

## BEYOND THE STARS: NAVIGATING THE ECONOMICS OF SPACE EXPLORATION AND COMMERCE

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**Abstract.** Space tourism has experienced significant growth in recent years, with the demand for space travel increasing at an annual rate of 40.2% from 2023 to 2030. Sub-orbital and orbital space tourism are two categories of space tourism. Sub-orbital tourism, led by Virgin Galactic and Blue Origin, aims to pass 300,000 miles and reach the Karman line. Orbital tourism, on the other hand, allows passengers to spend a few minutes in space at a height of 300,000 feet. Space travel offers an unforgettable experience that can impact one's viewpoint and awareness of the cosmos. However, there are some disadvantages, such as security concerns and the high cost of space travel.

**Keywords:** interplanetary economy, space industry, space tourism, suborbital traveling, orbital traveling

### Introduction

Though it has been around for over 20 years, the concept of space tourism feels like something out of a futuristic science fiction movie. Some may remember American businessman Dennis Tito (figure 1) from 2001, when he became the first tourist from the wider community to visit the International Space Station. Due to the enormous 20 million dollars Tito had to spend on his space mission, most of us would only be able to dream of traveling into space through movies and stories.



Figure 1. Dennis Tito – first businessman traveler to space

The idea of space travel fills us with amazement and interest, raising our curiosity. For good reason, this growing business has accelerated in the last several years. The chance of traveling outside Earth's atmosphere and into the infinite reaches of space has intrigued people for countless centuries. This dream is no longer restricted to scientists and astronauts thanks to recent technology improvements, and the idea of achieving it is attractive to anybody [1].

### Interest for interplanetary tourism is increasing

Even though it may appear that only the very wealthy can afford space travel, there are other factors at play as well. Anyone has the chance to participate part in something genuinely outstanding, incredible, and revolutionary. There is no denying the attraction of space tourism—the opportunity to experience weightlessness, see the planet's beauty from afar, and view the globe from a whole new angle.

Recent studies indicate that not just the rich are interested in space tourism; 38% of luxury travelers said they would want to go on a leisure space journey. With affluent travelers between the ages of 16 and 34, that percentage increases to 58%.

Even just thinking about space travel may excite and amaze us. Many see it as an opportunity to live out their childhood fantasies and do things that they could never have imagined. It's an opportunity to experience the extraordinary and move on from the routine. Space tourism offers several opportunities, including suborbital and orbital travel, lodging in space hotels, and even visiting commercial space stations.

We will go into the field of space tourism in this piece, looking at its background, present situation, important figures, and potential future developments. We will talk about the advantages and difficulties of space tourism, as well as how it affects the economy and society and raises ethical and environmental issues. Put on your seatbelt and get ready for takeoff.

### The industry of space travel is developing

Recent years have seen a tremendous growth in the space tourism business, which has the potential to rank among the most expensive in the world. The demand for space travel is increasing, even if the sector is still in its infancy. From 2023 to 2030, it is predicted to rise at an annual rate of 40.2%. The market for space tourism was estimated to be worth USD 695.1 million globally in 2024 and is expected to grow to USD 8,669.2 million by 2030.

Another anticipated growth rate for the government consumer market is 37% CAGR between 2024 and 2030. With a market share of 38.6%, North America dominated the US market as a whole in 2022. The region offers a sizable base for research and development as well as an established structure that has facilitated the quicker implementation of contemporary technology [2].

Sub-orbital and orbital space tourism are the two categories of space tourism (figure 2) [2].

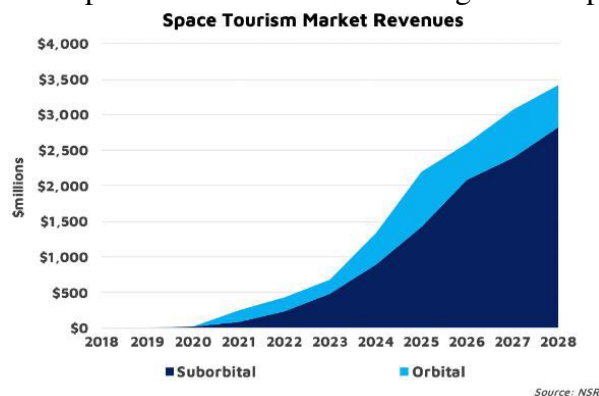


Figure 2. Average income of space tourism

### Suborbital Tourism

With 49.3% of the market share, the sub-orbital sector led the market in 2024. Its goal is to pass 300,000 miles and reach the Karman line, which serves as a standard for defining the boundary between space and Earth. Currently, Virgin Galactic, a subsidiary of Richard Branson's business, and Blue Origin, the company founded by Amazon's billionaire Jeff Bezos, are the two main competitors in this market. Rocket-powered, both businesses' devices can accommodate up to six people at a time. In addition to many autonomous flights with goods on board, Blue Origin has already transported 32 people on the New Shepard, while Virgin has conducted four successful flights but recently filed for bankruptcy after running out of money.

### **Orbital Tourism**

Orbital spaceflight travels far longer than suborbital spaceflight, which allows passengers to spend a few minutes in space at a height of 300,000 feet. At an elevation of more than 1.3 million feet, passengers may expect to stay whatever from a few days to more than a week in space. Due to the promises made by two major firms, Space Adventures and Axiom Space, indicating up to nine seats in orbit will be accessible for purchase by people or groups.

With 49.3% of the sector's volume overall in 2022, the sub-orbital category dominated the market. On the other hand, throughout the course of the estimated duration, the orbital section is anticipated to increase at the quickest rate of 41.0%. As space travel becomes more affordable and more people become interested in the experience, it is anticipated that requests for space tourism will only grow in the years that follow [3].

### **Actual assignments and rivals in Interplanetary Travel**

Despite being relatively new, the space tourism sector already includes a number of significant players: Zero-G,Space Adventure, Boeing, Zero 2 Infinity, World View, Space Perspective (figure 3), Nanoracks, Axiom ,SpaceX (figure 4),Blue Origin. These businesses are working to provide new products and services that will increase the affordability and accessibility of space travel for a larger segment of the population.



**Figure 3. Space Perspective wants to take tourists Figure 4. Elon Musk`s company SpaceX on balloon rides to the stratosphere**

The world's first all-civilian expedition, Inspiration4, was arranged in 2021 by businessman Jared Isaacman, demonstrating the rising interest in space tourism. With no paid astronauts on board, this flight marked a significant advancement in making space travel more accessible to the general public [4].

NASA offered \$415 million in financing to three businesses for the development of commercial space stations. \$130 million went to Blue Origin, \$160 million to Nanoracks, and \$125.6 million to Northrop Grumman Systems Corporation. By offering the infrastructure required to sustain it, these technologies contribute to satisfying the increasing demand for space tourism.

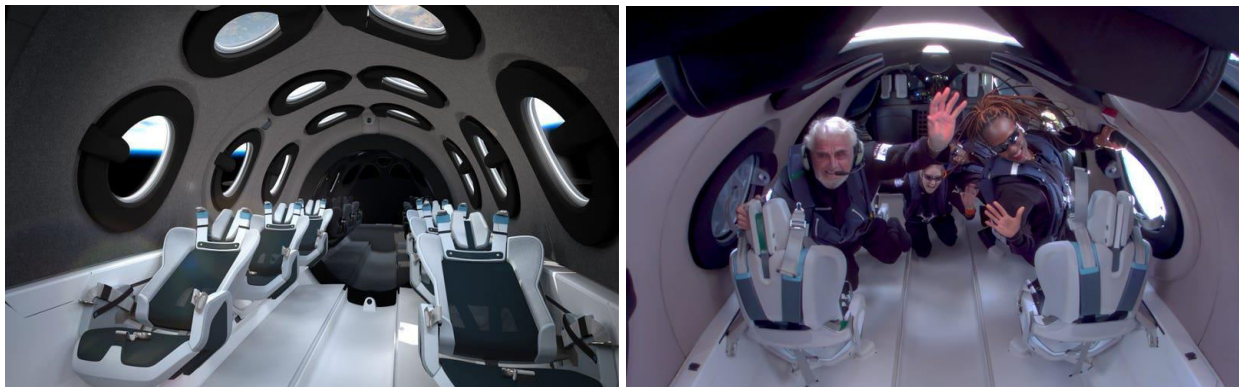
### **Why do we have a high expectation for extraterrestrial traveling?**

Due to its ability to provide a completely new and unique experience that is not possible on Earth, space tourism is growing in popularity. Typical luxury vacations on Earth could provide enjoyment and amusement, but space travel provides an unforgettable experience that could impact one's viewpoint and awareness of the cosmos as a whole.

Traveling into space offers the chance to observe Earth's beauty from an entirely new angle. It allows anyone to see the sensitivity and connection of all species on Earth and to view the world as a whole. Few individuals have ever experienced the sense of floating in space and experiencing weightlessness, which makes it an amazing and unique experience.

It's a personal choice to opt for space travel over a luxury vacation on Earth, but space travel offers an unforgettable experience that can't be found anywhere else. It offers a chance to escape the routine of daily life and set off on a very special journey that may encourage on personal development and self-discovery. In addition, it presents the possibility to develop investigation, technology, and space exploration—all of which might eventually prove advantageous to all of humanity.

Virgin Galactic's second commercial flight took off last month. Space tourists can pay \$450,000 for a seat on one of the company's flights (figure 5).



**Figure 5. Virgin Galactic Spaceship Seats Rotated Back In Space. Jon Goodwin and Keisha Schahaff wave for the camera while weightless inside the cabin of VSS Unity [5]**

### **Complications with traveling to space**

Even while space tourism has many intriguing possibilities, there may be certain disadvantages and unfavorable consequences to take into account.

- **Influence on the Planet:** Space tourism may have an adverse effect on the environment. In addition to consuming a lot of energy, launching rockets and spacecraft can result in considerable noise and air pollution. These emissions have the potential to damage the atmosphere and cause climate change.
- **Security Worries:** Space flight is still a risky activity, and catastrophes can happen. Failure to follow safety procedures does not exclude the possibility of a tragedy, which might have disastrous outcomes.
- **Price:** Space travel is currently a costly endeavor that is only available to the rich. Plenty of people will be excluded from the opportunity to go to space, potentially leading to emotions of inequity and aristocracy.
- **Space trash:** Every spacecraft launch produces trash that may remain in orbit for a long time, and as more spacecraft are launched, more garbage is produced. Even minimal debris can result in damage and cause issues for other expeditions.
- **Resource Consumption:** Energy, fuel, and materials are only a few of the abundant resources needed for space flight. The ecosystem and the availability of resources for future generations may suffer from the depletion of these resources, which might have long-term effects.
- **Law Concerns:** It is unclear who will be held accountable if something goes wrong because the legal framework for space tourism is still developing. Concerns have also been raised on how space tourism may affect international space treaties and legislation.

The sector needs to guarantee sustainability and safety while learning from its past failures and laying the groundwork for future advancements. This entails keeping funding research and development and making sure that space flight is more widely available and reasonably priced [6].

## Conclusion

Creating data-driven, universal indicators for the developing space industry will take a lot of work. More work in that area could be advantageous. Decision-makers, business, and the general public, and aid in their comprehension of the importance of space operations in the broader economy.

In addition, there could be global initiatives to divide the statistics categories for the aviation and spacecraft sectors, as well as drills focused on space-related services (such satellite navigation and telecommunications). To properly define and measure the space economy, case studies evaluating the social and economic effects of space applications in the modern world would be beneficial. Such effort may find momentum through the OECD Global Forum on Space Economics [7].

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