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The Commercialization of Outer Space

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Abstract

Over the last 50 years, outer space has been the subject of international attention. The late 1950s marked the beginning of a new era in human exploration. The majority of interactions with space have occurred within the foremost national governments of the world. This paper will explore the growth of commercializing space and how it will mark a new era for the human race. An era where humans are not bound to Earth will begin. Furthermore, how the future of society will be influenced is discussed greatly in regards to the ever increasing commercialization of space.

Keywords: Space, commercialization, advertising, tourism,

The Commercialization of Outer Space

Over the last 50 years, outer space has been the subject of international attention. The late 1950s marked the beginning of a new era in human exploration. The majority of interactions with space have occurred within the foremost national governments of the world. In 1957 it began with the launch of Sputnik 1 by the Russian government and then the 1958 launch of Explorer 1 by the American government. After these two ground-breaking achievements, the international space race was officially underway ("The history of,"). For decades, governments of the world have played the role as *the* explorer of the stars. However, governments may not remain the key players in space exploration for much longer. As national interest in American agencies such as the National Aeronautics and Space Administration (NASA) dwindles, their responsibility to further the space program lessens. Alongside other issues, such as military involvement in foreign countries, using the monetary resources available to the American government, the focus on government space exploration has diminished. In light of this decreasing interest, funds for government space agencies, the commercialization of space surfaces is the likely next step for space advancement. As with most anything, commercializing space may stir up controversy. Does capitalism have the right, or can it handle the responsibility in taking over space advancement in areas where the American government may be lacking?

Literature Review

History of Commercialization

The commercialization of space has been a long and arduous process beginning as early as 1965. In the mid 1960s, the first commercial satellite went into orbit to be used for telephone

communications (Velocci, 2012). Since then, telecommunication satellites have been the primary mark of the commercialization of space. The private sector, however, has been involved in many of the manned and unmanned missions conducted by the National Aeronautics and Space Administration (NASA). The process of building rockets and helping to advance propulsion technologies has been supplemented by the private sector (Velocci, 2012).

Now that companies find themselves with the technological and monetary ability to further capitalize on space, there will be more than telecommunications satellites in orbit in the near future. The basis of future commercialization of space resides in the idea of bringing humans into space. This transport will be utilized by the government itself or, in true capitalist fashion, by the consuming public of America in the form of space tourism. Space tourism will provide the monetary incentive for companies in the private sector to ensure that the most efficient means of space transport are discovered.

Space Tourism

The modern meaning of “commercializing space” relies on this idea of space tourism and transport. With companies such as Space-X and Virgin Galactic already well established, the private sector looks to take hold of this burgeoning industry of space tourism and transport. The future industry of space tourism can be categorized into four main business models: Space tourism, intercontinental travel on Earth via space, transport to private or government owned vessels such as the International Space Station, and corporate sponsorship from companies not involved directly with space travel (Pelton, 2012).

Space tourism itself consists of bringing paying customers into space. Space as a destination may become the most profitable measures of space commercialization. Already, Virgin Galactic offers suborbital flights for \$200,000 (“Space ticket,” 2013). Starting in 2013, Virgin Galactic will be flying over 500 space tourists into suborbital space (Pelton, 2012). This marks the true beginning of a new era in space commercialization. Companies such as Virgin Galactic show the viability of space tourism. The initial investment in their space vessel, SpaceShip Two, was between \$400-\$500 million, but with over \$100 million worth of tickets sold for the first year of operation, and a long list of eager patrons, they look to eventually turn a profit in years to come (Messier, 2011).

The early stages of space tourism will consist of short suborbital flights into space. These daytrips to space allow for tourists to experience the weightlessness of space and to view Earth as a whole. Earth’s wealthy patrons are already taking advantage of this opportunity. With continued support from the wealthy, the space tourism industry will be able to flourish. The next step for space tourists will be staying in space for extended periods of time on a commercial space station. Orbital Technologies, a company based in Russia, already has plans for an orbiting hotel. Current estimates put the cost of a five day stay aboard a luxurious space hotel at \$960,000 (Delana, n.d.). With a hefty price tag, Orbital Technologies’ commercial space station will aim to be the high end space experience. With gourmet food and plenty of living space for up to seven tourists at a time, it will be “geared toward uber-wealthy tourists” (Delana, n.d.). Orbital Technologies’ project intends to be open by 2016.

Similarly, hotelier Robert Bigelow has announced the production of an inflatable habitat that would attach to the existing space station (Matthews, 2013). This module, the size of a large

room, can be transported to space in its compact form weighing only 3,000 pounds. This method is much cheaper than launching full size modules that can weigh up to 10,000 pounds (Matthews, 2013). The implications that arise from the success of this project may help shape the future of space tourism. Companies, such as Orbital Technologies, will be able to create and expand their commercial space stations in a cost effective manner.

Efficiency and Benefits

The space tourism industry, as with any expensive process, will flourish with this focus on efficiency as a cornerstone of the business. The American Congress itself has declared that “free and competitive markets create the most efficient conditions for promoting economic development, and should therefore govern the economic development of Earth orbital space” (Bush, 2002, p. 71). Efficient monetary gains for private companies, however, are not the only benefit to be had with the advancement of space tourism.

The drive to create habitable space destinations that can be reached as quickly and as safely as possible may replicate the technology advancement that NASA has had since the mid 1970s. Over the past four decades, NASA’s efforts have created hundreds of spinoff technologies that have benefited the general public. Carbon monoxide detectors, stud-less winter tires, anti-corrosion coating, and even the electric car are all byproducts of NASA’s mission to get to space as quickly and efficiently as possible (“NASA spinoff,”). With a concerted effort in the future by private companies to achieve an even higher level of efficiency, there arises the prospect of more spinoff technology. The need for new technologies will create the demand for scientists, technology, engineering, and math professionals. Not only will society benefit from the creation of new technologies, but this increase in demand for educated individuals may have

positive effects on society itself. These positive effects may manifest themselves in the American population enthusiastically supporting scientific endeavors or in a basic increase of scientific literacy in the average citizen. In either case, the benefits of an increase in technology cannot rationally be argued against.

Apart from sending tourists into space as their final destination, the future of Earth tourism and travel may benefit from the use of space. Space has the opportunity to become part of the journey rather than the destination. The use of hypersonic transport vessels will allow transcontinental travel to be accomplished within only a few hours (Pelton, 2012). The monetary gains to be had with quick transcontinental flights are potentially worth tens of billions of dollars in new business per year (Pelton, 2012).

Hypersonic transport vessels would travel in the upper atmosphere near the edge of space. These space-planes may utilize the technologies being created in the space tourism industry to more effectively travel long distances quickly. Any commercial space activities are directly influenced by the cost to get into orbit. With an increase in the previously discussed space tourism industry, the cost will eventually decrease enough to create a cost effective space-plane industry (Lindskold, 1999). If hypersonic travel can be accomplished at a competitive price to normal airplane travel, the opportunity for a new industry of space aiding Earth tourism will prosper. That is not to say that hypersonic travel must cost less than or equal to the cost of normal airplane travel. Especially during the early years of hypersonic travel, the cost will most likely be relatively higher than other forms of travel. However, as supporting infrastructure is established on Earth and space-planes become more efficient, the higher price will be relative to the benefits of this method of travel.

Good Business

The third major business model for space commercialization is the transport of goods and people to private or government owned vessels such as the International Space Station. In early 2011, NASA's space shuttle program was retired, thus removing the ability for the American government to launch astronauts into space without the aid of the Russian government's Soyuz spacecraft (Malik, 2010). Although the American and Russian governments have a healthy relationship, NASA is already supporting this business model of space commercialization. The Dragon spacecraft from the company SpaceX has already completed missions of cargo transport to and from the International Space Station. NASA currently engages SpaceX in a \$1.6 billion contract for a total of 12 cargo transport missions (Boyle, 2013). It is evident that NASA fully supports the use of private space transport. In contracting out transportation missions, the American government can save money of research, development, and creation of new spacecraft. Although the "Soyuz capsules are the only spacecraft that transport people to and from the station ... NASA intends to have U.S.-built commercial spaceships — perhaps including an upgraded version of the Dragon — carrying astronauts within five years" (Boyle, 2013). A second company, Orbital Sciences Corporation, also hopes to have a spacecraft ready to be used in the near future for cargo transportation.

The American government has already proved the viability of commercially owned transportation spacecraft. The next step for commercially owned spacecraft is to help with the transportation of cargo for businesses that would benefit from space travel, but are not equipped to travel there. Deep Space Industries Incorporated looks to become the first asteroid mining company. They currently have plans to send unmanned spacecrafts on reconnaissance missions.

These missions will determine whether an asteroid contains mineable minerals. However, there is a large monetary barrier to entry for a company such as this. Without the help of other companies, such as SpaceX, Deep Space cannot hope to reach an asteroid in a financially viable manner.

Sponsorship

The present plan from Deep Space Industries officials is to fund their missions with corporate sponsorship. This presents another area for space commercialization. With this business model, corporations will be allowed the chance to sponsor space missions they deem worthwhile. This may be the purest form of space commercialization. Putting a logo on a rocket or having a corporate sponsored mission be the first to mine an asteroid are opportunities that many large corporations will jump at the chance to be a part of. “The Google Lunar X Prize, Unilever, and Red Bull each are spending tens of millions of dollars on space sponsorships, so the opportunity to sponsor a [Deep Space Industries] expedition into deep space will be enticing” (Wall, 2013). A similar company, Planetary Resources, has investors such as Google executives Larry Page and Eric Schmidt (Wall, 2013). Google continues to show support of space exploration with a “\$20 million grand prize to the first privately-funded company to land a robot on the moon and explore the surface” (“Moon mining,” 2013).

With more funding from corporations and cooperation with privately owned companies able to travel to space, businesses that would otherwise not have the ability or funding to make it to space will be given the opportunity to further the space legacy by establishing permanent commercial enterprises in space. The founding of stable businesses in space helps “support the

expansion of humanity beyond the Earth ... to create an amazing and hopeful future for humanity” (Wall, 2013).

The Environment

Although there are many benefits to an increase in space commercialization, there are detractors that would posit otherwise. Along with concerns of practicality and safety, the biggest concern with increased commercialization of space is the environmental impact. An increase in commercialization implies an increase in rocket launches. Some environmentally conscious researchers are concerned about this increase in rocket launches. Two types of rockets in use today are the kerosene and liquid oxygen rocket, and the hybrid rocket engine that makes use of synthetic hydrocarbon and nitrous oxide. Both rockets create an unwanted amount of pollution, but the hybrid rocket specifically emits more black carbon than the kerosene and oxygen engine. Virgin Galactic currently employs the use of these hybrid rockets. Normally, rain washes out black carbon particles from the atmosphere, but there is no weather in the stratosphere. Therefore, pollution may remain for up to 10 years (Mann, 2010). In the Polar Regions, black carbon has already caused ozone reductions of 5-6% (Mann, 2010). Virgin Galactic, alone, plans to launch 500 tourists into space in the coming year. If a significant increase in rocket launches takes place, the environment may be placed under serious conditions.

To combat those fears, NASA implements the use of Hydrogen and Oxygen based rockets. This type of engine releases no carbon into the atmosphere, thus removing any fears of future pollution. The issue with the Hydrogen and Oxygen rocket is that it poses a technical challenge. Sufficient venting and insulation of the rocket during flight must take place in order to ensure that the liquid hydrogen does not expand too rapidly. As well, liquid hydrogen has the

ability to leak through the smallest of pores caused by welding (Liquid hydrogen,” 2013). These limitations have been thoroughly countered by NASA and the hydrogen and oxygen mixture is the current fuel mixture used in all launches. With the increase in rocket launches, it will be necessary for companies to use this fuel mixture in order to prevent future environmental damage.

Safety

Space tourism also faces the challenge of overcoming the fears of safety. On the rare occasion of a spacecraft malfunctioning, a copious amount of news coverage follows. The general public may feel uneasy about potential disaster when traveling into the unknown of space or traveling at hypersonic speeds across the globe when they are so aware of the horrors of a malfunctioning spacecraft. These fears will be increased not simply due to the media hype, but also due to the large amount of financial investment made to begin with. Potential space tourists may not see the benefit of risking their lives for large amounts of money.

Virgin Galactic already has a waiting list for tourist visits to space that includes many wealthy people. In advertising the fact that many rich people risked all they were worth to visit space and returned safely may help quell the fears of the common tourist. There have not been any major disasters yet within the space tourism industry. There can never be a 100% success rate with anything as complicated as space flight, but until that day, space tourism companies can advertise the ever increasing safety of space tourism.

Expense

Monetary concerns are at the forefront of anti-space tourism arguments, as well. Two main issues with money are the perceived waste of money that space tourism is along with doubts of the financial practicality of this future industry. Space tourism concerns itself with being a profitable business. If there are monetary issues that would prevent the industry from growing to its full potential, they must be addressed.

The possibility of the public resenting the corporations wasting money on this new industry is the least potent of monetary problems that may arise. Although the corporations are currently running initial space missions off of money that is already invested in their respective businesses, there will come a point when further missions must be funded through money given directly by consumers. If the public views space tourism in a negative manner, they will not consume the product. If the product remains unconsumed, the lack of funds will stall or potentially destroy the space tourism industry. As well, a company may lose public support if they are seen as funneling money into an industry that is not worthwhile. Although, this issue may potentially arise, space tourism is already being consumed as a valuable product. The few wealthy patrons of space tourism may not be able to sustain the industry long term, but when it becomes financially viable for the average person to take part in space tourism, there are no major indicators that they will view the industry in a negative light.

The major issue concerning money is the financial practicality of this industry. This issue may affect both consumer and producer. The initial monetary investments needed for a company to focus on space based enterprises are incredibly high. For instance, Virgin Galactic spent over \$400 million on constructing their one major space vessel (Messier, 2011). While the potential

monetary returns are high, this lofty initial investment may prove to be an unbreakable barrier to entry for many companies. Only the wealthiest companies will be able to compete in this industry. As space tourism increases and space technology is publicly distributed, entry level costs for companies will decrease (Lindskold, 1999). Until the popularization of the space tourism industry, however, many companies will be unable to enter into the space enterprise market. A lack of competing companies within the industry may motivate the initially invested companies, such as Virgin Galactic and Orbital Technologies, to price their services low enough so that newer companies would not be able to compete without sufficient financial backing from investors or corporate sponsors. Unfortunately, there is no way to predict the future actions of companies in a growing industry. Increased distribution of technological advances and support through sponsorships will come to be the most effective method of allowing new companies to break through the financial barrier to entry.

Whether or not there are companies providing services, the consumer must be presented with reasonable prices for these services. If the \$200,000 price tag of Virgin Galactic never lessens, only the wealthy will be able to afford trips into space (“Space ticket,” 2013). Space travel, by nature, has become increasingly more efficient since its conception. However, it is still a pricey endeavor. This high ticket price is the major restriction on the growth of the space tourism industry. If prices are able to decrease to practical levels, the common consumer will most likely jump at the chance to partake in this new industry.

Discussion

There are many potential business models that utilize the idea of commercializing space. Space tourism, intercontinental travel on Earth via space, transport to private or government

owned vessels such as the International Space Station, and corporate sponsorship from companies not involved directly with space travel are all opportunities waiting to be capitalized on. Both governments and private citizens will be able to participate in this new industry. Through the power of capitalism and competition between companies, the most cost effective methods of space travel will be discovered and implemented. Many issues may arise during the growth of this new industry. Ranging from safety fears, to environmental concerns, to doubts about financial practicality, the commercialization of space will overcome these issues. Governmental regulation will ensure that space travel is conducted in a manner that is safe for both tourists and the environment. As well, free market competition will guarantee that this industry is financially practical.

Conclusion

The growth of the commercialization of space will mark a new era for the human race. An era where humans are not bound to Earth will begin. The future of society will be influenced greatly by the ever increasing commercialization of space. Governmental space travel has made headlines since it began almost 60 years ago. No longer will visiting space remain a distant dream for the average person. There will be opportunities for citizens to reach the unreachable. With the power of the free market driving innovation, the consuming public will be able to make space travel a reality.

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