

Space X, the private space launch business of an iconic leader – A case study

Introduction

Space exploration, space travel and research in that area has traditionally been a government domain since the rockets started blasting off from the Earth in the last century. Obviously, the cost of building ground infrastructure, hiring of qualified professionals and the risks involved without tangible and clearly projectable objectives makes it less attractive for private investment. Even those satellite launch projects outsourced to private agencies have been government funded on a turnkey basis and private competition in this area was unheard of, not imagined and till the last few years was considered improbable. Everything has changed in the last decade, mainly due to the entry of one particular company which is the path breaker as a private company trying to enter on its own in sending rockets and satellites to space and taking contracts for routine servicing of space stations. This case study endeavors to explore the conditions which led to this new phenomenon the people behind it and the future.

The focus of this study is more about the corporate and business strategy which may construct a sense of purpose for Space X; to a lesser extent, the technological competitive advantage developed by the company will also be explored. This study can only be completed by studying the innovative leadership provided by the founder and the leader, Elon Musk and the ways in which he attracted the best minds to come and work for organizational missions which at one time were considered impossible.



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A Background on space exploration by mankind entry of space X

With the developments in space exploration which started as an individual hobby in the early 1900s by Konstantin Tsiolkovsky (widely considered the pioneer of Astronautic theory), Russia exploded into a capital intensive government funded activity after WWII, leading to fierce competition between the then superpowers the USA and the USSR till the end of the Cold War. In the late 1900s several countries including China, Japan, UK, India started sending rockets and satellites to space. In the early 2000s, the US and Russian satellites and probes could reach up to Saturn and in 2016, Earth probes were hovering over Pluto, the farthest frontier in the Solar System. Again there was no private funding or participation till about 2005 except for the purposes of seconds long 'space tourism' on specially made aeroplanes where the passengers could experience zero gravity. Everything changed between 2005 and 2010, Space X came into existence and it brought a new era in this field.

Founded by Elon Musk in 2002, in California, USA, Space X designs, manufactures and launches advanced rockets and spacecraft. The company has set itself as a mission to revolutionize space technology, with the ultimate goal of enabling human beings to colonise other planets. It is the only privately held firm to return a spacecraft from low-Earth orbit, which it first accomplished in December 2010. The company made history again in May 2012 when its Dragon spacecraft attached to the International Space Station, traded payloads, and returned safely to Earth — a technically challenging feat previously accomplished only by governments. Since then Dragon has delivered cargo to and from the space station multiple times, providing regular cargo resupply missions for NASA.

As stated in the Space X website, future of Space X is defined as under:-

“Under a \$1.6 billion contract with NASA, SpaceX is launching a number of cargo resupply missions to the International Space Station(ISS), for at least 20 flights under the Commercial Resupply Services (CRS)

indicate a bias towards technical expertise as a necessary requirement to hold the position.

It may be noted that except the 'legal' function, core management functions of marketing, finance and commercial transactions have been shown only in the level 2 management structure, which makes Space X a unique firm which focuses more on innovation, technology and quality aspects.

A case in point is the 'Mission Assurance' function at the level 1 which deals entirely with the quality aspects of the space projects.

Uniqueness of the Elon Musk's Leadership

Elon Musk, the founder of Space X, started as the co-founder of Pay Pal and holds major interests in Solar City and Tesla Motors both founded by him. It is relevant here to characterize Elon Musk through his statement, "*If something is important enough, you should try, even if the possible outcome is failure*".

Elon Musk, through his own words has - a vision to change the World. First, on the purpose of founding Tesla Motors, to 'reduce the global warming through sustainable energy production and consumption', meaning, by applying the results of his cutting edge research in manufacturing battery powered electric cars, thereby reducing the use of fossil fuels with the aim of completely stopping environmental pollution at a future time. Secondly, he says, to 'reduce the chance of human extinction by making life multi-planetary and colonize Mars'.

Imagining possibilities- Elon Musk professes being forward looking is the second most admired characteristic of leaders who the followers prefer to follow. Elon Musk explains that most forward looking individuals have a desire to make a difference in the World and the best leaders are those who address this desire or longing by communicating the significance of the organization's work so that people understand and identify their own role in creating and performing that work.

The Space X Business Plan

It is relevant here to mention that all the Elon Musk founded firms follow these common set of rules which are contrary to conventional business practices. They are,

- No Elon Musk firm will patent anything
- No Elon Musk firm will advertise
- No Elon Musk firm will have any dealerships, they directly sell

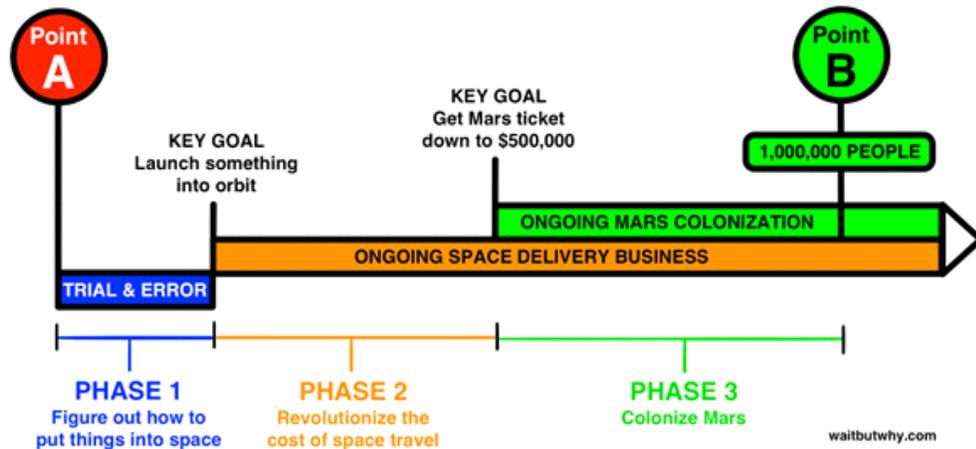
As mentioned above while introducing the leader, Elon Musk and his thoughts, the 'business plan' of Space X is unique and unlike any other business plan ever seen. Here is a diagrammatic representation of the plan which has, in the long run, dual purpose of space launches and Mars colonization as the long term objective. In 2008, when the company announced its intentions, the World was sceptical about these objectives and the Phase 1, coloured in blue has been surpassed by Space X and now they are in the Phase 2. Significantly, in the Space X's journey of invention, discovery and innovation in finding ways to send vehicles to space, they have achieved many firsts.

Their F9 rocket has done more launches as a model till date than any government agency till date, Space X is the first organization to achieve a sea platform landing of a returning rocket whereas the government launched rockets were wasted into the ocean earlier. Most importantly, the Space X space transport activity is the cheapest till date by any organization government or otherwise.

Recently, in Aug 2016, one of the Space X rockets with payloads from 5 clients including 3 foreign governments exploded within a minute of launching.

It is interesting to know about the Phase 3 of Space X business plan; that is to colonize mars. Space X is already on the job in identifying optimal living solutions for the Mars dwellers traveling from Earth.

The SpaceX Business Plan



A Brief Look at the Available Financial Information of Space X

Space X is a closely held private company and the availability of financial information is limited to what is made available by the company in the open domain.

Before we go into the financials, it is necessary to see the core activity which generates money for Space X. Falcon 9 or F9 is the only rocket model developed by Space X which is working for them and the cost of each launch is easily at 30% as that of the nearest competitor in the USA, the Boeing-Lockheed Martins' 'United Space Alliance' which works on contracts given by the NASA, uses government launch facilities. And an F9 launch costs 50% of the cost of a launch by the Airbus consortium of France.



As per the details available from the SpaceX website, Elon Musk has a 10% equity, 20% are held with private equity investors and another 10% by investors guaranteed by Elon Musk. 50% of the funding for all future operations is by the client as the company receives the money up-front for all launches from the client at the time of signing the contract. As on Dec 2015, Space X has over 40 launch missions scheduled and paid for by the clients, the details are available in the list given below.

Since 2010 up to July 2016, the Space X F9 rocket has performed 29 launches with 3 failures, which is a considerably good record as compared to the launch histories elsewhere in the World and is comparable to the launch record of Indian Space Research Organization (ISRO) which has about the same percentage of launch failures. However, the ISRO projects, being the Indian Government funded-executed ones, are not answerable to investors and are not subject to financial pressures as in the Space X. Further, the technical edge Space X enjoys is far ahead and fast developing as compared to the ISRO projects.

The uniqueness of Space X as a business entity is brought out as under:

Re-use of the launch rocket which others 'write-off'- Space X re-uses its rockets by making them land safely on earth platforms and sea

barges converted into floating landing sites. Thus saving enormous amounts on the launch vehicles. This is possible by the cutting edge innovation and engineering wizardry.

Amazing launch maths: A Falcon 9 launch costs \$61.2m, and a Falcon 9 Heavy at \$65m, are much less than the Lockheed Martin-Boeing alliance and the Airbus, both of which are listed companies. And Space X, in this field is entering its fourth year, whereas both these competitors are over two decades old. Once Space X masters the reusing of the launch vehicles, one can safely bet that the competitors will take a few years to catch up with Space X in terms of launch costs and profitability, thus the cash reserves to fund further research.

Elon Musk argues that reusability will yield “a hundred-fold cost reduction in marginal costs.” That only refers to the cost of the first-stage Falcon 9 rocket. It does not mean that the total cost of a launch will drop from \$60 million to \$600,000 — but it still leaves a lot of room for cost-cutting. According to Gwynne Shotwell, Elon Musk’s deputy each Falcon 9 launch costs “\$1 million or less” in fuel. Changing the oil and servicing on a recovered rocket costs perhaps \$3 million more. Then you add the overhead of running a space launch business (maintaining the launch pad, making payroll, paying the electric bill), and the cost of replacing Falcon’s second stage and its cargo capsule — neither of which are currently recoverable. It all adds up.

Beating the competitors: According to S&P Global Market Intelligence, Lockheed Martin earns about 12.6% profit margin from the space systems business, Boeing earns less than 10%. This, while charging twice the money, Space X charges plus a \$1 billion annual retainer from the US government. If Space X starts re-launching the used-serviced rockets, its profit margins will be ten fold.

Scarce profit data in the open domain: Being a privately held firm, Space X profit are difficult to obtain, knowing the secretive nature of its leader. However, authentic government sources estimate the figures profits currently at 10%.

Current Opinion of Prospective investors: There are seasoned investors following Space X who say they will dump Apple shares and buy Space X the day it lists in the stock exchange. Because, the launch costs may come down to few hundred thousand dollars and the company will be earning hundred times more.

The Business Strategy Perspective

Running the Space X business model through the available business strategy models require a brief back ground check indicated as under.

Reproduced model ‘Strategy by Two Lenses’ by Christian Rangen, Elisabeth Ovstebo and Inger Hanne Vikshaland. The two lenses being the Porter’s analysis approach for strategy and Gary Hamel’s innovation approach for strategy.

Strategy as analysis		Strategy as innovation
Analytical, Logical & Linear	Mindset	Creative & disruptive
Logical	Ambitions	Offensive
Stable, Expect it to be much like the present	The future	Unstable, Expect it to be different
Rational actor	People perspective	Passion
Preserve and tune existing business model	Business model	Develop and test a portfolio of new business models
SWOT PESTEL Five-Forces Value-Chain	Main tools	Disruptive Innovation, Business Model Canvas, Strategic Innovation Canvas The Innovation Pyramid
Difficult, creates resistance	Change	Love to create it, make change happen
Michael Porter	Leading proponent	Gary Hamel

Two lenses on strategy
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STRATEGIC INNOVATION CONSULTING GROUP
THE SPACE X STRATEGY OF CHRISTIAN RANGEN AND ELISABETH OVSTEBO IS VISUALISED UNDER A STRATEGIC INNOVATION CONSULTING GROUP'S REPORTING CHANNEL.

Applying the approaches to the Space X Business Model characterises the following aspects:

- **The mind set** of Elon Musk is innovative and disruptive, and the very ethos of founding of Space X is disruptive and in a way, leap of faith.

- **Ambitions** of Elon Musk if not 'offensive' for the Space X, break all the set rules in the minds of the erstwhile 'experts' and these rules are being broken as a routine.
- **The future:** The expectation of the future for Space X is bordering on un-certainty, and while others think that it is teetering on the brink, each passing month and week prove is proving that this is a company that thrives on stretching the barriers of impossibility and is succeeding.
- **People perspective** simply believes in the passion of the employees and their faith in the leader's vision. Anything less is considered inadequate. Only the best minds who 'believe' are hired and others do not exist for this company.
- **Business model** as viewed by the erstwhile business strategists is vague, at times non-existent and depends continuously on innovation, invention and discovery of relevant nature. There is a visible dis-regard for the profit forecasting, estimations and logical reasoning but a religious regard for new thinking and innovation. The business model itself is a mix of several models with its own character.
- **Main tools:** Disruptive innovation leading to a multiplicative effect on the possibilities of strengths deployment. As per the Standard & Poors' Global Market Intelligence (S&P GMI) analysis of the space rocket launch business by private players across the World, Space X, once perfecting the re-launch protocols and technology to the usable stage from the current demonstration stage, the profits are envisaged to jump from the current 50% to 1000% or more. The figure is still considered conservative but the analysts argue that, 'how can you estimate the possible profits in a field where, what you were discarding into oceans once will be used intact by Space X for at least seven launches. Till that happens, the loss of the rocket after every launch is the only major expenditure, once they (Space X) master the re-launch, perhaps no other company can match them for a long time till the time they also master the same'.

- **Change:** Change is a misnomer for the Space X, because it is not just change which is happening inside the company, but it is the change in the understanding of the basic laws of physics, paradigms of mathematical explanations in belief erstwhile and the endless possibilities they are creating in terms of business.

Taking Space X business model through the Porter’s 5 Forces as Academic Study

<p>Bargaining power of suppliers</p>	<ul style="list-style-type: none"> • Marginal, as all the research is done in house and components and assemblies are in-sourced if the supplier does not play up. • For the next decade, the requirement of the same component in big numbers not envisaged. All items required are produced in-house, in small numbers. • Control of suppliers may gradually increase once the firm increases the number of launches to several times that of the present, which is one per 3 weeks.
<p>Bargaining power of customers</p>	<ul style="list-style-type: none"> • Marginal, as currently Space X is giving the price advantage of over 50% to the nearest competitor • The business of space launches being a highly capital intensive affair, the money is collected at the time of contract and the deal itself is kept transparent • In over 60% of the launches the clients are governments or government designated agencies. Hence the bargaining power of customers is related to the policy changes the government may make. Currently, Space X launches are taking place from the US. In the future, launches may take place from international ocean based platforms where in the bargaining power of the customers even in terms of policy may be reduced.
<p>Threat of new entrants</p>	<p>Yes, the threats exist. The following organisations are the probable competitors.</p> <ul style="list-style-type: none"> • Several Russian government backed or partially Russian owned companies • The Chinese government • The Indian government • Mitsubishi Heavy Industries in Japan • Arianespace, supported by some European governments <p>In addition, Amazon’s Jeff Bezos, himself not a match for the technical genius of Elon Musk has already floated Blue Origin. a</p>

<p>Threat of new entrants</p>	<p>Yes, the threats exist. The following organisations are the probable competitors.</p> <ul style="list-style-type: none"> • Several Russian government backed or partially Russian owned companies • The Chinese government • The Indian government • Mitsubishi Heavy Industries in Japan • Arianespace, supported by some European governments <p>In addition, Amazon’s Jeff Bezos, himself not a match for the technical genius of Elon Musk has already floated Blue Origin, a space launch business company which in the future may take lead in challenging Space X.</p> <p>However, in the following areas, Space X’s pace of innovation is easily the fastest.</p> <ul style="list-style-type: none"> ➤ Launch vehicle engine configurations ➤ Re-use of launch vehicle, recycling of parts and assemblies ➤ Seaborne landing platforms ➤ Re-entry shields, material research ➤ Hiring of people, per capita contribution to the core business of the organisation <p>The above list of innovation and research edge covers most of the areas of space exploration and rocket technology, as the months and years go by, Space X may achieve higher gaps in all these areas vis a vis the competitors. It is relevant to mention here that the competitors took several decades or years to arrive at the current position and within 5-7 years of existence, Space X is leading the pack in most parameters.</p> <p>Space X will not suffer from bureaucratic delays, multiple levels of decision making, tiring and long negotiations involving government functionaries, finance agencies and social activists. In fact, Elon Musk’s hold on the entire organisation is complete and undisputable.</p>
<p>Threat of substitute products</p>	<ul style="list-style-type: none"> • Threat of a disruptive innovation exists in the form of space lift/a re-entry technology which does not burn or destroy the vehicle while returning to the earth surface.

	<ul style="list-style-type: none"> • Space X being the latest entrant in the space launch arena, has chosen the approach of innovation and change as compared to the competitors, thus taking care to not make the same mistakes made by the competitors who have been in the business for a long time. • Space X started with strict budgetary controls and on a need-to-spend basis rather than the government approach of allocating a large amount of money and spending it within a given period. The result is the optimal use of every possible resource, an employee base which is one of the most passionate, innovative and resourceful. • Entire SpaceX is a research centre, best of minds always on their feet and presently there are no competitors for Space X.
<p>Competitive rivalry within an industry</p>	<p>Yes, this is already in motion. Though the contributory effect of the bargaining power of suppliers and customers, threat of substitute products and the threat of new entrants is insignificant, a strong leader and innovator like Elon Musk may challenge the status quo and crash land in this domain.</p> <p>Elon Musk is a genius with a proven history of erratic behaviour, unpredictability and ability to relate seemingly different businesses together into profit making ventures. There are competitors who are equally stubborn who may stand up to Elon Musk and compete, such as Jeff Bezos with his Blue Origin.</p> <p>Jeff Bezos and Blue Origin, the competitor: Jeff Bezos, founder of Amazon, the e-commerce giant, started Blue Origin with a childhood dream of making spaceflight affordable to the public. Bezos's professional history is a saga of changing businesses from selling books directly to customers to selling apps and toys and now to the spaceflight start up. Similar to Elon Musk, Bezos has the ambition of making space travel similar to air travel and venturing into inter planetary travel and colonizing of other habitable planets. Bezos has invested \$46.7 billion of his money into this venture and is a serious competitor. There is a difference though between Musk and Bezos, while Musk's space ventures are in public record, Bezos has been secretive in the current developments at Blue Origin.</p>

Future Rocket Launch Calendar of Space X

Space X has announced a calendar for over 50 launches spanning from 2017 to 2019 which includes launches for a number of US and other nationality clients. This includes launching of a lunar lander weighing over 500kg in 2019. Space X is gradually increasing the launch payload capacity from under 3 tons to over 5 tons by 2017 and to achieve 10 tons by 2019. The core profit area currently and in the foreseeable future is the launching business with client payloads. The envisaged Mars Colonization is yet to see the light and it is not known as to what stage the solutions for this objective have reached. However, believers in Elon Musk are expecting breakthrough announcements in 2017 on this.

Possible Threats to Space X Profitability and to the Viability of the Business Model of Space Launches

Briefly, possible threats to Space X business model and to the viability of earning profits can be listed as under:-

- **Technical failures :** Technical failures may lead to cost overruns as project costs per unit is enormous and may lead to the drying up of finances
- **Competition:** Already, Jeff Bezos' Blue Origins are in the fray and have shown clear intentions of matching Elon Musk both in Mars Settlements and space rocket launches. This may lead to erosion of profit margins once more private players join the race.
- **Disruptive technologies:** Space exploration is an unpredictable field. The author takes the liberty of listing several researches going on in the field where the rockets themselves may become obsolete, such as Hyper Planes which are normal aeroplanes which can be configured to travel in space, Space Lifts which are geostationary and are capable of providing permanent connection with a fixed space station from a 'Space Drome' located on the earth surface. Both of these can carry pay loads.

- **Accidents and incidents:** Space shuttle challenger and columbia failing in 1986 and 2003 respectively, resulting in the death of the crew, pushed back the US Govt efforts in space research by 6 years as stated by the NASA. Eventually, space shuttles are considered too expensive, complex and have become far and few in usage. Similarly, if a Space X rocket carrying astronauts fails or results in their death, the pressure on the Govt or the financing agencies to continue funding will be enormous.
- **Leadership losing interest:** Till now, Elon Musk is the founder, leader and promoter of several companies including the Space X. His interest has spanned from remote payment platforms, automobiles, electric automobiles, solar energy, space and many others. If he loses interest in Space X sometime in the future, it may be difficult for his replacement to continue the same momentum, zest and commitment.

Conclusion

The above information and endeavor for analysing the available information on Space X may seem unconventional. Because, the leader Elon Musk is unconventional, his Space X is unconventional and the information available about it is unstructured, unlike a regular listed company. There is no other private company or a start-up which has generated such interest among the discerning management professionals than Space X because the nature of its business, the scale of the investments needed, the kind of risks involved and the public opinion it may cause if the projects fail. The trail blazing characteristic of Space X and its founder is the enormity of the ambition and objectives set and the way the company is moving towards achieving them.

For a strategy professional, this Space X business model may seem like an untested, unknown and non-conforming venture which does not fit into any established conceptual strategic framework. The interesting aspect is that it is working. And that is qualification enough for this business model to be studied deeper and analyzed in detail.

It is relevant here to mention that Elon Musk, the co-founder of PayPal, an internet based financial transaction firm, founder of Tesla Motors where he wants to relieve the humanity of dependence on fossil fuels by making efficient and economically viable electric vehicles, co-founder of Sun City, where he wants to make the renewable source of solar energy the main competitor to the fossil fuels and wants to solve the energy requirement problems of the World forever- now wants to launch rockets to space and eventually make humans successfully develop residential settlements on Mars. For an average business professional, the Mars settlement may sound far-fetched and fairy tale like. But this innovator has a history of proving the World wrong and Space X may be a game changer for the mankind.

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