

# Space tourism: a look in the past and future



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Space tourism is tourism in which participants pay for flights into space.

Space Tourism is the term that's come to be used to mean ordinary members of the public buying tickets to travel to space and back. Many people find this idea futuristic. But over the past few years a growing volume of professional work has been done on the subject, and it's now clear that setting up commercial space tourism services is a realistic target for business today.

It's a distinct category of "space travel" which also includes travel in space for work purposes - to date, mainly by government staff. In recent years it has been observed that, although governmental space agencies are not interested in space tourism, it is an objective of development of space activities and will help considerably in funding the space operations or activity.

A report published by NASA - "General Public Space Travel and Tourism" in March 1998, endorses the idea of space tourism; pointed out that it is going to start sub-orbital flights; that it promises to be a much wider market than space launch.

Although space tourism had come up in a number of science fiction stories, it is an astonishing fact that in almost none of them, tourism is portrayed as more than a small-scale activity greatly overshadowed by government space missions - military operations, scientific research, defence, etc. This is a good example of how the Cold War pattern of space activities has paralyzed the public's imagination. That is, government organizations carrying out monopoly "missions" in space ostensibly for the benefit of the taxpayer and

created a fixed image of what are space activities, which has dominated the imaginations of scientists and engineers, politicians, the media, and the general public for several decades.

The price for a flight to the International Space Station is US\$ 20-35 million. The space tourists or the spaceflight participants as called by few, usually sign contracts with third parties to conduct particular research while in orbit. This helps to minimize the expenses.

Infrastructure is being developed for a suborbital space tourism industry through the construction of spaceports in various parts of the world, including California, Oklahoma, New Mexico, Florida, Virginia, Alaska, Wisconsin and Esrange in Sweden as well as the United Arab Emirates. Some prefer to use the term “ personal spaceflight” as in the case of the Personal Spaceflight Federation. A number of startup companies have sprung up in recent years, hoping to create a space tourism industry. For a list of such companies, and the spacecraft they are currently building, see list of space tourism companies. Russia halted orbital space tourism since 2010 due to the increase in the International Space Station crew size, using the seats for expedition crews that would be sold to paying spaceflight participants. However it is planned to resume in 2012, when the number of single-use three-man Soyuz launches rises to five flights in a year.

### **Dispute over the terminology of “ space tourists”**

Dennis Tito, Mark Shuttleworth, Gregory Olsen, Anousheh Ansari and Richard Garriott have conveyed their desire to be called something other than “ space tourist”. The reason accorded was that they carried out scientific

experiments as part of their journey. Garriott has expressed his opinion to be called as “ private cosmonaut” or “ private astronaut. Tito prefers to be known as an “ independent researcher” and there are many terminologies proposed by others as well. Charles Simonyi is the only one who seems to have no issues about calling it “ space tourism”. However, it is important to note here that even the Outer Space Treaty or the other relevant conventions do not provide with an appropriate definition.

NASA and the Russian Federal Space Agency have agreed to use the term “ spaceflight participant” to distinguish space travelers from astronauts on missions coordinated by the two agencies.

There is a notion that space tourism has a potential of being burgeoning industry that could further the development and settlement of space and so a need to settle the objections on terminology.

## **Growth of an Early Dream: Harnessing Potential**

The economic promise of space tourism has been discussed in some detail in earlier papers. Its potential to grow into a large-scale airline-like business was described in 1986[1]. Based on a wide range of related research that has been published in the intervening 20 years, the potentially important economic benefits were described with detailed supporting evidence in 2006[2]. The major points are summarized briefly here.

The 2001 orbital flight by Dennis Tito on a “ Soyuz” rocket demonstrated the remarkable fact that, despite having spent the equivalent of \$1 trillion since the same type of rocket launched the first satellite in 1957, the government space agencies of the OECD have not reduced the cost of getting to space at

all in half a century. Soyuz remains the cheapest and safest means of space travel.

The 2004 flights of SpaceShipOne further demonstrated that sub-orbital flights could be made at a cost of about 1% of the expendable rockets used by space agencies, and that commercial passenger services could in principle have started in the early 1970s, if not earlier. From the economic point of view this would have been very desirable, creating new industries and employment. Consequently it is clear that governments' "space policies" have been responsible for a delay of 40 years so far in exploiting space travel economically.

Studies by Asford and Collins[3], the Japanese Rocket Society ( JRS)[4], the Space Transportation Association (STA) and NASA[5], Ashford[6], Bekey[7]Futron (for NASA)[8]and others have increasingly showed that space travel could grow into a large new business activity; that it could reduce the cost of traveling to orbit by 99% or more; and that this could lead on to other valuable activities such as CO2-free energy supply from space[9]. Reducing launch costs sharply would also enable large-scale economic development in space, contributing greatly to the resolution of global environmental problems, and removing the justification for "resource wars" by making the limitless resources of space economically accessible. It could also have important cultural benefits[10].

It is also important to recognize that, from an economic or business point of view, the space industry is today very unhealthy. Employment in rocket engineering in the USA fell from more than 28, 000 in 1999 to less than 5,

000 in 2002[11], while European space industry employment fell by 20% from 1995 to 2005[12]. The “bottom line” is that, like any other industry, unless the space industry starts to supply services that can grow to be sufficiently popular with sufficiently large numbers of the general public to reach substantial economic scale, it cannot become a major commercial activity, and will continue to impose a heavy burden on taxpayers.

## **Accruing Benefits: Advantages**

### **Research benefits**

For one it is an important to discuss as to why so much emphasis is given on space tourism and the purpose of space tourism. Space development, exploration as well as cultural renewal is the prospect of space tourism. The Space agencies have sufficient justification to contribute greatly to the development of space tourism, since it is their existing legal responsibility or the duty to encourage the commercial use of space. Such agencies could contribute in different ways which are closely related to their existing fields of work, which include appropriate research, technology development, education, and legal activities. The space agencies could possibly contribute through their research to short-term orbital stays by average people, treatment of minor-ailments in gravity and so on.[13]

Till date no government space agency has provided more than minimal support for space tourism-related research, the resistance within space agencies is still far stronger than those favoring such efforts. This reluctance of government space agencies has adversely affected the budgets allocated to such activities which include space tourism. However, this situation is fast changing due to two ongoing trends. First is the worsening economic

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situation which has led to the increasing need for development of new industries to reduce world-wide unemployment. Thus there is a lot of economic potential in such commercial activities which should be beneficially utilized.[14]

And secondly the participation of private players in space tourism activities is educating the public about such economically very valuable new space activities that could be developed without burdening space agencies' budgets.

### **Economic benefits**

Under democracy and capitalism, if there is substantial demand for a particular service which is not threatening to some sections of society, people and agencies freely supply it. However, the development of commercial space activities like space tourism services will provide great economic and social benefits for humanity than any business opportunity because of its potential to grow as large as aviation and even more.[15]

It has been reported that many of those involved in government-funded space activities and also politicians view space tourism as “ a waste of money and resources” or not worth investing in because the return on investment may be very low.[16]Tragically, space agencies themselves rather than the general public decide what technology is developed. As a result space activities remain a burden on taxpayers instead of a source of profit for the economy and the public loses interest in any kind of space development.

This is a serious fallacy because in future such space tourism services have the potential to become a popular new branch of the leisure and travel industry with the help of advanced aerospace technology, the economic effects of the growth of such activities will be very positive, not only for companies but also for world economic progress and society as a whole. Moreover under its influence, “ space development” will resume its natural meaning of economic development in space, instead of its present meaning of development of government-selected technology and there use in space, generally without economic benefit.

### **Challenges Confronting Space Tourism**

Commercial space activities today are mainly limited to communications, broadcasting and observation satellites. The decline in the commercial demand for satellites has lead to contraction of the commercial space industry and also to the need to develop new space markets if the space industry is to grow. Since there is no other space activity that offers any greater potential for growth, space agencies’ anti-space tourism stand is growing increasingly untenable.

Thus in line we have certain challenges that again pose a threat to the development and growth of space tourism. Cost is one of the biggest challenges as such space travel by tourists is limited only to rich people till now. OECD space agencies have spent approximately \$1 trillion since 1961 without any reduction in the cost of getting to space at all. This clearly reveals that space agencies have not been trying to cut the cost of getting to space. The fact is that the space agencies do not know how the cost of space flight can fall, because they have not studied the possibility. This strongly

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suggests that the cost of access to space as performed by space agencies in orders of magnitude is higher than it needs to be.[17]As further evidence of this, NASA is proposing to expend \$14 billion for developing an expendable capsule of comparable capability to the Apollo capsule 40 years before, though possibly carrying more passengers. This vehicle would have a cost many times higher than Soyuz and would have no economic value.[18]

As a consequence, unless they accept that there is an urgent need to reduce costs as far as technology allows, and to observe space tourism as the only activity that offers to link the economic energy of consumer spending on space development, space agencies' role in the future development and exploration of space is likely to shrink progressively. Ultimately, by reducing the cost of space activities, the development of space travel will lead to the permanent and progressive expansion of human culture into space. However; this will also require institutional change.

As already discussed that space agencies focus more on development of satellites and the recent decline of commercial demand for satellites has led to rapid contraction of the space industry, of which the annual revenues are now barely 2% of the \$1 trillion of cumulative expenditure made by OECD space agencies to date.[19]Thus it has become a strong notion that the agencies spend every year on space activities which are neither profitable nor lead to development of commercial space activities. In summary, space agencies' negative stance is not economically justifiable; it is based on political calculation. Thus any kind of political considerations as well as stance of politicians play a vital role in discouraging such activities. So all

this needs to change and the space agencies should remember their statutory responsibilities.

## **Insurance Industry and Space Activities Linked**

As space tourism matures, it shows a picture of tremendous opportunity for “insurance companies” to offer coverage to space travelers, a much similar activity to what they carry out in airlines. Neither in space law or air law has the contract of insurance been regulated on an international level. Space Insurance has, however been available from private sources from a number of years. Space Insurance concerns especially communication satellites. The first insurance satellite contract, written for Intesat’s Early Bird’ in 1965, provided pre launch coverage. Pre-launch coverage will cover risk associated with the manufacturing and transport of satellites, but cover for the launch itself is also available. The two forms may include the risk of loss or damage to the space object and the risk of loss or damage to the on-board equipment. Regarding the insurance of spacecraft, I would like observe the following: insurers play a very important role, reducing the financial risk, which will make parties more willing to finance spacecraft. The problem is that the companies would like to see the result first[20].

International conference on space business, was organized as part of Bengaluru Space Expo 2010, where speakers scrutinized that since Yuri Gagarin’s flight in 1961, 38 citizens from all over the globe have flown in space. Most of the individuals till date who have flown either were astronauts, military personnel or scientists who have been expensively and extensively trained, but as of now, one will also see the emergence of ‘space tourism’ with space access for private individuals.

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S Ramakrishnan, Director of ISRO's Liquid Propulsion Systems Centre, said that apart from satellite and space launching sector, personal space flights, space tourism and other space tourism activities are emerging as a possible market for insurance industry.

Ramakrishnan referred to the successful ' Spaceship-I' venture, and the Spaceship-II which is expected to take place shortly.

These initiatives are currently being catered to only ' select people who enjoy the adventure spirit'; they are perhaps ' paving the way for possible sub-orbital trans-atmospheric passenger and cargo transportation systems with commercial potential in not too distant future'.

At a session on risk management for space ventures, it was pointed out that risk cover in space tourism is possible, and something we can imagine. It was also pointed by Ramakrishnan as to the change in policy direction in USA- NASA in handing over of the earth orbit transportation sector to private sector, which has also been taking separate and promotional initiatives in this regard.

As space tourism matures into personal space transportation system, it can be foreseen that what happened in beginning of the airline business (when insurance players started offering insurance cover for passengers) is taking the same turn in space tourism. Executive vice-president of ISB, Tim Wakeman, speaking on risk and insurance solutions for space ventures in the 21st century, said, within India, the space industry is thriving and contributing around `10, 000 crore(`100 billion) per annum to the Indian economy. He said it is a good time to buy insurance for spacecraft as market

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conditions are favorable with premium rates declining and availability of insurance capacity is going up three-four times the demand.

While space venture promises huge returns with an evolving sector, the execution risks are far too high.

Risks involved in space sector are related to industrial, technological, commercial, financial, legal and in particular, insurance.

Officials said that the time is ripe to share the risks and returns with other stakeholders who plan to enter business in space activities. Also it was said that despite the recent economic depression, the global space industry remains robust and healthy, United States' decision to emphasize on commercial resupply of the International Space Station and reallocation of fiscal resources from Space Shuttle or manned space to earth observations and exploration.

India's space industry is registering explosive growth, with many opportunities for indigenous and foreign suppliers to help further develop the country's communications and positioning, among other things. The above statement was made by Tom Captain, vice-chairman, Deloitte LLP, Global Aerospace & Defence Sector Leader.

A report released by CII-Antrix-Deloitte during the conference said the spending in space activities is expected to increase by an average of 14.8 per cent annually in India over the next four years and estimated to be `10,000 crore (`100 billion) by 2014. India is ranked sixth currently; globally in

terms of technological capabilities and space budget, behind the US, Europe, Japan, Russia and China, as mentioned in a New India Space Market Study.

## **Legal Regulations concerning Commercial Activities in space**

In near future space tourism will become the domain of private enterprises. However, commercial activities not necessarily need non-governmental or private participation. But for some reason it is the private enterprises that have supported the idea of space tourism until now. Space Tourism revolves around public interest and public welfare which in turn creates a tremendous need for manpower. Thus the states should support and provide adequate platform to private enterprises.

Now a big that follows is which law will govern such private enterprises carrying out such activities. National law and International law both can be made applicable. Here we will be focusing only on international regulations that govern such entities. However, this takes place in an indirect way i. e. government and non-government bodies sometimes delegate certain tasks on private enterprise, Therefore the legal conditions regarding private activities in outer space have to be examined.

## **Relevant Space Law treaties, Agreement and Conventions.**

### **Outer Space Treaty of 1967**

The Outer Space Treaty is taken as the backbone of international space law. When the said Treaty was created and came to force there was no clue as to direct private activities in outer space. Nevertheless the Outer Space Treaty does not disregard private activities in outer space altogether. Art. VI and IX

of Outer Space Treaty can be referred in this context. Moreover Art. I of the treaty mention the freedom principle and include the right of free access, the right of free exploration, and the right of free use. This freedom is only granted to the States.[21]

United Nations has also deliberated on this issue through its resolution 1962(XVIII) of the General Assembly entitled “ Declaration on Legal Principles Governing Activities of States in the exploration and use of Outer Space”. On the same lines Soviets have also proposed that “ all activities of any kind pertaining to the exploration and use of outer space shall be carried out solely and exclusively by States”.[22]

The Outer Space Treaty also stipulates the principle of “ exploration and use of outer space” and so space tourism comes within the scope of “ use” in this context. It is important to note here that no provision in the treaty mentions “ commercial”. Art. VIII of Outer Space Treaty gives jurisdiction, ownership and control over the space object and its personnel in outer space into state’s hands. Although the Outer Space Treaty mainly discusses States Parties it has a ruling effect on such activities by private enterprises. Art. VI of Outer Space Treaty stipulates a national State responsibility for outer-space-activities carried either by a governmental or private organization. [23]Thus risks of space tourism could finally fall on states and they can be held liable. Such a legal situation is not satisfying for the State Parties or for the private enterprises engaged in space tourism.

## **Liability Convention**

The Liability Convention was created as a consequence of Art. VI Outer Space Treaty i. e. the responsibility-principle. Art. II of the Liability Convention makes the launching state absolutely liable to pay compensation for any kind of damage caused by its space object on the earth surface or to aircraft in flight.[24] Article III of liability convention and IV of Outer Space Treaty provide that if the damage is caused elsewhere other than the surface of the earth, the launching state shall be only liable in case the damage is due to its fault or the fault of persons for whom it is responsible which covers non-governmental entities as well. The launching state is absolutely liable and is liable in different degrees of fault, but in final consequence the state is liable for damage caused by a private enterprise.[25]

This adversely affects space tourism as the states refuse to allow private enterprises to perform space tourism, or that states set up exaggerated requirements. However, the Liability Convention must be considered as insufficient with regard the aspect of settlement of claims. Therefore it is suggested that the potentially unlimited liability of states mentioned in liability convention should be replaced by an international agreement that stipulates a limited and guaranteed maximum-amount-liability for such activities.

## **Registration Convention 1975**

The Registration Convention has two main functions i. e. to coordinate launches and to ensure identification of the launching state in respect of the Liability Convention. Private enterprises that want to carry out space tourism have to comply with this procedure. The problem occurs when a launching

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state is not a Member State of the Registration Convention. Thus this problem needs to be resolved for avoiding any kind of conflict.[26]

Further in line we have the Moon Agreement and the Rescue Agreement that can also be referred while dealing with the legal issues involved in space tourism. Taking into consideration the present situation where there is no specific law that deals particularly with space tourism and at the same time presence of insufficient laws on outer space make the situation worse. Thus there is an immediate need to enact legislation for commercial activities in outer space such that states supervise the outer-space-activities of their governmental organizations or private enterprises. Another solution is to create an international treaty that grants an equal standardization and leads to more transparency and reliability for private enterprises in space tourism or any other commercial activity in outer space.

## **Environment concerns**

Environmental concerns in case of space tourism cannot be avoided and is a big area of concern. Space-touristic traffic can have an effect on the environment on earth. However, newly-developed transport-systems which resemble more like aircrafts will work more efficiently and therefore less polluting. Art. IX of Outer Space Treaty also talks about the preservation of celestial bodies' environment that might be interfered by space tourism. Accumulation of debris can also pollute the outer space environment.[27]

Thus keeping in mind the common-heritage-principle space tourism has to comply with environmental standards.



## **Conclusion**

Humans have outgrown the Earth several decades ago. Now it is time to correct the view that deceived both government and the public into believing the myth that space is a barrier rather than being full of opportunities. There are prospects in future for the start of sub-orbital passenger space flight operations from newly- developed commercial spaceports. Thus in order to maximize the benefits of this opportunity the public in many countries have to compel their governments to make relevant institutional changes which are needed to overcome the long stagnation of space activities maintained by the space agencies only and their clients who profit from present arrangements.

Space tourism contains aspects of space transportation, manned space flight, and commercialization of outer space. Considering the loopholes in the existing laws there is an immediate need for a regulation, be it a treaty, to deal and cover conflicts and disputes that may arise. On these lines, there have been efforts made to create an agreement, to mention one, e. g. the Draft Convention on Manned Space Flight. Moreover, the approach of international space law needs to be properly re-defined and reconsidered to enable private enterprises to directly perform such commercial activities.

The time has come to recognize that, far from being an eccentric or even misguided “ fringe” activity, space travel and tourism should already be the mainstream – and it would have been but for the huge economic and social deviations caused by the cold war. But instead of being the passive victims of history – specifically of unfortunate incidents such as the cold war which destroyed vast quantities of resources, killed millions of people, and

seriously stunned the development of the space industry to turn the focus on missiles and expendable launch vehicles developed from them. Initially this increased the rate of development of expendable rockets capable of delivering heavy payloads to orbit, and thereby increased the rate of first crewed flights to orbit. The after effect of this, was, that, civilian space activities based on expendable vehicles became a victim of cold war politics, and are still dominated by government space agencies' political agendas, rather than generating economic value.

The growth of " Space Tourism Movement", which can be reasonably called so, is going to have a huge beneficial cultural effect, which will widen human horizons as appropriate for the 21st century. Under its influence, " space development" is going to resume its original meaning of economic development in space, instead of its present meaning of " development of government-selected technology for use in space", generally without economic benefit. And the " space age" will have its original meaning of the period when people go to space - as passengers, customers, employees, operators, managers and tenants but for government employees. As such, tourism is not going to be just a small part of future space activity, a small-scale activity even made smaller by government space agencies - it is going to be the mainstream and highlighted space activity. Already it should have been the main focus of the government agencies by now. It is an extraordinary and a non performing idea that private citizens traveling to and from space should not be the main activity in space. The idea that government knows better than the general public as to how their money should be spent is fundamentally a Soviet one[28]. But even after consuming

\$1 trillion on government space activities with no commensurate economic benefit to taxpayers, it is high time for the general public to insist that this mistaken policy be reframed and their demands be made significant to space development, as they are in aviation industry.