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## **FORMATION AND DEVELOPMENT OF SPACE TOURISM**

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***Abstract:** The relevance of the chosen topic is that tourism has long been considered as one of the most profitable and intensively developing sectors of the world economy. The development of tourism is important in solving social problems. In many countries, it is through tourism that new jobs are created, a high standard of living is maintained, and the prerequisites for improving the balance of payments of the country are being created. The need to develop the tourism industry contributes to raising the level of education, improving the system of medical services for the population, introducing new means of disseminating information.*

***Keywords:** space tourism, traveling to space, extreme tourism, development*

### **INTRODUCTION**

Tourism has an impact on the preservation and development of cultural potential, leads to the harmonization of relations between different countries and people, forcing governments, public organizations and businesses to participate in the preservation and improvement of the environment.

If we consider tourism as a form of recreation, it can be noted that it occupies an important part of the pastime of people, being one of the types of leisure. Tourism is one of the effective means of meeting the recreational needs of the population, and is currently acquiring a mass character. This is due to the growing interconnection and interdependence of countries as a result of the openness, globalization, increase in the international trade and expansion of its scope, covering not only the exchange of goods and capital, but also services. Intensive international contacts, both at the state and individual levels, social communication via e-mail and mobile phones, hotel reservations, transport tickets, and other services ordered via Internet have become typical of the social practices of millions of people around the world.

The implementation of new technologies in the field of tourism has led to the emergence of new types of tourism. Achievements in the field of new technologies allow modern tourists to visit places previously inaccessible to them. A prime example is a space tourism. At present, with certain material possibilities, it is quite possible to visit the orbital space station. Space tourism is a completely new area of tourism, which is just starting to develop. This is the most expensive and, perhaps, the most exotic type of extreme tourism as a trip to the Earth orbit. These are paid from private funds into space or near-earth orbit for entertainment or research aims. There are many people who dream, even though the corner of their eyes, to look at the vast expanses of our galaxy.

## RESULTS

In the distant 1960s now, soon after the launch of the first satellite into orbit, and then the astronauts, everyone quickly believed that the space was conquered. Soon, apple trees will bloom on Mars, and people, as Korolev once said, will begin to fly into space through the trade union vouchers. The rapid development of astronautics convinced many that it will be so! And how could it be, otherwise soon after the flights of Gagarin and Titov in orbit, "multi-seat" ships with a crew of 2-3 people were already cruising. In 1965, Leonov first emerged into open space. In 1969, the first man set foot on the surface of another planet, a year later the Lunokhod traveled along the Moon, transmitting daily and even somehow ordinary images of lunar landscapes. At the beginning of the 1970s, space stations appeared in Earth orbit, where people spent weeks and months doing research and installation work.

However, it was in the mid of 1970s that this development, which was quite visible to the common man, had gone so far, seems to be ending. The stations both flew in near-earth orbit and continued to fly. Outwardly, only their names and the names of the inhabitants changed. Everyone understood that important experiments were being conducted there, but the nuances were not available to non-specialists.

As a result, the seething enthusiasm of previous years gave way to cooling down to the space theme as a whole. It came to the realization that the romantic era of the first flights, apparently completed. In fact, the development of "cosmic" events was directed towards the interests of two superpowers, competing on Earth and therefore immersed in concerns, very far from organizing mass "cruises" to other planets. They needed military space and scientific space.

Perhaps today, when the acuteness of the "big space race" is gone, and the state is ready to "move over" and allow private initiative, allowing private funds into the space industry, the faded dreams of space travel will receive new opportunities for flourishing. Cosmos may soon turn from the object of scientific research into the one of the tourism areas. Earn on sending tourists into space can be a lot. In any case, much more than his scientific research. Specialized travel agencies are already being opened, transports are being developed, designed exclusively for the transportation of tourists into the space. As in any business, there will be competition. Under the influence of competition, the development of any industry goes faster. Therefore, it is worth hoping that in the near future, space will become more accessible. There are several options for traveling to space:

- The first is the comfort. In the cabin there are passengers who want to visit outer space. The device flies over areas of the Earth at the request of passengers, may decrease over what is necessary. Landing in the regions of the poles and other interesting places. Also, the route may include circling the moon and landing on it. At the end of the tour, another group of tourists is taken on board.

- The second option is amazing accommodation. With the help of the spacecraft in a continuous mode, delivery to the orbit of structural elements from which the hotel is assembled. This can be a fairly large hotel, with dozens of rooms and support staff. Recall that it has artificially created gravity, so that problems with a long stay will not. In some rooms, gravity can be turned off, to test the effect of weightlessness.

- The third opportunity is the construction of a habitable complex on the Moon, where there is also the possibility of a long stay. Those interested can visit Mars and live there for a certain amount of time. There are no problems and circled all the planets of the solar system. As tourist trips to various places on Earth have become familiar, so will the same flights within the solar system soon become common.

- The fourth option is the purchase of this device in personal ownership. It is possible to fly wherever you want, when you want and how many times a day. Start and landing occurs from any surface, without any runways.

Most options are possible only in the distant future. But what do we have today?

### **The development of space tourism nowadays**

*Main foreign private companies* are Virgin Galactic, EADS Astrium, Bigelow Aerospace, Blue Origin, Rocketplane, Space Adventures, Scaled Composites.

*Organizations* are Arcaspace, Astronaut Club European, LiftPort Group, Personal Spaceflight, Space Tourism Society, Association of Autonomous Astronauts.

*Successful ships* are SpaceShipOne, SpaceShipTwo, Genesis I, Genesis II.

*Life in space* are Space Station MKS (Space settlement, Space colonization, Space commercialization, Suborbital spaceplane in the future).

Along with the traditional tour operators have appeared a lot of space companies.

1. The most popular company, Virgin Atlantic Airways, is developing a private suborbital machine. Its owner is Richard Branson. He announced the launch of the new space project "Virgin Galactic". This project was created using SpaceShipOne that is a private, reusable manned suborbital spacecraft. The idea of creating this ship belongs to Scaled Composites LLC (USA). Since 1982, the company is engaged in the development and production of experimental aircraft. The aim of its creation was to participate in the competition Ansari X Priz.

At the heart of the construction of the miracle ship was a hybrid engine that runs on polybutene and nitrogen oxide. Inside the cabin you can be without a spacesuit, as it is a sealed chamber with the necessary pressure. A large number of double-layer glass windows, each of which individually withstands ambient pressure, and the content of oxygen, carbon dioxide and humidity, is controlled by different systems. Oxygen is supplied from cylinders, and carbon dioxide is absorbed by a special installation.

On April 1, 2004, manufacturers received a license from the US Federal Aviation Administration. Flight test for Ansari X Priz was scheduled for September 30, 2004.

To a height of 14 km the ship raised a special aircraft "White Knight". At this level, SpaceShipOne disconnects and aligns for 10 seconds. After this time, the ship takes a vertical position, due to the inclusion of the rocket engine, which remains on for about one minute. This minute is enough for the device to rise to a height of 50 km. The remaining 50 km it passes by inertia. In space, SpaceShipOne was about three minutes, moving along a parabolic trajectory. Not reaching the apogee of the trajectory, he removes the wings and tail, for entry into the earth's atmosphere. It descends to an altitude of 17 km, assumes a horizontal position and plans before landing. As a result, the company Scaled Composites LLC received a reward of 10 million US dollars.

In this way, humanity is still one step closer to space exploration. Richard Branson received a license to use SpaceShipOne for private flights.

Later, on March 22, 2010, SpaceShipTwo, the ship for space tourists, also the brainchild of British billionaire Richard Branson and his company Virgin Galactic, passed its first flight tests. SpaceShipTwo Enterprise soared into the sky from the Mojave cosmodrome 110 kilometers from Los Angeles, rising to an altitude of about 14 thousand kilometers. Representatives of the company reported that the first flight, which lasted 2 hours and 54 minutes, was successful. SpaceShipTwo created the American aircraft designer Bert Rutan, the owner of Scaled Composites. That he owns the development of the predecessor of the current apparatus as SpaceShipOne and the carrier WhiteKnightTwo (White Knight-2). As planned by Rutan, the spaceship is fixed between the fuselages WhiteKnightTwo, which looks like a catamaran. WhiteKnightTwo raises the SpaceShipTwo to an altitude of 16 km, after which SS2 undocks and independently takes off to an altitude of 100-110 km into the suborbital space. A spaceship lands like an ordinary plane. The private spacecraft SpaceShipTwo was first demonstrated in early 2008 in New York. At the end of the same year, the WhiteKnightTwo carrier aircraft passed its first flight tests.

The company Virgin Galactic is going to create only 5 spaceships and aircraft carriers. After successful test flights, it will be possible to make commercial flights that are expected to begin in 2012. A commercial tour of duration takes 2.5 hours, of which for six minutes' space tourists will be in a state of weightlessness. Journey into orbit will cost thrill-seekers at 200 thousand dollars, and this is the most budget option. Virgin Galactic has already formed a lineup of customers. 330 people left their applications, reserving seats on the spacecraft and investing \$ 42 million in the project. Pre-payment depends on the wishes of customers. Those who want to be among the first pay the entire amount at once, those who want to get into the first thousand pay between 100 and 175 thousand dollars, and then the rest.

At the same time on board the SpaceShipTwo Enterprise accommodates two pilots and six passengers. Representatives of the company claim that after the start of commercial flights, tourists will go into space up to four times a year.

The creation of an aircraft with a capacity of 3,000 people is predicted. Passing on this ship will be an expensive ticket, worth about 200,000 US dollars. This project should be launched within 5 years. If we dream up a little, we can assume that maybe in 10-15 years these flights will become available to many citizens, and will cost no more than a trip to the sea.

2. A similar project of suborbital flights by 2012 plans to implement the company EADS

The European aerospace concern EADS (European Aeronautic Defense and Space Company), which is the parent company of its better known "daughter" Airbus. EADS has announced a new initiative that will help the group to earn. By 2012, EADS also intends to take up space tourism.

The device with which EADS plans to perform suborbital flights is already under development. It is also known that in the future ship specialized seats will be used, allowing you to feel comfortable during weightlessness and acceleration of the ship.

From a height of 100 kilometers, tourists will clearly see the boundaries of the planet with its atmosphere, perfectly consider the dark blue outer space, and also see the Moon and the Sun as full-fledged space objects, and not because they can be seen from the Earth's surface. After being in the zone of weightlessness, the pilots will turn on the brake motors for 10 seconds, which will slow down the ship. A minute after the ship starts to slow down, it will be in the atmosphere of the Earth, which will begin to actively attract it. In this zone, rocket engines will be disconnected and ordinary aircraft engines will be switched on, which will allow the device to land. These space flights will last about 90 minutes. During this time, the device should reach a height of 100 kilometers and space tourists for about 3 minutes should be in a zone of weightlessness.

In the meantime, EADS has introduced a full-size model of the cockpit of a future spacecraft. The presentation took place in Paris in front of 2,500 invited guests and reporters from industry publications. According to the EADS plan, for 8 years of the programs' work (by 2020) about 15,000 tourists should visit the space.

3. The company Space Island Group in the future plans to build in orbit an entire city from the external fuel storage of shuttles. These huge tanks, about 3,000 cu. meters, which are planned to be modified to meet the needs of the inhabitants, are called "geodes". The project includes two types of stations Zero-Gravity Stations and Partial-Gravity Ring Stations. The first option requires the presence of one geode and more, and the second at least 12.

The idea of similar use of external fuel tanks arose at NASA in the 1970s, at the same time the variant of the project of connecting 12-16 geodes in orbit in the form of a rigid rotating wheel was also discussed. In the center of it should be located a few more geodes connected to the central column controlling the rotation of the station. The central column is designed to receive passengers and accommodate electronic equipment. The inner part of the wheel is divided into 2-3 decks where tourists will be located and where it is planned to create gravity equal to  $\frac{1}{3}$  of the earth level. Of the seven or more geodes, it is proposed to build research stations and small plants for their assembly. A fleet of 25-50 shuttles of the new model will deliver tourists to orbit, each of which will be able to carry almost 230 tons of cargo and about 300 tons of liquid non-toxic hydrogen and oxygen on board. The passenger compartment is designed for 100 seats.

4. The company X prize is created on private donations. Its task is to manufacture a cheap mode of transport for space flights. In order to achieve this goal as soon as possible, an international competition was announced with a prize fund of \$10 million. The competition pursued the idea of creating a space tourism, owned not by the state, but by an individual. An indispensable condition is the rise of the aircraft by at least 100 km (the boundary of outer space). The ship should be designed for three passengers, not astronauts or one passenger and cargo equal to the approximate weight of two more. After the first flight, the ship must be able to make another flight no later than two weeks later. At the same time, in addition to the replacement of fuel, the replacement of ship parts should not exceed 10%. After the second flight, the device must remain in good order as to make the flight again if the need arises. Construction of the ship

should be carried out by a private company at the same private funds. The ship should lift into the air three adults a height of 188 cm and weighing 90 kg. In total, over 20 participants were registered, and from the Russian Federation Cosmopolis XXI takes part in the competition

5. Atlas Aerospace is exploring prospects for organizing expeditions to the moon, believing that from a technical point of view it is not difficult. Today, the possibility of a lunar flight is being studied from an economic point of view, while financial and investment analysis should show when this can be done. However, the preliminary, "earthly" part of the lunar project is already being launched. An installation simulator is being prepared that will simulate the flight to the moon on a real-time basis as fully as possible for ground conditions. "Road" back and forth will take 7 days. In the role of an improvised lunar module, the base unit of the Mir station was used. The crew of enthusiasts must experience all the factors and routines of space flight, except for prelaunch overloads and weightlessness, they will "eat" them in a centrifuge and in an IL-76 LL flying laboratory. On the "moon ship" will be adequately reproduced the external environment, and the "picture" is so realistic that, looking out the window, it is possible to see the stars, the Earth and the Moon in the mode of "running the starry sky". Electron-optical devices imitate the movement of celestial bodies in the same way as when a ship is moving in real flight. Food, sleep, toilet, the whole system of vital activity, oxygen installation will work in space mode. Installation of the installation in Star City was to be completed in January-February 2003, after which the crew immediately began training.

It is worth noting that today the concepts of private space flights, which would be more appropriately called suborbital, have so far developed mainly in the United States and mainly with private funds.

### **PROBLEMS OF THE SPACE TOURISM DEVELOPMENT**

In recent years, projects in Russia and other countries have been formulated and have begun to be slowly implemented, which can be conventionally combined with the slogan "space not only for professionals".

But in the development of space tourism, as in any other form of tourism, there are problems:

1. They owe their appearance to the specifics of the established aerospace market. Today, unmanned cosmonautics brings in revenue launches of communication satellites, navigation, space research platforms that ensure the commercial interests of customers. It is profitable. But piloted astronautics is still unprofitable everywhere in America and in Russia. The enormous costs are associated with the problems of placing a payload into orbit.

The satellite weighs less than a manned spacecraft, which also needs a more "delicate" launch mode, since a person is physically unable to withstand the same overload as a mechanism. Therefore, satellites can be launched in "hard" mode on cheaper carriers, the role of which is suitable for simpler and, therefore, less expensive missiles, including former ballistic missiles. Therefore, the cost of starting at least one person is very high. Even the launch of the American shuttle "Shuttle", which

takes on board 7 people, costs half a billion dollars. Expensive for the trade union voucher! Actually, the market prompted the idea of launching "commercial" astronauts named "space tourists", paying for the "entrance ticket" from 20 million dollars. Therefore, "The future of space flight depends on the ability of individuals for a fee to visit space". This is one of the development problems today.

2. Another problem in the development of space tourism is that today serious financial problems have arisen around the construction of the ISS. Both Russia and the USA are experiencing difficulties, which reduce their participation in the project. Astronautics is a very expensive; it is very problematic to expect some profit or even payback from space research. In this regard, the development of private astronautics is very slow, but still goes. The USA is still the leader in this area. There are many things have been produced for astronautics in private mode. Many private firms are engaged in space taking governmental orders. Moreover, they are developing both launch vehicles, spacecraft, and orbital stations light, cheap, based on new principles that have not yet been used in the history of cosmonautics. Therefore, in the USA, such projects are financing from the private capital.

3. Private astronautics is risky (commercially and technically) for participants. For example, suborbital flights on winged spacecraft, which several companies in America are trying to build, are very unsafe. They declare that before switching to commercial use (tourist transport), it is necessary to carry out about 30 test flights.

4. Moreover, the current ISS station has been defined as a period of 15 years, i.e. until 2012. What does the ISS look like today, which people have already called "a space communal one"? According to astronauts, the station resembles a pipe a hundred meters long: modules go one after another. Everything is viewed; it is inconvenient. Difficulties arise even in the male team. And what can we say about female? The station, of course, is still under construction. It is possible that later will be better.

Those who managed to work on the Russian orbital station MIR, consider that it was more comfortable: there modules diverged in different directions. The base unit, where astronauts have lived, was good. Americans in their segment do not have even toilets, no means of livelihood. Therefore, for the development of space tourism it is necessary to build comfortable space stations for tourists.

5. In addition, despite the fact that space tourists pay millions of dollars, this does not mean that anyone will be allowed into the station. Potential station visitors should be able to read and communicate in English, undergo medical tests, including psychological ones, as well as appropriate training at the training centers in Star City and in Houston. That is, today the availability of money does not give 100% the ability to fly into space.

6. A very serious development problem stands in the way of the implementation of some projects. On the one hand, travel companies cannot fail to attract billions of dollars in profits and the possibility of creating tens of thousands of new jobs in orbit, and on the other hand, there is a state monopoly for human exploration of space in Russia and the United States. According to researches of American experts, this problem can be solved in two ways, which are called "commercialization" and "privatization" of the space.

"Privatization" means that the space stations and ships will belong to the private sector in this case and the state's role will be reduced to the peculiar role of the client. "Commercialization", on the other hand, provides that private companies can only rent, enter into leasing agreements, or participate in the use of systems that are fully owned and controlled by the government. The "commercialization" policy at the moment adheres to the NASA administration, whose representatives allow the only 30% of the ISS commercialization, realizing that injections of private capital may well help in solving some problems of financing space programs. Besides, space tourism is able to provide sufficiently tangible investment in the development of basic science.

## CONCLUSION

For thousands of years, the starry sky has fascinated human beings with its grandeur and infinity. It gave people a crazy dream of flying and the desire to know the secrets of distant galaxies. It was and remains a source of inspiration and creative energy. Up to 2010, the cosmos became closer.

A space touristic industry requires investment and development of initiatives, that is, to act with it as with a normal business project. But while the development is underway to create a special aircraft that can freely leave the limits of gravity and come back. Such space project will be a very expensive, and preparation is required, but potential space tourists will pay in the future all costs. Scientific exploration of space in the world can go to the background due to the development of space tourism. As for the danger that this type of tourism harbors, it is not so great if we take into account the statistics of road and air crashes. The risk associated with flights into the space, significantly outweighs benefits that humanity can receive as a whole. Perhaps, a couple of decades will pass, and space tourism will become as familiar as a bus tour or crew tour.

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