

## Privatization of Spaceflight: A Result of Aerospace's History

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## **Privatization of Spaceflight: A Result of Aerospace's History**

### **I. Introduction**

For thousands of years mankind gazed at the night sky and dreamed to one day explore the vast universe. While this once was science fiction, the technology of today has made this dream a reality. However, with the recent shut down of the space shuttle program and the emergence of large space companies, the question of privatizing spaceflight has become very relevant to the expanding aerospace industry today. This recent shift to privatization will shape the future of the space industry and the direction taken by mankind in the exploration beyond Earth, both near and far. This paper will first discuss the STS framework SSK (Sociology of Scientific Knowledge), especially with regards to the strong program, then investigate the background of the aerospace industry through the lens of the STS framework, and lastly the privatization of spaceflight will be discussed with a focus on its impact on the aerospace industry and society as a whole.

### **II. Sociology of Scientific Knowledge**

SSK asserts that all technological advancements, as well as failed technological endeavors, are a product of the social environment in which they are created (SSK, 2017). Technology and societal influences are deeply intertwined. Viewing them as mutually exclusive is detrimental to understanding technological advancement. Within this school of thought there are two programs: the weak program and the strong program. The weak program would argue that scientific theories failed due to a combination of societal factors, not purely scientific reasons. The strong program agrees, but builds off that logic by also asserting that even the successful scientific theories are also a result of the social factors and circumstances. Within this framework, societal factors are of utmost importance when investigating the implementation and

success of a technology. Next, the history of the aerospace industry will be briefly investigated through this lens, with an emphasis on the strong program.

### **III. History of the Aerospace Industry**

The aerospace industry grew exponentially since the Wright Brothers first achieved flight in 1903, nevertheless, serious technological advancements were not without societal influence. McCleskey (2006, p. 5) explains how at first, planes were used for the United States Postal Services (USPS) to deliver airmail, and due to the societal need at that time, they were not the safest aircraft, neither were they fit to carry passengers. The U.S. Postmaster General held the power to give contracts and mail routes to companies due to a vertical structure dominated by the USPS. This created a difficult arena for smaller companies pushing to carry passengers and further privatize the industry due to lack of influence with manufacturers to build aircraft safe enough to fit their needs. These companies were almost completely boxed out in 1930 when the Postmaster General consolidated the routes and contracts to only three companies. Understandably, this led to complaints from the smaller companies who found sympathy in a new Senate following elections in 1932 and in the midst of the Great Depression, where the U.S. was in great need of pulling out of economic hardship. As a result of these societal factors, Congress passed the Air Mail Act of 1934 making all airlines independent operators. This spurred growth within the industry, and opened the market for aviation, thus safer aircraft was made accessible to transport passengers due to the growth in competition. As we can see the social factors of the change in government as well as the Great Depression played huge promoters of the development of this technology, it was not the technological capability of the states, rather the circumstances they appeared in.

The story on aviation does not end there, in less than 10 years after the bill was passed the United States found themselves amidst World War II, which created a huge demand for aircraft. In 1938, previous to the war, the total units produced for military aircraft reached about 900 units, but only 6 years later in 1944, 95,272 planes were sent off to war (Harr, 1965, p. 56, 64). The war didn't only increase production and create new companies as a result; however, Harr also describes how it greatly increased the production capability and performance measures within those aircraft. Boeing produced designs increasing by 50% endurance on their bombers while raising the payload capacity, and then after receiving more requests from the military they over doubled the weight while keeping performance capabilities. The war trained facilities and engineers to think and deal with problems in a fast and efficient way to make higher, faster, and heavier flight possible. Without the war it can be argued the aviation industry would not have grown nearly at the rate it did. As a result of these huge technological advancements, once passenger air travel resumed post war and there was a surge in demand, the industry was able to progress far quicker than imagined, and to help regulate the new traffic, the Federal Aviation Administration (FAA) was born. The Second World War is directly responsible for many aviation feats and production advancements such as the use of high strength aluminum in fuselage that created the perfect environment for a blooming industry to take off.

This phenomenon did not stay in the air, rather is also seen within the space race between the US and the Soviet Union during the 1960s. Due to the growing tension between the US and the Soviet Union, there was constant competition and a lot of propaganda. Due to the Soviets putting a rocket into orbit and working to put a man on the moon, America worked to improve technology and eventually millions of Americans were able to watch Neil Armstrong, from their homes, take "one giant leap for mankind." This groundbreaking event did not magically appear,

rather the social factors of the Cold War that led to a large budget increase for the National Aeronautics and Space Administration (NASA) and subsequent research (Shi, 2016), followed by President Kennedy's charge to put a man on the moon before the decade ended, all created a perfect environment for the implementation of technology that made it capable for the Apollo missions to happen.

As seen in this brief history, the SSK framework is relevant to the production, application, and widespread implementation of technology within the aerospace sector. When the social factors are favorable for the development of space technology, there is a surge in the application of said technologies. Using this as a common theme and background of the aerospace industry the privatization of spaceflight will be further discussed.

#### **IV. STS Framework Analysis**

Henry R. Hertzfeld (2000) defines privatization as “the process of applying a market-oriented approach to government programs, with the objective of moving the program's activities and assets out of direct government management, control, and ultimately ownership.”(p. 1) Initially, the space industry was dominated by government and their appropriate agencies, for example the USA and NASA. However, with the emergence of entrepreneurs who have the capital to become relevant players, there has been a recent push to privatize. Currently the required capital creates a barrier for many parties to enter, however as seen in the aerospace industry, this is how most developments begin. Flying was once a luxury, however after the Second World War and a spike in competition driving down prices it became more accessible to the common man. Although spaceflight is in the early stages of privatization, with the right factors, growth can occur at exponential rates.

As SSK would assert, this recent development did not come about by itself, however, it too was a product of society. The space industry itself has grown significantly and has been at the forefront of science for quite some time. “Today, worldwide launch rates are appreciable and sustained. Unbeknownst to most of the public, there is a major launch to earth orbit (ETO) essentially every week of the year” (Rahman, 2010, p. 2). Given this competitive environment, it is no surprise there is a push to privatize spaceflight and to open up a new world of travel and high-class leisure that has been inevitable since a hope inspired origin of space flight. Rahman also notes the 2007 Space Report showing the industry to be a \$251 billion economy (p. 1), while more recent estimates show increases of nearly 50% to that number (Australia, 2017, p. 1). As the space economy grows at a high rate and begins to play a bigger role withing the global economy, this opportunity will only continue to raise interest of entrepreneurs and investors.

To understand this, it is necessary to look closer at the current state of the space industry. With space flight, there is a high amount of infrastructure needed, such as launch pads, control centers, and significant aviation coordination so that there is no interference between aircraft during the launch sequence. In a space industry dominated by governmental agencies, there is only internal coordination needed, and all infrastructure is paid for by the respective governments. However, the space landscape today does not only include governmental operators, but “the last 10 years have seen significant investment in commercial space ventures and the move toward privatization of historically government-only functions. As a result, a number of businesses have developed commercial infrastructure offerings based on a multiuser shared approach to classic space ground support requirements.” (Probert, 2006, p. 2). This has led to an integrated business model. However, Probert also asserts that “Commercial services substantially enhance the capabilities of the NASA GN” (p. 3). Commercial services not only

create a pay as you use system that frees NASA resources, also diversifies capabilities allowing for an optimal solution to suit mission needs, as well as aid in maintenance and upgrades. Thus, the more private companies get involved, the more benefits arise for involved parties, thus encouraging further privatization.

This does however raise ethical questions about the rights of private companies to use international space freely to gain a profit and their responsibility in the case of accidents. According to the Outer Space Treaty (Adopted as a UN Resolution), “outer space is not subject to national appropriation by claim of sovereignty”, and “States shall be responsible for national space activities whether carried out by governmental or non-governmental entities.” Of course, companies must follow regulations for the countries in which they reside, however with the possibility of space tourism becoming closer to a reality, these companies will become more important on the international level which will lead to closer regulations by respective countries. The biggest change is that national interest and public safety is not the only focus of all stakeholders, rather there is an aspect of decision making that will be influenced by the economics. Just how SSK asserts, the implementation of technology is heavily reliant upon the social factors. However, if there is a focus and push from investors or stockholders to produce a profit, or even passengers to travel, but a safety technology needs to be tested or developed further, the company will not want to give an appearance of unreliability by postponing or cancelling trips, but trips of this magnitude put the passengers, ground workers, infrastructure, and even other satellites at risk. Thus it will be necessary to enforce strict safety codes even to private companies to avoid such dilemmas.

Social perception will also greatly affect implementation. As seen in the history of the industry, when society viewed a technology as needed or desirable, it was able to spark

innovation as seen in the widespread infrastructural change to meet the demand of airplanes in WWII which ultimately led to a post war period of growth. In a similar way, if society supports this advancement, and private companies can obtain a good reputation with the public, it will only create a snowball effect within the industry due to the nature of its growth being dependent on societal factors.

Thus, as seen throughout the history of the aerospace industry, and even today, according to the SSK framework, this technology, and its subsequent adaptation will have a high dependency on the social environment. Currently, this environment is favorable towards growth, “The community of scientific and business payload/spacecraft developers is, therefore, likely to be well served in the foreseeable future” (Shamim, 2010, p. 12). This will produce an increase in innovation, and the creation new companies. The question is not if society is capable of achieving these great advancements, but rather, if society is willing to implement and accept them.

## **V. Conclusion**

To conclude, it is seen within the aerospace industry throughout the years, starting with the airplane business, moving to the space race, and today with the privatization of spaceflight that society and their perception of the technology and willingness to accept and implement it will be one of the driving factors since technology is not solely reliant on its ability to complete a task, rather also a product of the environment in which it is being implemented. Privatization itself can prove quite beneficial and can pave the way to create a space environment similar to modern air traffic. Ribeiro Gomes (2013, p. 5) stated in his paper “The participation of private companies is due to define a new era in the space technologic development providing new space products and space missions in a cheaper and faster way, and also with better development.”



McCleskey (2006, p. 9) also came to a very similar conclusion in his research stating: “The achievement of low cost, operationally responsive space launch systems appear to be a natural consequence of the presence of commercial independent space launch operators. While this is not a necessary condition, we argue that it is sufficient.” Private companies are making great achievements and advancements in the science world, and now it falls onto society to create an environment where these innovators can innovate and go to places nobody has ever been before.

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