

The Law Communicants Journal (TLCJ)

An International Journal for Multidisciplinary Research

VOL.1 ISSUE 1



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Paper Title: **Space Tourism Sector - The Rational Outgrowth of Adventure Tourism Market**

Publication ID: **TLCJR29UC6DN**

Name of the Institution: **ICFAI Law School, ICFAI University, Dehradun**



SPACE TOURISM SECTOR - THE RATIONAL OUTGROWTH OF ADVENTURE TOURISM MARKET

ABSTRACT

The Space Tourism Sector, as the title suggests itself, is the logical outgrowth of the adventure tourism market that paves a path for the legitimate travellers to become an astronaut and explore space travel for business and recreational purposes. It should be noted that the space tourism sector gained prominence after the orbital and suborbital opportunities became available. This paper is an attempt to analyse whether space tourism is a considerable step in expanding tourism? Whether this segment of the aviation industry covers a large or small segment of consumers who are willing to have space experience? Whether after years of dedication and hard work, this segment would be a turning point for the tourism sector? Whether there is any insurance concerning the lives of legitimate tourists? Whether there are any legal or political issues in space travel? Whether there are any challenges to which the existing legal framework is ineffective to respond? Whether the states should adapt to the current airspace rules or should establish comprehensive regulatory rules/laws for space tourism? Whether there is any long-term approach to the Private Space Mission? Whether there is any provision or precautionary measures concerning the safety of the space tourists? Whether space tourism has been approached widely ignoring the cultural interpretations and the political economy? Whether the future of the space tourism sector is bright or is critical? Whether the future of the space tourism sector is subject to paradoxes in the long run? This paper is an attempt to address all such controversial questions that crossed the minds of thousands of readers.

Keywords- Space travel, Space tourism, legitimate tourists, Private Space Missions, Airspace rules, space sector, orbital space tourism, suborbital space tourism, Outer space legal regime.

THE ORIGIN OF SPACE TOURISM

- **Orbital Space Tourism-**

The birth or development of space tourism was witnessed at the end of the 1990s through a deal between the American Space Company, named, **Space Adventure Limited**, and the Russian Company, named, **MirCorp**¹. MirCorp which was a private venture to generate the income for aging space station maintenance decided to sell a trip to Mir and Tito became the first paying traveler. However, before Tito could experience the space travel to Mir, the decision was taken to deorbit the trip to Mir and the mission was diverted to **International Space Station (ISS)** after the interference of the American Company.

Tito became a world's first space tourist thereby paying \$20 for the trip. The Orbital space tourism experienced continuous growth following Tito's mission by South African and a computer millionaire named **Mark Shuttleworth**² in 2002 and an American businessman named, Gregory Olsen in 2005³. Gradually, space tourism grew over time and there was an increase in the spaceflight participants. Since 2007, the aforesaid American company named, Space Adventures offered the spaceflight around the moon on a spacecraft⁴ named Soyuz for a fee of \$100 million.

- **Suborbital Space Tourism**⁵-

After the industry of orbital space tourism gained popularity, many initiations were made in this direction by the other companies thereby developing suborbital vehicles. The suborbital vehicles were brought in to take tourists to an altitude of 100km/62miles and to make this industry a commercial profitable proposition⁶.

The companies started competing for the Ansari X Prize (a \$10 million reward by the X Prize Foundation)⁷ which is to be given to the non- governmental organization that could launch a crewed spacecraft (reusable) within two weeks.

¹Isaac Levi Henderson, Wai Hong Kan Tsui, *The Role of Niche Aviation Operations as Tourist Attractions* [2019], <https://www.sciencedirect.com/topics/social-sciences/space-tourism>

² The Editors of Encyclopaedia Britannica, Mark Shuttleworth [Septemeber 18, 1973], <https://www.britannica.com/biography/Mark-Shuttleworth>

³ Erik Seedhouse, Space tourism [March 20,3030] <https://www.britannica.com/topic/space-tourism>

⁴ The Editors of Encyclopaedia Britannica, Spacecraft, <https://www.britannica.com/technology/spacecraft>

⁵ Erik Seedhouse, Space tourism, [March 30,2020] <https://www.britannica.com/topic/space-tourism>

⁶PatrickCollins, AdrianoAutino, What the growth of a space tourism industry could contribute to employment, economic growth, environmental protection, education, culture and world peace [June 2010]

⁷Stephen J. Garber, NASA History Web, Ansari X-Prize : A Brief History and Background [February 05, 2010], <https://history.nasa.gov/x-prize.htm>

However, this prize was awarded to the 'SpaceShipOne'⁸ in 2004 which was designed by **Burt Rutan** of Scaled Composites.

Well, concerning the safety and security of commercial human spaceflight in the United States, the **US Commercial Space Launch Amendments Act (CSLAA)** under the sponsorship of the **Federal Aviation Administration (FAA)** was enacted that regulates the safety of such spaceflight⁹. The guidelines, therefore, issues required the participants to provide informed consent while participating in the launch or re-entry.

Whether controlling the working of every company concerning the safety of spaceflight participants was an easy job for the FAA? Whether the safety of spaceflight participants, in any manner, affects the growth in the ranks of spaceflight participants?

It should be noted that at an earlier stage, that is the development stage of the industry of suborbital space tourism, it was difficult for the FAA to control how the company designed their vehicles and also the safety of the participants¹⁰. Further, the rank of spaceflight participants would grow with the evolution of the space tourism sector. Also, the orbital and suborbital spaceflights would inescapably pave a way to the lunar excursions and the missions to Mars¹¹.

THE CULTURAL INTERPRETATIONS IN SPACE TOURISM

Culture is simply a human coping tool that has affected the space future by way of organizational culture. For instance, when NASA¹² was established, it was having cultural biases from diverse organizations. Just like humans develop macro-culture, the organizations also develop the organizational culture¹³. NASA has a unique culture where technological

⁸ National Air and Space Museum, SpaceShipOne, https://airandspace.si.edu/collection-objects/spaceshipone/nasm_A20050459000

⁹ Harvard Journal of Law & Technology, Commercialization of SpaceCommercial Space Launch Amendments Act of 2004 [Volume 17, Number 2 Spring 2004], <http://jolt.law.harvard.edu/articles/pdf/v17/17HarvJLTech619.pdf>

¹⁰ Nick Masters, Senior Analyst, A Milestone for Space Touris, [Jun 11 2020],

<https://www.ibisworld.com/industry-insider/analyst-insights/a-milestone-for-space-tourism/>

¹¹ Tronchetti, F., 2013. Fundamentals of Space Law and Policy. 1st ed. New York and London: Springer Briefs in Space Development, pp. 3-5.

¹² Atkinson, J. D.; and Shafritz, J. M. *The Real Stuff: A History of NASA's Astronaut Recruitment Program*. New York: Praeger Publishing, 1985 & Oberg, J. *Star-crossed Orbits: Inside the U.S. Russian Space Alliance*. New York: McGraw-Hill, 2002.

¹³ Toshiki Hasegawa, The Cultural Effect of Space Tourism on the Space Industry and Society [April 21-23, 1999], http://www.spacefuture.com/archive/the_cultural_effect_of_space_tourism_on_the_space_industry_and_society.shtml

innovation is carried out. It is an organization where people from different backgrounds, missions, and expectations came up together for space development. **But whether the organization culture would help in attaining global peace and space development? If NASA is to provide with the technological starting blocks, then does it have that leading culture for space development or it is imprisoned in that usual technical culture that focuses on the next stage?**

It should be noted that the space tourism sector is influenced by its spaceflight participants who are further dependent on the factor of novelty and culture¹⁴ because culture shapes tourism behavior. The importance of organizational and space culture can be understood through the following-

- **Self-Acceptance-** the space culture provides a sense of self where the self-acceptance is exhibited.
- **Association-** the culture fix organizational relationships and connections as the first lunar inhabitants established the relationship based on professionalism.
- **Values & Beliefs-** the culture shapes the belief system and attitude of people that in turn develops within them their priorities¹⁵
- **Work Pattern-** the work activities carried on in an organization also influences the culture and its direction. The work culture is related to the use of technology and the conducting of economic affairs.

Therefore, the human race is now towards the spacebased culture and not earth-based and the culture is of prominence when space tourism is taken into account¹⁶. The purpose of this article in this context is to bring coherence about the reality of an organizational culture that influences the decisions, plans, working, operations, and activities of an organization, as in the case of NASA¹⁷.

¹⁴ Moran, R. T.; Harris, P. R.; and Moran, S. V. *Managing Cultural Differences: Global Leadership Strategies for the 21st Century*. Burlington, MA: Elsevier/Butterworth-Heinemann, 2007, Seventh Edition (www.books.elsevier.com/business)

¹⁵ Martin Parker and David Bell, *Space Travel and Culture: From Apollo to Space Tourism*, <http://www.gbv.de/dms/mpib-toc/593622715.pdf>

¹⁶ Harris, P. R. *The New Work Culture... Managing the Knowledge Culture*. Amherst, MA: Human Resource Development Press, 1998, 2005

¹⁷ Philip R.Harris, *The Influence of Culture on Space Developments*, <https://space.nss.org/settlement/nasa/spaceresvol4/influence.html>

IS SPACE TOURISM TO BOOST THE TOURISM SECTOR?

The outgrowth of the space tourism sector has undoubtedly proved to be a milestone or a turning point for the Global Tourism Industry¹⁸. It is a matter of pride that the industry which was deemed to be a kind of fantasy for us and an ambitious notion might be a high-paying business in the upcoming times.

The crucial question that arises is **whether the tourism sector is up for the rise of space tourism? Whether the growth of this industry would be able to contribute to world peace and economic growth?**

I understand that this new sector of tourism is beneficial concerning the social and economic aspects. It would result in the creation of more employment opportunities in aerospace and other related sectors. Further, if this industry witnesses growth at large scale, it would make the various space activities feasible and commercial thereby reducing the costs of space travel. It would further reduce the damage caused to the environment by avoiding the 'resource wars'¹⁹ and ensuring the preservation of peace.

THE FEASIBILITY & REACH OF SPACE TOURISM SECTOR

When we consider the space tourism, the pivotal question that arises is that **how feasible and affordable the space experience is? Whether it is going to be economical for all class of people or it is only for the privileged and rich class?**

The travel industry is witnessing a rapid transformation as the space tourists' desire for a unique and extreme experience²⁰. However, affording the excessive prices by all the legitimate travelers who want to even become astronauts is doubtful. It should be noted that space-traveling would not be that economical when considering the commercial markets and not every class of people can have this experience. Being a tourist, we want our safety and fitness; we have a desire for having a memorable experience of floating freely in zero gravity and to discuss the adventure in an informed way

¹⁸ Nadia Drake, The future of spaceflight—from orbital vacations to humans on Mars, <https://www.nationalgeographic.com/science/space/space-exploration/future-spaceflight/>

¹⁹n: C. Brunner & A. Soucek, eds. *Outer Space in Society, Politics and Law*. Wien and New York: Springer: Studies in SpacePolicy Volume 8, p. 493.

²⁰Janez Mekinc University of Primorska, Faculty of Tourism Studies – Turistica, Slovenia janez.mekinc@fts.upr.si Iztok Bončina PhD student at the University of Primorska, Faculty of Tourism Studies – Turistica, Sloveniaiztok.boncina@guest.arnes.si, Safety and Security in Space Tourism, Pg 13-16. <https://pdfs.semanticscholar.org/475e/de8a8041360eab06c74877f6ca00272ac2b4.pdf>

and what not? These aspirations are not bound by the class of people and are just expectations of people. The customer base is small and limited to their income. But if the prices of space travel soon would come down, the market would witness the entry of new customer groups²¹. The growth of this industry is highly sensitive to customer satisfaction and experience²². Therefore, the space operators should provide quality services to its customers such as medical check-ups, food, pre-flight training, and other related services to attract potential customers.

Therefore, commercializing the space travel industry would serve as a major turning point for the development of humankind. But before experiencing space travel, the following questions need to be answered **whether space operators have enough resources to perform the screening of tourists before the journey? Whether the personal interests of operators are superior or the health and wellness of travelers? Whether the journey can be accompanied by space doctors to deal with health emergencies?**

IS THERE ANY CAUTIOUS APPROACH TO INSURANCE AND SAFETY OF TRAVELLERS?

The space industry is now becoming a booming industry of the aviation sector but most of the economic activities are concerned with transporting the broadcasting satellites²³ into the orbit. However, there could be huge liability risks to the companies as ensuring the safety and health of the spaceflight participants has been a major challenge²⁴.

It should be noted that the companies are even eager to launch more valuable orbit but **whether they are complying with the reliable safe transportation methods or the participants are endangering their health? Why NASA always preferred customer safety on their every mission? Whether the companies would be able to mitigate the risks and at the same time manage the associated costs? Do space tourists need special policies on their space travel**

²¹ Katherine Harmon Courage, Can Space Tourism Companies Keep Their Customers Safe and Healthy? [February 18, 2014], <https://www.scientificamerican.com/article/can-space-tourism-companies-keep-customers-safe-healthy/>

²²David B. Sawaya, Graduate of the International Space University, Strasbourg, France and former research assistant at the OECD, Space tourism: Is it safe? [March 2004], https://oecdobserver.org/news/archivestory.php/aid/1242/Space_tourism:_Is_it_safe_.html

²³ International Telecommunication Union, <https://www.itu.int/itudoc/gs/iturcd/74207.pdf>, Pg 1-46

²⁴Kopal, V., 2008. An Introduction to Space Law. 3rd revised edition ed. Netherlands: Kluwer Law International, p. 103.

when the pilots and sky drivers need extra life insurance? Whether the expanding business is open to a pool of unhealthy passengers?

The expanding business of spaceflight to ensure the good health of human specimens should keep their promise to allow only average health participants thereby making this industry a billion industry²⁵.

For instance, in 2014 the fatal crash incident occurred of a test flight named, Virgin Galactic Spaceship that was designed to take the tourists to space. **In such a case, whether the companies should have ensured the cautious approach or the insurers is not concerned about space tourism?** Therefore, after the crash of this spaceflight, it was observed that the US insurance policies exclude space tourism from its coverage which was a loophole then.

However, if we examine the experiences of space travelers till date, the estimation could be made of various kinds of health problems, therefore, encountered by the tourists such as nausea, poor vision, weakened bones, and serious health concerns of travelers with problems of blood pressure as during the takeoff, the body needs high compression.

STATUTORY IMMUNITY TO THE SPACEFLIGHT OPERATORS-

Despite the improved technology or the technological advancements, the effect of spaceflight on the human body is poorly understood. Due to this, it is often certain that the company operators will be faced with significant and noteworthy liability. Also, the absence of a regulatory framework in a new space industry has made this industry pay more of the claims than collecting the premiums for a few past years.

However, the Space Law governs the various space-related activities comprises of certain international agreements, conventions, treaties, and rules of an international organization. **The crucial question arises is whether space law deals with the rescue of astronauts and international cooperation? Whether the space laws deal with the liability and the damage caused by the spaceflights?**

²⁵Kleiman, M. J., 2010. Space Law 101: An Introduction to Space Law, Washington, DC: American Bar Association: Young Lawyers Division 101 Practice Series.

After the NASA Act (National Aeronautics & Space Act) of 1958²⁶ that was signed on July 29, the US space law was codified in several laws. The NASA Administration was made to organize a US civilian space program.

LEGISLATION	OBJECTIVE
Commercial Space Launch Act, 1984 ²⁷	Department of Transportation (DOT) regulates that commercial space launch activities
Land Remote Sensing Policy Act, 1992 ²⁸	Established a regime that regulates commercialization of land remote sensing satellites
Commercial Space Act, 1998 ²⁹	This Act gave DOT an authority to regulate commercial spacecraft and the launches into space
National Aeronautics and Space Administration Authorization Act, 2005 ³⁰	International Space Station (ISS) was established as a ‘national laboratory’ to ensure that its use was not limited to research sponsored by NASA and that the programs of NASA are balanced among space science
National Aeronautics and Space Administration Authorization Act, 2008 ³¹	The main objective was space exploration and that the programs of NASA are balanced among space science, spaceflights, and aeronautics
National Aeronautics and Space Administration Authorization Act, 2010	The change was proposed to the US organized spaceflights programs

²⁶National Aeronautics and Space Act of 1958, 42 U.S.C. § 2451. S.102

²⁷**Commercial Space Launch Act, 1984**, Louis de Gouyon Matignon space law [June 03, 2019], <https://www.spacelegalissues.com/the-commercial-space-launch-act-of-1984/>

²⁸UN, 1961. International co-operation in the peaceful uses of outer space, New York: UN Doc. Resolution 1721 (XVI).

²⁹UN, 1958. Question of the Peaceful Use of Outer Space, New York: UN Doc. 1348 (XIII).

³⁰ Prof. Joanne Irene Gabrynowicz, Director Editor-in-Chief, Journal of Space Law Chief, Journal of Space Law UN/Thailand Workshop on Space Law UN/Thailand Workshop on Space Law“ Activities of States in Outer Space in Light of New Developments Activities of States in Outer Space in Light of New Developments jointly organized by jointly organized by UN Office for Outer Space hosted by GISTDAGISTDA17 November 2010 17 November 2010 Bangkok, Thailand Bangkok, Thailand

³¹ Prof. Joanne Irene Gabrynowicz, Director Editor in--Chief, Journal of Space Law Chief, Journal of Space

Commercial Space Launch Competitiveness Act, 2015 ³²	Several changes were made to the commercial space policy of the US
NASA Transition Authorization Act, 2017 ³³	Concern was on the continuity of NASA in the event of the presidential transition

Despite the aforementioned space laws, the National Defense Authorization Act, 2020 was enacted to create a sixth-military service, that is, the Space Force.

Further, the following are some of the Space Treaties of the UN that govern the activities of space exploration and use of outer space therefore including the moon and the other celestial bodies.

TREATIES/CONVENTIONS	DESCRIPTION
Outer Space Treaty, 1967	<ul style="list-style-type: none"> • Exploration and use of outer space in the interest of all nations³⁴ • Free access to all areas of outer space including the celestial bodies³⁵ • Freedom of scientific investigation in outer space • No placing of nuclear or other weapons in orbit • Use of outer space for peaceful purposes³⁶ • The establishment of military bases on outer space is forbidden • State parties are liable for the damage caused by space objects and also responsible for space activities at the national level³⁷

³² Springer: Studies in Space Policy Volume 8, pp. 224-225.

³³ Sen. Cruz, Ted [R-TX], [115th Congress Public Law 10][From the U.S. Government Publishing Office], 115-10 (03/21/2017)

³⁴ Art.I of the Outer Space Treaty, 1967

³⁵ Art.IV of the Outer Space Treaty, 1967

³⁶ Art.IV of the Outer Space Treaty, 1967

³⁷ Art VII of the Outer Space Treaty, 1967

	<ul style="list-style-type: none"> • Principle of international cooperation³⁸ and non-appropriation³⁹
Astronaut Rescue & Return Agreement, 1968	<ul style="list-style-type: none"> • Render humanitarian assistance to astronauts who are in distress⁴⁰ • To return astronauts to the launching authority⁴¹
The Liability Convention, 1972	<ul style="list-style-type: none"> • Resolves claims for damages caused by space objects⁴²
The Registration Convention, 1976	<ul style="list-style-type: none"> • Maintains a national register of space objects launched⁴³ • Notifies the UN when an object is no longer in the orbit
The Moon Agreement, 1984⁴⁴	<ul style="list-style-type: none"> • Moon explorations to be carried out in the interest of all nations • The moon shall not become a property of any state • Governs the moon exploitation • Preserve and protect the moon's natural resources

THE CHALLENGES & IMPLICATIONS IN SPACE TOURISM

The Space law is a relatively new sector of Public International Law that ensures the access of all the human specimens to have fair access to space. Through an overview of the founding treaties and conventions, the article is an attempt to give a holistic understanding of the emerging challenges⁴⁵ in the space tourism sector.

³⁸Art.V of the Outer Space Treaty, 1967

³⁹Art.II of the Outer Space Treaty, 1967

⁴⁰ Art.2 and 3 of the Rescue Agreement

⁴¹ Art.4 and 5 of the Rescue Agreement

⁴² Art. II of the Liability Convention

⁴³ Article II of the Registration Convention.

⁴⁴Bini, A., 2010. The Moon Agreement in the 21st century. *Act Astronautic*, 67(3-4), pp. 496-501

⁴⁵Tronchetti, F., *supra*, p. 19

Some of the current challenges concerning the space laws are-

- **The increasing role of the private sector in the outer space:** the increasing role of private sector urge the authorities for the review of the existing policies
- **Domestic Laws:** the use of domestic laws demands timely and continuous reforms in the laws to ensure broader engagement with the mercantile space innovation
- **Military Activities:** despite the treaties and agreements, there is a significant increase in the military activities on the outer space
- **Space Assets Protection-** the damage-causing to the space assets is a matter of concern and the moon and the celestial bodies are natural heritage which shall be preserved.
- **Opinio Juris:** the legal regime concerning the Anti-Satellite Weapon invites 'Opinio Juris', that is, the opinion or necessity of a law to ensure the application of the Outer Space Treaty on all the states.

However, there is a clear and dire need to assess the existing legal framework in light of the aforementioned challenges. Further, the new space rules should align with technological developments and new trading space activities.

NEW SPACE-PRIVATIZATION OF OUTER SPACE ALONG WITH SPACE TOURISM

Although the space sector is witnessing exploitation and challenges, the development of this sector is on the way. The hike in the private spaceflights is associated with the 'New Space'⁴⁶. The term New Space can be defined as companies working to open the space frontier to the settlement of humans along by way of economic development.

However, it should be noted that more and more states are undertaking space activities that increase the chances of contradicting international agreements of space. This shows that there is a need to reform the laws to catch up with reality. Therefore, there is a dire need for both public and private regulations to deal with the problems of launch permits and national security. Further, the states are in control of the access to space and they should ensure that appropriate measures are taken to regulate the private users.

⁴⁶Gary, M., 2016. NewSpace: The 'Emerging' Commercial Space Industry", NASA. [Online] Available at: <https://ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/20140011156.pdf> [Accessed 29 08 2021]

The pivotal questions are yet to be answered that Liability Convention states that the launching state is liable for any damage caused to space through its space object but then who is responsible for the incident and who is the owner? Who is the private launch operator and who is undertaking the launch?

Such ambiguities leave the countries to the risk of high payments and compensations and so space tourism raises the most baffling challenge of liability. In the upcoming years, spaceflight operators have to play a crucial role in determining the complications and legal issues. However, it is estimated that private operators⁴⁷ can increase their share in the space industry in collaboration with the government.

THE SPACE TOURISM FUTURE-

Space tourism which was once a mere dream for the people to experience space travel is now one of the booming industries. In 50 years, extraordinary progress has been witnessed in space explorations. **But should we spend money on robotic space explorations or humans?** The increasing role of Private Spaceflights has resulted in more affordable⁴⁸ space travel services and if money is spent on robotic space explorations then what is the major goal in this direction?

The space tourism industry is at its growing stage where multiple companies and operators are entering for future space missions⁴⁹. Presently, there are approximately 70 different space agencies both governmental and non-governmental of which around 13 have the launching capabilities and potentialities. Further, a wide range of opportunities is available where legitimate tourists have a chance to experience a thrill of space tour. In today's time where we are in the 21st century, the objectives of the space companies apart from space tourism have been framed to catch up with the real world. These objectives are of mining of other planets, developing innovative spacecraft & crewed spacecraft, and not only this, but NASA is very ambitious and determined to establish a human presence on the moon by 2028. Further, the US Agency in collaboration with other commercial and international partners is working in the same direction and this mission is known as '*Project Artemis*'.

⁴⁷von der Dunk, F., 2007. Passing the Buck to Rogers: International Liability Issues in Private Spaceflight. Nebraska Law Review, 86(2), pp. 404-405

⁴⁸Sundahl, M. J., 2009. The Duty to Rescue Space Tourists and Return Private Spacecraft. Journal of Space Law, 35(1), pp. 163-200

⁴⁹G. Laferranderie & D. Crowther, eds. Outlook on Space Law over the next 30 years. Hague, London and Boston: MartinusNijhoff Publishers: Kluwer Law International, pp. 363-371

In addition to this, China is even planning a crewed mission by 2030 to the south pole of the Moon and on the other hand, India launched a combined lunar orbit in 2019 through a mission named, '*Chandrayaan-II*⁵⁰'.

The future of Space Tourism is bright and glaring. To launch space-crafts for future missions, both public organizations and private organizations are working in this direction to develop the most suitable and sustainable methods⁵¹. For instance, the new space capsule named, '**Orion**' has been developed by both NASA (National Aeronautics and Space Administration) and the European Space Agency. This capsule was developed to take astronauts from the ISS (International Space Station) vice-versa. It was further developed to facilitate repeat landings on the surface of the moon. It should be noted that the Orion spacecraft was first launched in 2014 in an uncrewed flight.

However, companies such as Virgin Galactic, Blue Origin, and Airbus have begun working on the development of spacecraft to send private customers to space and make them experience the thrill of space travel.

The **Five Future Space Missions** are as follows-

1. Parker Solar Probe⁵²

Description: this space mission was named after Astrophysicist Eugene Parker. It was launched on August 12, 2018, but the objective was not met of reaching the sun and it would not reach until 2025. The main objective behind this mission is to record the observations of the sun and provide error-free data on solar winds.

2. James Webb Space Telescope (JWST)⁵³

Description: this space mission was named after James Webb which is to be launched in March 2021. The objective of this mission is to assess and study the properties of the star system both chemical and physical. Also, to study distant objects and events in the

⁵⁰Elizabeth Howell, Chandrayaan-2: India's Orbiter-Lander-Rover Mission [October 08, 2019]

⁵¹Hampson, J., 2017. The Future of Space Commercialization, s.l.: Niskanen Center Research Paper. Available at:<https://science.house.gov/sites/republicans.science.house.gov/files/documents/TheFutureofSpaceCommercializationFinal.pdf>

⁵² Parker Solar Probe-The Mission, NASA's Parker Solar Probe mission will revolutionize our understanding of the Sun, <http://parkersolarprobe.jhuapl.edu/The-Mission/index.php>

⁵³James Webb Space Telescope (JWST), <https://www.jwst.nasa.gov/>

universe. The type of this mission is a telescope and the operators of this mission are NASA, European Space Agency (ESA), and the Canadian Space Agency (CSA).

3. Mars Global Remote Sensing Orbiter and Small Rover⁵⁴

Description: this space mission was launched in July 2020 and is a robotic rover. This mission is also known as HX-1 which has been operated by China Aerospace Science and Technology Corporation. The main objective of this mission was to land on Mars and to analyze the scope of life on the planet of Mars.

4. Starship⁵⁵

Description: this spacecraft is being developed by the company, named SpaceX to take humans to Mars and the Moon. The original name for this rocket was Big Falcon Rocket which was changed in 2018 to 'Starship'. This mission of powerful spacecraft is the first commercial mission that is scheduled for 2021. This spacecraft has been designed to carry larger payloads into space. In addition to this, the rocket is designed to carry large numbers of crew members into space and this spacecraft is aiming at reducing the costs and reusing space explorations in the future. This rocket further has a carrying capacity of 100,000 kilograms.

5. Breakthrough Starshot⁵⁶

Description: this spacecraft is to be launched around 2036 and the mission is operated by Breakthrough Initiatives. This spacecraft named, Breakthrough Starshot is an engineering project that aims at sending 1000 tiny spacecraft in a journey to Alpha Centauri thereby lasting 20 years. The objective of this mission is to achieve and acquire interstellar travel and to test the likelihood and possibility of ultra-fast space travel. It should be noted that the project is still in its infancy.

The company named Blue Origin which is founded by Jeff Bezos, the CEO of Amazon is also nearing its first spaceflight with the human travelers and in this direction, and the company is developing New Shepard Rocket System for its space tourism business. In addition to this, NASA's future would continue to be a tale of explorations of space, technology, and humans.

⁵⁴Mars Global Remote Sensing Orbiter and Small Rover, Global Remote Sensing Orbiter and Small Rover [July 23, 2020],

⁵⁵ Starship Service to Earth orbit, Moon, Mars and beyond, <https://www.spacex.com/vehicles/starship/>

⁵⁶ Yuri and Julia Milner, Breakthrough Starshot [2015], <https://breakthroughinitiatives.org/about>

NASA works in the spectrum of aeronautics has made a remarkable contribution in the fields of aviation, economic growth and development, and national security. Hence, the space explorations not only involve the physical exploration of space but also the telescopic exploration and in the near times, the humans would no longer be earth-bound. The new era of space law is yet to come by creating sound and long term plans. After years of hard work, dedication, focus, determination, and research, the space tourism industry would be a turning point for the tourism sector at both the national and international levels.

Therefore, the space tourism sector will become acceptable, sustainable, and mainstream with proven technology, increased capacity & capabilities to launch space objects into space, and reduced costs. With the advent of the number of commercial space ventures, this sector of the aviation industry has the greatest potential in the adventure tourism market.

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2. Allianz SE & Munich, *Travel Insurance for Space Tourism*(November 15, 2011), <https://www.allianz.com/en/press/news/business/insurance/news-2011-11-15.html>
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