents have been adopted.

Thus, it can be stated that the legal regulation of commercial projects in the space sphere faces a number of contemporary challenges. Among them are the need to harmonize national legislations with international agreements, the protection of intellectual property, the regulation of private ownership of space resources, as well

as issues of security and liability in cases of space incidents. An important aspect is also the development of effective mechanisms for controlling the activities of private companies in space to avoid legal collisions and ensure compliance with ethical standards.

**Conclusions.** Thus, the commercialization of space requires a review and adaptation of legal norms to ensure balanced development of the space industry, where innovation and economic growth go hand in hand with international security and justice.

## References

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