Forum: The Fourth General Assembly

Issue: The question of regulating commercialized space travel through sustainable development

Student Officer: Neal Bhatia

Position: President Chair

Introduction

Throughout history, humanity has made strides in the research and development of space travel. As of 2022 there have been 366 human spaceflight missions and over 1500 unmanned missions. While the research and development of space travel has been ongoing for just under a century in more recent years commercialized space travel has been pursued. Commercialized space travel refers to traveling into space for recreational purposes. In the last decade alone there have been numerous commercialized space flights including Virgin Galactic, the world's first commercial spaceline. While the United Nations along with an amalgamation of governing bodies have created legislation for space travel there is no specific enforcing body operating in celestial regions imposing these regulations.

In 1962 The General Assembly adopted the resolution" General Assembly resolution 1962 (XVIII) of 13 December 1963". At first it was highly debated whether or not legislation should be developed; however, this resolution was adopted without a vote by The General Assembly. The resolution was aimed at setting a standard for space flight, and addressing the many concerns states on space travel as a whole.

Ever since commercialized space travel more often referred to as "space tourism" has become more abundant in society, more issues and bewilderment have occurred. Antonio

Guterres, the United Nations secretary general, stated that he was perplexed and bewildered on the reasons behind commercialized space travel as it had no positive impact on humanity. Commercialized space travel can be perceived as the growing difference between the affluent and the poor. Commercialized space travel is detrimental for the environment in addition to providing little advantage to humanity. If space tourism continues and increases in scale without being regulated, it could generate barriers towards achieving the UN's SDG's (Sustainable Development Goals).

.Definition of Key Terms

Commercialized Space Travel

The act of traveling to space for recreational purposes

Development

The process by which something is created or advanced in terms of effectiveness or efficiency

Emissions

The discharge of a certain substance into an environment such as gas

Legislation

The process by which laws are made or enacted

LEDC'S

Lesser Economically Developing Countries- Countries which are not in a good state economically and struggle to provide for all of their citizens

MEDC'S

More Economically Developed Countries- Countries which are in a good state economically and have enough economical resources to support their nation

Space flight

The application of aeronautics to fly to space

Space tourism

A niche market where people pay in order to visit space just as a tourist would visit a country

Sustainability

The ability to make use of natural resources whilst avoiding the depletion of these natural resources

UN SDGS

Sustainable Development Goals- These are 17 goals which the UN aims to achieve by 2030 in order to create peace and prosperity on the planet

Key Issues

Lack of international legislation on commercialized space travel

As of today a set of rules and regulations are overseeing all space travel ensuring, no spaceflight activities cause any detrimental consequences. Commercialized space travel is a relatively new concept and as of 2027 the world's first space station with tourist accommodation is set to be unveiled. With the many commercial initiatives set to be implemented it is important that standards are set and legislation directed at the commercial side of space travel is to be implemented. While many resolutions have been passed on spaceflight as a whole, there is limited reference to personal space travel or commercialized space travel, creating a gray area for spaceflight companies to operate in. Questions of liability, development and exploitation.

Liability

International law does not specifically state the liability of “space tourists” or non trained astronauts visiting space for commercial purposes. This causes confusion as to the liability of passengers and any damage caused to commercialized space

travel facilities. As of today there are no UN resolutions which are explicitly aimed at this issue causing tourists to be liable to their operators' terms of service. This creates questions of the ethical aspects behind the operators terms of service and the economical factors. Additionally, in terms of liability for damage caused due to negligence, or errors by passengers, there is no insurance service providing coverage on this.

One more aspect of liability is the liability of the space tourist. United Nations resolution "1962 (XVIII). Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space" operative clause 9 states that "*States shall regard astronauts as envoys of mankind in outer space, and shall render to them all possible assistance in the event of accident, distress, or emergency landing on the territory of a foreign State or on the high seas. Astronauts who make such a landing shall be safely and promptly returned to the State of registry of their space vehicle.*" While this resolution did make it clear that astronauts shall receive aid from any available party in events of distress and upon re-entry into earth it is unclear whether this applies to space tourists. The question of why governments would be willing to spend their GDP to rescue space tourists could also arise.

Development

As commercialized space travel is developing more national governments are looking to implement legislation explicitly on commercialized space travel. However, as of today international space law does not define the legal status and rights of commercial space flight passengers. If legislation were to be suddenly implemented it could cause problems in terms of the research and development of commercial space travel. This is due to the reason that if laws are implemented

too early on and they are harsh, space operators may have to change their projects in order to cope with newly constituted legislation. This could have numerous economical as well as social impacts on the operator of the commercial space line and the passenger. In turn this could curtail innovation in terms of space tourism.

Exploitation

As of today space tourists are required to travel in compliance with the terms of service of their operator due to the simple reason of there being no international laws or guidance on commercialized space travel. This could lead to the operator's terms of service being very exploitative in nature whether it be in terms of the price or the quality of the service provided. As of today a seat on Virgin Galactic's commercial space liner, which takes passengers up to 50 miles in height, and includes a few days of training, costs 450,000 dollars. This amount is very high due to the fact that the market is niche and there is a lack of competitors. Since the market is very niche it is easy for corporations to monopolize themselves and due to the lack of legislation become an exploitative business.

Consequences of commercialized space travel

Entering the 21st century commercialized space travel has taken the world by storm. A couple dozen companies have proposed plans for space tourism in the coming decade. As of now there are 3 dominating companies (Spacex, Blue Origin and Virgin Galactic) which own a majority of the market share in this upcoming industry. As these companies enter into a new space race of bringing people to space for recreational purposes numerous concerns have arisen. The environmental and economical impacts are being questioned as well as the ethicality behind space tourists. This is due to the simple reason that space tourism can be seen as an act of displaying wealth and power in the eyes of many.

Environmental consequences

A study conducted by the aerospace corp in 2010 revealed that soot released by 1000 space tourism flights could warm Antarctica by nearly 1 degree celsius. This could exacerbate climate change as a whole. The paper also mentioned that eventually this soot would accumulate around 25 km above the earth cooling the surface of the earth by approximately 1.2 degrees fahrenheit while Antarctica would warm up. Equatorial regions could lose up to 1 percent of their ozone layer while the poles could gain upto 10% of their ozone layer. With this information it can be interpreted that the soot produced from these rockets contribute to atmospheric heating at a greater rate than the carbon dioxide emitted from these rockets. However, the paper also acknowledged the use of hydrogen based fuels and came to the conclusion; if hydrogen based fuels were used the soot produced would be 1/10th of the fuel produced using carbon based fuels. Due to the lack of regulations on commercialized space travel even if space tourism has disastrous impacts on the environment space liners can choose to ignore these.

Economical consequences

According to a model produced by Morgan Stanley by 2040 the value of the space tourist industry could be an estimated 1 trillion dollars. While this industry will generate large sums of revenue for the many companies running the industry it would have major economic drawbacks on the planet earth. Firstly, governments would have to spend more of their GDP on regulating this industry and this could be a significant cost which LEDCS would have to incur. The expanding economy would mean that the externalities produced due to the production and consumption of spaceflight would occur on a much larger scale. This would increase the socioeconomic gap between people increasing the gap between the affluent and the poor. One final economical factor which could occur as a result of an increase in the scale of space travel is the governmental spending in order to ensure rules are being followed. Governments would have to invest in capital and equipment which can help them regulate these space tourists and this in turn could cause an increase in expenditure for the average taxpayer.

Ethical implications

As of today space tourism has no benefit to humanity other than the sole purpose of experiencing the feeling of being in space. While this may provide for a thrilling experience it definitely does not have any pros to humanity. In fact it causes more damage to all of humanity than positives. In terms of economics a service like this would be classified as a demerit good. This is due to the simple reason that it produces outcomes which are socially, economically and environmentally undesirable. This has major ethical impacts as space tourism is a showcase of the rich and a demonstration of the ever growing gap between economical classes in society. Questions such as why such large sums of money are going into space tourism when there are people suffering on earth. The UN world food programme stated that "We need $7 billion dollars to deliver food to the millions of people facing famine this year. We need $40 billion dollars per year to feed all of the world's hungry people and end global hunger by 2030." If the money used on space tourism was to be donated to the UN world food programme, they could defeat world hunger by 2030. Due to these reasons it is highly impugned by people if space tourism should be condoned. It can also be said that if this money were to be donated instead by the affluent to the United Nations, the UN could have the necessary resources to achieve their SDGs providing for a sustainable and fair human race.

Sustainability

Sustainability refers to the avoidance of the depletion of natural resources in order to maintain biological systems. Currently, there are no sustainable sources of fuel for space travel which have been implemented. Most rockets typically use fossil fuels which are extracted from the earth in the form of coal, natural gas and oil. Fossil fuels are not sustainable as it takes a greater period of time to replenish it than it does to deplete it. This means that commercial space travel is not sustainable in terms of the source of fuel. It is also not sustainable in terms of the environment due to the many environmental consequences such as the build up of soot. While we are already exhausting fossil fuels, if commercialized space travel was to be implemented on a larger scale in society the rate

of depletion of fossil fuels would soar. After interpreting the reasons, one major challenge of commercialized space travel is the sustainability aspect of it.

Major Parties Involved and Their Views

Blue Origin

Blue Origin was founded by Amazon's founder Jeff Bezos on September 8th in the year 2000. Blue Origin is an aerospace company which started off by sending satellites to space and eventually creating spacecraft suitable for taking people to space for recreational purposes. In 2021 Blue Origin held its first crewed mission where it took the company founder (Jeff Bezos) along with 5 other crewmates to space and back. The sole purpose of this flight was to show off the company's new reusable rocket, as well as provide for a compelling experience. Since then Blue Origin has conducted 5 more space flights all for recreational purposes. While Blue Origin did not release a specific price, the first public figure to be released was at about 1.25 million dollars per ticket. Blue Origin is in support of space tourism and is looking to expand its operations in the near future.

Virgin Galactic

Virgin Galactic was founded in 2004 and it is a space tourism company. The company sends people to space for recreational purposes and has its first manned space flight in 2021. Richard Branson the founder of Virgin Galactic was on board this flight and this marked the first time in history that the founder of a spaceflight company went to space. Since then Virgin Galactic has planned many more missions and even ordered 2 more aircraft from Boeing which will be used to operate its services. Virgin Galactic has set the price of 1 ticket at 450000 dollars which is lower than Blue Origin. The company offers single seat, couple and even family packages. The operator is also in the process of building a new astronaut training center in order to expand its services. The first official commercial flight of Virgin Galactic will occur in spring of 2023. Virgin Galactic has

made it evident that they are in support of space tourism and are going to expand their operations in the near future.

Spacex

Spacex was founded on March 14th 2002 by Tesla founder Elon Musk with the sole purpose of making more affordable and reusable rockets. Since then Spacex has had 182 successful missions along with a couple of failures. Spacex has only recently gone into the market of space tourism. Spacex had its first recreational space mission in September of 2021 when the first people went to space without an astronaut. This marked the beginning of a new era in terms of space tourism. In August of 2021 Spacex signed Mr. Denis Tito to go on a full trip to the moon and back. While the exact date of the trip has not been decided it is expected to occur within the next few years. While spacex does not have the sole goal of space tourism it is certainly a company which is competing for market share in the industry.

The Federal Aviation Administration Of The United States

On May 21st 1958 a bill to create the FAA (Federal Aviation Administration) was submitted by a senator in the United States. The FAA is in charge of regulating all aviation activity in the United States. This gives the FAA the power to regulate any activities which are happening in terms of space travel whether it be commercial or non for profit. While the FAA holds the power to regulate this they do not as the congress imposed a moratorium throughout 2023 on regulating the industry of commercialized space travel. Due to this reason people participating in commercial flight activities are not classified as passengers but are classified as flight participants. It is predicted that the FAA will slowly impose legislation in order to control this infant industry.

Development of Issue/Timeline

Date	Event	Outcome
23/08/1958	The creation of the FAA (Federal Aviation Administration)	The creation of the FAA led to the creation of a body which has the right to regulate all aerospace activity across the United States. The FAA has the authority to regulate commercialized space travel and any such aerospace activities.
20/12/1961	The creation of UN resolution RES 1721 (XVI)	This resolution's main aim was to set regulations on space travel and it essentially stated that no party can claim ownership of any celestial body in space. Without the implementation of this resolution commercialized space travel would not be possible as governments would try to seize control over celestial bodies.
13/12/1962	The creation of UN resolution RES 1962 (XVIII). Declaration of Legal Principles Governing the	This resolution helped clarify legal principles of the exploration of outer space for astronauts and passengers of

	Activities of States in the Exploration and Use of Outer Space	space shuttles as a whole. This brought clarity to the liability of the passengers in a spacecraft. This resolution was vital for the development of commercialized space travel as it was a resolution which helped set the basis of space travel as a whole. One important aspect of this resolution is clause 5 which goes through the importance of states taking liability of any private space missions which are being undergone in their nation. This is vital to the development of commercialized space travel as it means that governments must approve and ensure that all spaceflight activities taking place are indeed safe.
08/09/2000	The creation of Blue Origin	This was a vital step in spaceflight as Blue Origin is one of the 3 major competitors in the industry of commercialized space travel.

		Blue Origin was started by the founder of Amazon Jeff Bezos
14/03/2002	The creation of Spacex	Spacex was founded by the founder of Tesla, Elon Musk. It was a company with the primary objective of making reusable rockets however in the future they started exploring commercial space flight ventures. Currently spacex is one of the 3 major companies in the market for commercialized space travel.
2004	The creation of Virgin Galactic	Virgin Galactic was founded by Richard Branson and it was made in order to provide commercial space travel. Currently it is one of the top 3 firms in the industry of commercial space travel.
30/04/2022	The first ever commercial spaceflight	Denis Tito, a billionaire , paid the Russian Space Agency an estimated 20 million dollars to fly aboard a Soyuz capsule to the international space station and spend time there. This was

		the first time in history that someone went to space for commercial purposes.

Previous Attempts to Solve the Issue

Consent Forms

Currently there are no such regulations on commercialized space travel which means the rights and legality behind a space tourist is unclear. Due to this reason spaceline operators are required to produce consent forms which allow them to determine these rights. As of today a space tourist is considered as a flight participant and not a passenger which means that operators are not liable for the injury or death of any participants. By creating consent forms operators have been able to establish their customers' status in the flight as flight participants. The terms of service of these forms are drafted by the operator and then agreed and ratified by the customer. This is one way to ensure that the activities being conducted are in fact controlled. Additionally this helps clear the confusion behind the liability of the passenger. UN resolutions state that governments must provide aid to any astronauts who are in distress or have re-entered earth in a different geographical location. However, these commercial participants do not have the legal status of the astronaut hence the corporation takes liability for the search and rescue of the passenger. While the operator does take this into their hands they do not take the liability of the death or injury of the participants ensuring that the operator is safe from legal threats posed by mission failures. Since these consent forms are drafted by the company they are typically made in an exploitative manner in order to ensure that the operator is not liable for any serious damage but as of today this is the only way to ensure all of the activities conducted are indeed constitutional. All in all this has helped cover the gray areas and the lack of legislation for commercialized space travel. One example of this is Blue Origins

consent form. In short their form essentially states that the company is not liable for the death or injury of the passengers and that the passengers may be fined for any damage caused due to negligence.

Reusable Rockets And Hydrogen Fuel

While there are no regulations on the impact of commercialized space travel on the environment, companies have taken it upon themselves to try and be more environmentally efficient ,in order to preserve the environment, and more importantly look better in the eyes of the public. Blue Origin spacecraft is the first commercial spacecraft to make the use of hydrogen based fuel. This has several advantageous consequences in terms of sustainability and the environment. As the name states hydrogen is the main which hydrogen based fuel composes of and luckily hydrogen is the most abundant element in the universe. While hydrogen is not stored in pockets under the earth where it can be easily harvested, hydrogen can be derived from biomass, fossil fuels and even water electrolysis. If water electrolysis was conducted hydrogen fuel would be considered sustainable. Electrolysis involves splitting hydrogen from oxygen in water in order to produce hydrogen, this does result in the depletion of water however when hydrogen is made into hydrogen fuel it is mixed with air and as the fuel is used water is created as a byproduct. This results in a renewable cycle allowing hydrogen fuel to be sustainable if produced correctly. Blue Origin uses the same process in order to ensure that the fuel they use is sustainable for the environment. Other than being sustainable, hydrogen fuel has less consequences on the environment. Blue Origin's hydrogen powered rocket does not release carbon dioxide (co2) carbon dioxide is known as the most abundant greenhouse gas emitted by all anthropogenic activity. Being a greenhouse gas carbon dioxide contributes to the heating of the earth's temperatures leading to global warming. Hydrogen on the other hand is not a greenhouse gas and does not lead to the warming of the earth.

Due to this hydrogen fuel has fewer consequences to the environment than typical fossil fuels.

Congress Imposed Moratorium On Creating Laws For The Industry

The Federal Aviation Administration (FAA) has the authority to create legislation which would help regulate space tourism. This in turn could help mitigate consequences created due to space tourism. However congress has imposed a moratorium for creating laws on the industry of commercialized space travel. This means that the FAA is prohibited from executing any legislation which could help control space tourism. This is done with the sole purpose of protecting the industry at its earlier stages so that operators can innovate without being subject to federal laws. Since corporations do not have any laws to abide by, they are free to experiment and conduct activities which may be considered unlawful or unethical so that they can spark innovation. If harsh laws were suddenly made this could hinder innovation as companies would now have to operate under the restrictions of federal law. This results in many companies being able to test new rockets, features, fuel sources, etc in order to make space tourism more viable and beneficial for humanity. Regulations are made with the purpose to improve the efficiency of markets in terms of delivering results economically. Social regulations are implemented in order to protect the environment and the safety and health of society on a larger scale. More often than not companies have to go above and beyond in order to ensure that these policies are being followed and this causes the firm to operate under many restrictions. Due to all of these restrictions the corporation may not be able to encourage innovation due to the many legal procedures that must be undergone in order to get approvals. All in all the moratorium on creating laws for space tourism is an effective way to ensure that firms can still innovate.

Possible Solutions

The Slow Implementation Of Controlled Legislation

The main hurdle of the development of commercialized spaceflight is the lack of legislation and guidelines for operators to follow. Right now these flights commence in a highly unregulated manner and while this may be a tactic used to spark innovation, it will eventually have to be resolved. One possible solution to most of the key issues would be the gradual implementation of certain regulations which would help set guidelines for operators like Blue Origin, Virgin Galactic, Spacex,etc to follow. Legislation must be made on a variety of different aspects including the liability of commercialized spaceflight, environmental aspects and economical aspects behind it.

Legislation on the liability behind commercialized space travel

Firstly, a set of standard guidelines must be implemented for the liability of passengers. As stated previously, commercial spaceflight customers are considered flight participants and not passengers, which does not make them subject to receiving any aid from any other body in the case that they are under distress. This means that if a passenger is in distress no organization is required to provide the aid that they would provide to any other distressed astronaut or aeronautical passenger. As of now operators do not take the 100% liability of the passenger which is why it is imperative for governments to set legislation regarding this. Governments should ideally set a legislation which states that operators are liable for the search and rescue of the passengers after they re-enter earth's atmosphere. This is due to the simple fact that if they land away from the landing zone, no other body will be subject to assisting them and this could lead to severe consequences for the passenger. In order to accomplish this, companies may choose to hire search parties in a larger range around the estimated land site ensuring the safety of the passengers even if they land further away from the landing site than expected. As of today companies do not do this as it increases their costs and decreases their profits hence, this legislation must be implemented in order to ensure that operators do take full

liability of the search and rescue of the passenger. However, it is important to note that the operator should not be liable for the injury or death of any of the passengers unless it was of course caused by the operator's negligence. Legislation on liability should also include a clause stating that passengers would be liable to any damage caused to the machinery by their negligence. The implementation of these regulations would ensure the safety of the passenger as well as the efficiency of the commercial spaceflight operator.

Legislation on the environmental impacts of commercialized space travel

While legislation is important in order to clarify the liability of all commercial activities, it is also vital to regulate the environmental aspects of commercialized space travel. As of today there is not a single environmentally friendly fuel source which is efficient enough to be used for spaceflight. This means that with every commercial spaceflight tonnes of harmful gas or a variety of different byproducts are being released into the atmosphere contributing to global warming. Currently, most rockets use either Hydrogen fuel or carbon based fuel (fossil fuels). Fossil fuels release carbon dioxide which contributes to the greenhouse effect which in turn leads to climate change. Hydrogen fuel on the other hand releases water which is not bad for the environment and does not release harmful gasses. While this may be the case hydrogen fuel is still bad for the environment as rocket launches release soot. When an excess amount of soot is released it will accumulate in the atmosphere and this would cause temperature drops in regions around the world. This would however have an opposing effect on the poles causing the poles to heat up. Additionally, in equatorial regions the ozone layer would deplete these factors and would all contribute to climate change. This means that while hydrogen fuel may be a bit better in terms of the byproducts it produces it still has a major negative impact on the environment. Due to these reasons it is vital for the environment of the earth that regulations are implemented to combat the release of these harmful gasses into the atmosphere. Governments would have a couple of ways they could go about implementing this legislation. Governments could implement legislation which restricts

the amount of commercialized space flights occurring per annum; this would reduce the emission of these harmful gasses. While this may reduce the problem it does not solve it as these glasses would still be emitted into the environment. This legislation would be a way for governments to buy time so that they can discover environmentally friendly energy sources. If governments want an effective solution they must subsidize the research and development of environmentally friendly energy sources which companies in space tourism could implement. Corporations should be required to contribute to the subsidization of the research of these sources allowing governments and corporations to share the cost. Since governments would be restricting the spaceflights as well as researching environmentally friendly alternatives a balance would be created. Governments could also implement legislation which requires every commercial spaceflight to conduct experiments which space agencies such as NASA, ESA,ISRO,etc need to perform. This would ensure that while commercial spaceflight may be occurring it is also contributing to humanity and if these corporations conduct enough experiments it could reduce the amount of times space agencies like NASA, ESA,ISRO,etc would have to send rockets to space. All of these factors would reduce the impact on the environment but not reduce it to zero. Since we are limited by today's technology this is a solution which takes all factors into account.

Legislation on the economical implications caused by commercialized space travel

While the liability and environmental factors are two major issues that must be addressed, the economical implications of commercialized space travel must be resolved as well. For many, space tourism is a display of power and money from the top earners around the globe. It is also a sign of the growing socioeconomic difference between people all around the globe. The ethicality behind spending such a large sum of economic resources on spaceflight is questioned when the terrible situation of millions of people around the globe is brought up. UNESCO estimates that just over 795 million people around the world are undernourished due to the lack of food availability. The contrast between the

people traveling on this commercial space liner and the unfortunate is so great. To many people this looks like an ostentatious display of wealth. However, if the customers of these firms' perspective were to be taken into account it could be argued that people should be free to do what they want with their resources. Due to these clashing ideas it is vital for society that the government implements certain regulations to reduce the impact of this. The government should introduce legislation which would require operators as well as customers to contribute to society with every flight. This could be done by introducing a strict carbon tax on the industry where operators and customers would have to pay for polluting the environment. This would mean that operators would try their best to reduce their emissions and the government would also generate revenue which could be reinvested into society. Economically speaking this is known as a tradeable permit and this is widely incorporated in manufacturing industries. Governments should also implement CSR (Corporate Social Responsibility). This is a technique implemented in a few countries such as Austria,UK, South Africa,China,etc which ensures that privatized firms give back socially to society. In order to fulfill the requirements of CSR a firm must give back to society economically or socially and a firm must consider the environmental impacts that its business has. However, in the Industry of commercialized space travel it should be the responsibility of the operator along with the passengers to make a large contribution to society as large quantities of economic resources are going into flight.. The implementation of CSR and tradable permits would mean that firms would reduce the economical impact they have on society.

Conclusion on possible solutions

All in all the legislation discussed above should be implemented but it must be implemented gradually in order to ensure that innovation isn't hindered. This is due to the fact that if firms have many regulations they have to follow they are restricted in their activities and hence they aren't able to innovate to the best of their ability. The legislation mentioned above should be implemented after spaceflight becomes a larger industry within the next 5-10 years. However, the subsidization of the discovery of more

environmentally friendly fuel sources should commence now so that governments and corporations have more time to discover better sources of fuel.

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