

G.M. Ishkibayeva^{1*} , **D.Nurmukhankyzy²** 

¹JSC «Republican Space Communications Center» of the Ministry of Digital Development, Innovation and Aerospace Industry, Kazakhstan, Nur-Sultan

²Zhetysu University named after I. Zhansugurov, Kazakhstan, Taldykorgan

*e-mail: gulmira_marat@mail.ru

LEGAL EXPERIENCE OF THE UNITED STATES OF AMERICA IN THE ISSUE OF SPACE COMMERCIALIZATION

What is space now? What benefits can it bring to humanity and who is most interested in its development? Today, the history of the development of world cosmonautics shows that States at the dawn of space exploration pursued primarily a scientific and research goal for the implementation of their military and strategic tasks. The main feature of modern space activity is its active commercialization. Currently, commercial activities in outer space involve not only States, State institutions and international governmental organizations, but also private enterprises, as well as non-governmental organizations. Now space is a huge space for profit and its new participant is the private sector. It was private companies that began to invest huge amounts of money in the space sector. Today, the United States of America (USA) is a confident leader in the number of companies involved in space exploration. The comfortable development of the space business in the US is the result of a systematic, purposeful policy of the US in space exploration and profit from the work carried out, as well as the result of the legislative work of the state. Given the above, the practice and experience of the United States in the issue of space commercialization is of not only scientific, but also practical interest. The article is devoted to the international legal experience of the US in the issue of space commercialization. The authors analyze the main regulatory legal documents of the United States adopted since the beginning of space exploration, which contributed to the process of commercialization of space and space technologies, thereby contributing to the development of the state's economy as a whole.

Key words: space, space law, private space, US space.

Г.М. Ішкібаева^{1*}, Д. Нұрмұханқызы²

¹Цифрлық даму, инновациялар және аэроғарыш өнеркәсібі министрлігі «Республикалық ғарыштық байланыс орталығы» АҚ, Қазақстан, Нұр-Сұлтан қ.

²І. Жансүгіров атындағы Жетісу университеті, Қазақстан, Талдықорған қ.

*e-mail: gulmira_marat@mail.ru

Америка Құрама Штаттарының ғарышты коммерцияландыру мәселесіндегі құқықтық тәжірибесі

Қазір ғарыш деген не? Адамзат үшін қандай пайда әкелуі мүмкін және оны игеруге кім көп қызығушылық танытады? Қазіргі уақытта әлемдік космонавтиканың даму тарихы ғарышты игерудің басында мемлекеттер өздерінің әскери және стратегиялық міндеттерін жүзеге асыру үшін ең алдымен ғылыми және зерттеу мақсатын көздегенін көрсетеді. Қазіргі ғарыш қызметінің басты ерекшелігі – оны белсенді коммерцияландыру. Бүгінгі күні ғарыш кеңістігіндегі коммерциялық қызметке мемлекеттер, мемлекеттік мекемелер мен халықаралық үкіметтік ұйымдар ғана емес, жеке кәсіпорындар, сондай-ақ үкіметтік емес ұйымдар да тартылған. Ғарыш – бұл үлкен пайда және оның жаңа қатысушысы – жеке сектор. Бұл ғарыш секторына үлкен ақша қаражатын инвестициялай бастаған жеке компаниялар. Бүгінде Америка Құрама Штаттары (АҚШ) ғарышты игеруге қатысатын компаниялар саны бойынша сенімді көшбасшы болып табылады. АҚШ-та ғарыш бизнесін ыңғайлы дамыту АҚШ-тың ғарышты игерудегі және жүргізілген жұмыстан пайда табудағы жоспарлы мақсатты саясатының, сондай-ақ мемлекеттің заң шығару жұмысының нәтижесі. Жоғарыда айтылғандарды ескере отырып, АҚШ-тың ғарышты коммерциализациялау тәжірибесі тек ғылыми ғана емес, сонымен бірге практикалық қызығушылық тудырады. Мақала АҚШ-тың ғарышты коммерцияландыру мәселесіндегі халықаралық-құқықтық тәжірибесіне арналған. Авторлар ғарышты игеру басталғаннан бері қабылданған АҚШ-тың негізгі нормативтік құқықтық құжаттарын талдады, бұл ғарыш пен ғарыштық технологияларды коммерцияландыру процесіне ықпал етті, осылайша тұтастай алғанда мемлекет экономикасының дамуына ықпал жасады.

Түйін сөздер: ғарыш, ғарыш құқығы, жеке ғарыш, АҚШ ғарыш.

Г.М. Ишкибаева^{1*}, Д. Нұрмуханқызы²

¹АО «Республиканский центр космической связи» Министерства цифрового развития, инновации и аэрокосмической промышленности, Казахстан, г. Нур-Султан

²Жетысуский университет им. И. Жансугурова, Казахстан, г. Талдыкорган

*e-mail: gulmira_marat@mail.ru

Правовой опыт Соединенных Штатов Америки в вопросе коммерциализации космоса

Что такое космос сейчас? Какую пользу для человечества может принести космос, и кто больше всех заинтересован в его освоении? Ныне история развития мировой космонавтики показывает, что государства на заре освоения космоса преследовали, прежде всего, научную и исследовательскую цель для реализации своих военных и стратегических задач. Главной особенностью современной космической деятельности является ее активная коммерциализация. В настоящее время в коммерческую деятельность в космическом пространстве вовлечены не только государства, государственные учреждения и международные правительственные организации, но и частные предприятия, а также неправительственные организации. Теперь космос – огромный простор для прибыли и ее новый участник – частный сектор. Именно частные компании стали инвестировать колоссальные денежные средства в космический сектор. Сегодня Соединенные Штаты Америки (далее – США) являются уверенным лидером по числу компаний, участвующих в освоении космоса. Комфортное развитие космического бизнеса в США – результат планомерной целенаправленной политики США в освоении космоса и получении прибыли от проведенной работы, а также результат законотворческой работы государства. Учитывая изложенное, практика и опыт США в вопросе коммерциализации космоса вызывают не только научный, но и практический интерес. Статья посвящена международно-правовому опыту США в вопросе коммерциализации космоса. Авторами проанализированы основные нормативные правовые документы США, принятые со времен начала освоения космоса, которые способствовали процессу коммерциализации космоса и космических технологий, тем самым, способствовали развитию экономики государства в целом.

Ключевые слова: космос, космическое право, частный космос, космос США.

Introduction

The First President of the Republic of Kazakhstan- Leader of Nation N.A. Nazarbayev accurately describes the current situation of the space field: «recently there have been major changes in the global space industry, related to increase of international cooperation in the sphere of exploration and use of the outer sphere, along with rapid globalization and space commercialization. Majority of governments, including Kazakhstan, have come to an understanding of the importance of geopolitical interests in space, as the result of which the development and use of outer space became one of the priorities of national politics» (Nazarbayev, 2006:372).

Nowadays space activity and its structure has a slightly different appearance in terms of obtaining profit, rather than as it was in the dawn of the Space Age (space exploration). If the USSR and the USA remained dominant in use of outer space, then space programs have been deployed not only in Europe and Asia, but also African countries are developing actively in the space industry.

The period of Soviet «pioneer» exploration of space is over. Certainly, the successes of the

Soviet Union cannot be denied, especially its great contribution to global space activities. But the majority of countries, such as the United States of America (then-the USA), China and India have left far forward.

The efforts of American companies to space commercialization, as well as active legislative work of individual States provided a framework for emergence of private international space law.

Furthemore, it is worth noting that legal provisions which provided a basis of international space law, became the result of the Space Race between the USSR and the USA. Today the process of active space exploration by private entities creates premises for review of existing space law. It is important to note that space law cannot be defined by principles of commercial activity in space and legal regime for commercialization of space activities. Hence, this creates difficulties for States involved in space activities.

What commercial use does the space have for humanity? These include, first of all, remote sensing of the Earth, satellite communications, navigation and space tourism. It is of no surprise that the space sector requires a huge investment on the part of the State and not every State has the capacity to take

such measures to develop the space sector. Once it became apparent that the space sector can become a good resource of revenue, the private sector was interested in the possibility of exploring outer space. Large businessmen began to express their interest in investing huge amounts of money so as to take advantage of unlimited space resources.

However, only individual States at the national level have identified the possibility of space exploration by frequent organizations. The United States refers to one of such countries. In this regard, the United States experience in commercializing space is of interest not only in practical but also in scientific terms: what normative legal instruments the United States has adopted to commercialize space, and how these instruments have become part of the United States' national space programmes.

Theoretical and methodological framework

The theoretical value of the scientific article might be explained by the fact that its results complement theoretical concepts of the commercialization of space activities with new scientific evidence and results. While writing the article, general lecture, cognitive, logical, legal, formally legal complex research, legal modeling, system and other methods are used.

Degree of Study of Article

The article was written using the valuable scientific writings of legal scholars dedicated to the study of legal and theoretical problems of the commercialization of space – Payson D. B., Jahu R., Johnson K., Khrustalyov E. Y. Saprykin O. A., Mekayeva E. M.

Main part

It has been more than fifty years since the first artificial object appeared in orbit around the Earth. The first half of the twentieth century of human existence in space began with States being the only actors and the national space agencies of space-faring nations being the main actors in all space (D'angelo, 1994:34).

The beginning of the 21st century can be described as a trend in space activity. And the trend is caused by the huge potential that space can have in terms of «big money», that has attracted the attention of private international organizations and companies. As a result, the main mission of space is to make a profit.

Back in 1999, the Third United Nations Conference on the Exploration of Peaceful Uses of

Outer Space (UNISPACE- III), held in Vienna, noted the significant and actively growing contribution of private organizations into space development. At the same time, the need for legal regulation of space commercialization has been highlighted in the conference.

The world community recognizes as a space Power a State that has successfully launched a satellite with its space launch vehicle or a State that has its own space launch facility. Today these are the Russian Federation, the United States, Europe, China, Japan, India, Israel, Iran, North and South Korea. It's of no surprise that the space industry requires a great deal of capital and investment. The United States maintains the highest level of funding for the space industry. Already in 1958, the US Federal Law «On Aeronautics and Space» (National Aeronautics and Space Act, 1958) determined that private space activities should be fully encouraged. Because it serves a common good for the USA.

The space industry has been attracting private US investors since the late 20th century. Currently, private investment in the commercial space industry of the United States exceeded \$3 billion (Sheetz M., 2018).

Moreover, 2020 can be considered the largest investment in space infrastructure in history – more than \$5.5 billion. In 2017, the state invested about 11.3% of the country's budget in space programs. (Space Capital website, 2020)

A key element in the space industry in the USA is the National Aeronautics and Space Administration, which has been carrying out civil space programs of the state since 1958 (NASA website, 2020).

Historically, NASA has produced spacecraft and operated space infrastructures independently with state funding.

Over time, the need for additional funding for NASA programmes has become apparent. For example, the national program «Space Shuttle» was estimated with a budget of 5.15 billion dollars (Lexakov, 2011). In this regard, since the early 1980s, the United States has been implementing a new approach that involved private entities in high-budget space programmes.

In order to implement above mentioned policy, the United States has enacted a number of important laws designed to encourage private entities to explore space:

1. Bayh Dole Act or Bayh Dole Act

Congress had adopted the Act in order to encounter the issue of wasted inventions and to promote the use of inventions resulting from research or development supported by the State.

Another objective was to promote free competition and entrepreneurship without unduly burdening future research and discovery.

The policy underlying the law was aimed for giving grant a share of ownership to universities, a patent right in inventions, to provide an incentive for the commercialization of products (Nelsen, 1993).

By 1980, there were more than 28,000 patents, of which just under 5% were commercially licensed (Duecker, 1997).

In accordance with the law, patent rights for the results of the work developed with budgetary money could be transferred free of charge to organizations ready to engage them in commercial circulation.

In 1984, the Bay Dole Act was supplemented by the National Cooperative Research Act. The National Cooperative Research Act (1984) prohibited the application of antimonopoly legislation to research and development enterprises.

2. Stevenson-Wydler Technology Innovation Act (1980)

The adoption of the Act had two main tasks: 1) First of all, Industrial Technology Authority within the Ministry of Commerce should be established, which will oversee the establishment of a wide range of university centres to conduct research, promoting technological and industrial innovation, including cooperative industry-university basic and applied research; assisting individuals and small businesses in the generation, assessment and development of technological ideas, promoting industrial innovation and new business enterprises; providing technical assistance and advisory services to industry, especially small businesses, and providing curriculum development, training and training in innovation, entrepreneurship and industrial innovation; 2) Secondly, it concerns the use of Federal technology. Each federal laboratory had the task to create an Office for Research and Application of Technology. Each Federal laboratory with a total annual budget of over \$20,000, must provide at least one full-time professional as staff to its Office of Research and Application of Technology. After 30 September 1981, each federal agency was required to provide at least 0,5% of the agency's research and development budget.

3. Small Business Innovation Development Act (1982)

The Act primarily provided for small business activities aimed at providing small businesses with federal funding for research and development. The Act strengthened the role of small innovative firms and allowed them to use Research & Development

to create technological innovations that would contribute to the growth of economies.

At this stage, the formation of legal norms of the employee of the State and business is continuing. As a result, Congress adopted the Small Business Innovation Research program. The US has legislated that small business is the engine of economic growth.

4. «Commercial Space Launch Act of 1984».

The document laid the foundation for the commercial development of the space industry. The Act sets priorities for the development of the country's space sector. For the first time, the law established the right to engage private companies to carry out State space projects. For that purpose, the Act provided for a simplified form of obtaining licences for space activities and defined key requirements for systems for the safe transport of human beings into outer space.

5. Commercial Space Act (1998)

The Act for the first time sets out priorities for the development of the United States private space industry, primarily the use of the International Space Station (hereinafter ISS) for the benefit not only of the State, but also of private American entities, commercialization of spacecraft launches; subsidization of commercial space launches; establishment of a control system for private space carriers. In accordance with the Act, State bodies were given the right to engage private companies to implement State programmes in the space sector.

6. Commercial Space Transportation Competitiveness Act of (2000)

The main purpose of the Act is to have a favourable influence on the further development of commercial space transportation, as well as to increase the subsidies to the industry. The Act states that the powerful space transportation industry of the United States is vital to the economic well-being and national security of the country and that space transportation may therefore evolve into aircraft-type operations. In accordance with the provisions of the Act, space transportation should be a key component of stable United States economic development and national security. The Act also makes it possible for NAVSTAR to commercially use high-resolution satellite imagery and Global Positioning System (GPS) data. As a result of the Act, new private companies have emerged that specialize in space services, global positioning satellite development and the sale of navigation services.

7. The American Space Commerce Free Enterprise Act (2018)

The Act provided for the reform of the organization of work of the Earth remote sensing

system and the simplification of the procedure for the coordination of private space missions by public organizations. The Act also empowers the Department of Commerce's Space Commerce Department to issue certificates to United States citizens and non-governmental organizations (United States entities) for the operation of artificial objects launched from the Earth and transported in space objects (Congressional website, 2018).

To this day, NASA has been the chief implementer of the United States Space Laws to commercialize space activities and attract private funds for the development of the country's space sector. Furthermore, it is important to note that NASA has specialized units to ensure cooperation with private entities:

Space Market Development Division
Office of Commercial Space Transportation;
Office for the Commercialization of Space.

According to NASA, the organization's budget for 2017 was over US\$15 billion, of which 53% was allocated for launch activities, and 24% for the maintenance and operation of the orbital constellation (NASA website, 2017).

Moreover, in 2027, NASA's budget is expected to exceed \$20 billion, of which the organization will spend \$10 billion on training astronauts and delivering them, transporting cargo.

NASA also has plans to go to the Moon and Mars. By working with American companies and international partners, NASA plans to expand human exploration to the Moon. NASA is working over the next decade to ensure a permanent human presence on the Moon, to make new scientific discoveries and to lay the foundation for private companies to build a lunar economy.

This shows that the United States is making a determined effort to commercialize space activities. Moreover, the national space policy reform initiated by the United States almost 35 years ago continues today.

The starting point of the report «Новый космос» or, as proclaimed «New Space» in the USA, can be considered as 22 May 2012, when «Falcon9» with the spaceship «Dragon» is launched from the cosmodrome Canaveral rocket created by Elon Musk. A new page of the history of world cosmonautics opened, in Russia it was called «arrival of private in the big space».

The legal basis for the flight of a private rocket was established by B. Obama's Law «On the Competitiveness of Commercial Space Transportation» of November 25, 2015 (Commercial Space Transportation Competitiveness Act, 2015).

The Act regulates relations related to the participation of the United States private sector in United States space activities. The Act allowed United States citizens to engage in commercial exploration and exploitation of space resources, including water and minerals. The Act further states that the United States asserts sovereignty, sovereign or exclusive rights or jurisdiction over or ownership of any celestial body. (U.S. Commercial space launch competitiveness act, 2015)

Discussion and results

According to Businessweek, American citizens can now store everything they have brought from space. The anti-proponents called the law nothing more than a classical interpretation of the philosophy of the Wild West «he who dares wins», while the proponents accepted the law as a bold statement, which will finally liberate private space flights from the rigid regulation of the US government (Oduntan, 2015).

In response to the increasing share of private companies in space exploration, on 9th December 2020, the United States submitted a new National Space Policy 2020, approved by President D. Trump. The policy recognizes that a reliable, innovative and competitive commercial space sector is a fundamental factor for economic development, further progress and sustainable leadership in space. According to the Policy, the desire to explore space led the United States to create new technologies, capabilities, experience and businesses to achieve this goal.

The new policy introduces some innovations in support of space trade, namely, strengthening cooperation with the commercial space industry. It is done so as to achieve innovation and budget savings and continue to improve the regulatory framework to ensure timely, predictable, transparent and flexible licensing processes that allow for rapid innovation and adaptation to market requirements.

Along with existing programmes, the United States is actively committed to exploration of the solar system. Since the first steps on the Moon, the United States has used its space potential to stimulate economic growth, improve the quality of life of all Americans and people around the world, advance the principles of democracy, human rights, and economic freedom. In accordance with the Policy, the US plans to create an environment that will harness the energy of its industry to create innovative business approaches that will support and sustain the next generation of researchers and

entrepreneurs on the Moon and then on Mars and beyond its limits. The United States recognizes the importance of space for the development of all mankind.

However, private initiative in the United States is not limited with projects of Elon Musk. The smallest satellites, CubeSat (CubeSat), are also being actively developed and produced in university laboratories. They are placed in orbit in addition to the main cargo. The main mission of cubsats is research – for surveying the Earth's surface, testing chips for resistance to radiation.

The pace at which commercial space companies are emerging is growing rapidly each year: private companies Blue Origin, Moon Express, Planet Labs, Rocket Lab, Firefly, Spire, SpaceX, Deep Space Industries, Bigelow Aerospace. These companies develop technologies for space exploration.

Almost all major American companies are interested in and involved in space issues. Amazon, Blue Origin are developing Kuiper, SpaceX with Google, and Tesla is running Starlink.

It should be noted that the commercialization of space activities is the most rapid in the sphere of the creation and operation of space satellites. Since 1960, about 6,500 have been launched. The first was launched in August 1964 – the American Syncom-3.

Later, after understanding the need for communication satellites, many states expressed their interest in creating and launching a satellite, but the question was certainly on financial sides: a rocket that would carry a satellite into orbit and the satellite itself required huge investments.

On 20 August 1964, 11 states signed the Agreement on the Establishment of an International Satellite Communication Consortium (Communications Satellite Act, 1962). The United States played a decisive role in the organization, and it was thanks to the United States that the first satellite «Intelsat-1» was launched in 1965. The organization is now a commercial company and is the largest in the world. There were 2,062 satellites in Earth orbit at the beginning of 2019. (Kovalchuk, 2019).

Conclusion

Given that the study focuses on the US experience in commercializing space, it can be summarized as follows. The United States policy of commercializing space capabilities is tend to be well-targeted, resulting in the United States leading private space industry. Without a huge

strain on the US budget, the mere establishment of a commercial-friendly legislative framework demonstrates the potential for private investment in the economy.

According to Forbes correspondent Mikhail Kokorich, the degree of US technological superiority in space is so comprehensive, so that no potential adversary/competitor in the foreseeable future will be able to even approach the dispersed locomotive of American private innovation in space. (Kokorich, 2020).

The development and adoption is finally paid off in XXI. As a result, the size of the space economy is just over \$100 billion a year.

Today the requirements for private space activity are defined by the Code of Federal Regulations, Chapter III Title 14 «Aeronautics and Space». The Code defines the competence of State bodies to those wishing to explore outer space.

For example, there is no licensing procedure for the development, modernization, management of spacecraft, development, testing, production, repair and disposal of launch vehicles, rocket engines, control and scientific equipment. Licensing is provided for in two cases – when it concerns the protection of the life and health of citizens during the launch of rockets and their movement in orbit, and the compliance of the project with international requirements and the national security of the United States.

In this regard, private companies such as SpaceX, being the driver of the century in space, feel comfortable in the US.

Undoubtedly, any economic breakthrough has certain risks that the US may face in the long run. First of all, these are legal risks – change of participants of the world space market, legal position of private organizations, issues of responsibility in carrying out «business in space».

This requires further study, but the need to improve space law is self-evident. Moreover, it is necessary to create new norms of space law regulating the activities of entities for the commercial use of space. (Volynskaya, 2015)

It is worth mentioning that the decree of the President of the United States Donald Trump «On commercial exploitation of resources on the Moon». In particular, the Trump Order states that the United States does not consider the Moon as a public domain. It is noted that the United States is not a party to the Agreement Governing the Activities of States on the Moon and Other Celestial Bodies of 5 December 1979, which in turn recognizes the Moon

as the province of all mankind, and that all activities should be carried out for the benefit and in the interests of all countries (Agreements Governing the Activities of States on the Moon and Other Celestial Bodies, 1979).

After that, NASA announced the space program «Artemis», consisting of two stages – the landing of the crew with the first woman on the Moon and flights on the satellite with its infrastructure. On this project the President promised to allocate 1.6 billion dollars. (Polyakova, 2018).

In case this trend continues in the future, existing international treaty obligations will not be sufficient to address the future realities of space trade. Perhaps, it is due to the fact that the United States has already deviated from its international commitments to the diversion of space. But even if the US has so far maintained its treaty obligations, future opportunities for space trade will almost inevitably require a stronger assertion of national sovereignty to protect various forms of ownership in space.

References

- Budget of NASA Retrieved from <https://www.nasa.gov/content/fy-2017-budget-request>
- Communications Satellite Act (1962) Retrieved from <https://en.wikipedia.org/wiki/Intelsat>
- D'angelo G. (1994) Aerospace business law 101, USA, – 34 p.
- Duecker K. (1997) Biobusiness on campus: Commercialization of university developed biomedical technologies // Food and Drug Law Journal. 52, – 453–510 p.
- Jakovenko A. (2000) Konferencii o kosmicheskoy dejatel'nosti // Kosmos na rubezhe tysjacheletij. JuNISPEJS-III: dokumenty i materialy [Report of the Conference on Space Activities // Cosmos at the turn of the Millennium. UNISPACE III: documents and materials] – Moscow, – 46–48 p. [In Russian]
- Koval'chuk L. (2019) Kolichestvo sputnikov na orbite rastet s kazhdym dnev: skol'ko ih i kakim stranam prinadlezhat // URL: <https://tech.informator.ua/2019/08/24/kolichestvo-sputnikov-na-orbite-rastet-s-kazhdym-dnem-skolko-ih-i-kakim-stranam-prinadlezhat/> [In Russian]
- Kokorich M. (2020) Okonchatel'naja pobeda SShA: kak Rossija beznadezhno otstala ot Ameriki v kosmicheskoy gonke // Mnenie. [The final victory of the United States: how Russia is hopelessly behind America in the space race // Opinion] Retrieved from URL: https://forbes.kz/life/opinion/okonchatelnaya_pobeda_ssh_a_kak_rossiya_beznadejno_otstala_ot_ameriki_v_kosmicheskoy_gonke/ [In Russian]
- Leksakov A. (2011) Vo chto oboshelsja Space Shuttle Chelnochnaja kosmonavtika [What was the cost of the Space Shuttle space Shuttle] – Moscow, Zhurnal «Kommersant# Den'gi» №14, – 34 p. [In Russian]
- Nazarbaev N. (2006) Kazhstanskij put' [Kazakhstan's way] – Karaganda, izdatel'stvo TOO «Arko», – 372 p. [In Russian]
- National Aeronautics and Space Act (1958) Retrieved from <https://history.nasa.gov/spaceact.html>
- National Cooperative Research Act (1984) Retrieved from <http://counsel.cua.edu/fedlaw/Ncra.cfm>
- Nelsen Lita. (1993) Identifying, Evaluating, and Reporting Innovative Research Development at the University, In UNDERSTANDING BIOTECHNOLOGY 25, 26-7
- Oduntan G. (2015) Who owns space? US asteroid-mining act is dangerous and potentially illegal // The Conversation. Retrieved from URL: <https://theconversation.com/who-owns-space-us-asteroid-mining-act-is-dangerous-and-potentially-illegal-51073>
- Official page of NASA <https://www.nasa.gov/specials/artemis/>
- Official page of Congress of USA <https://www.congress.gov>
- Poljakova V (2018) Tramp podpisal ukaz o prave SShA ispol'zovat' resursy Luny [Trump signed an executive order on the right of the United States to use the resources of the Moon] Retrieved from <https://www.rbc.ru/politics/07/04/2020/5e8bc85a9a79473565bd61a0> [In Russian]
- Sheetz M. (2018) Space companies received \$3.9 billion in private investment during 'the year of commercial launch' Retrieved from <https://www.cnn.com/2018/01/18/space-companies-got-3-point-9-billion-in-venture-capital-last-year-report.html>
- U.S.A Commercial space launch competitiveness act (2015) Retrieved from URL: <https://www.congress.gov/114/plaws/publ90/PLAW-114publ90.pdf>
- Volynskaja O. (2015) Pravovoe obespechenie kommercializacii kosmicheskoy dejatel'nosti: mirovoj opyt i Rossijskaja specifika [Legal support for the commercialization of space activities: world experience and Russian specifics] Retrieved from URL: <http://readings.gmik.ru> [In Russian]