

Spacetech Startups in India– Challenges for Private Actors

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Abstract - An explosion of space startups around the globe is supercharging tech innovation, opening new markets around the world, and expanding the space power countries' influence. Despite the space program slowing down by the pandemic in 2020, the pioneering development by private players in space reach and activity to effectively utilize outer space resources has been in constant move. With the dynamic development of space activities and involvement of private space actors at the international level, many developments, ranging from cultural repositories to medical or stock photograph archives, have also appeared. The rivalry between the Space powers, whose space program has surged over the last two decades, is what most people mean when they refer to the 21st-century's space race.

Keywords — Technology entrepreneurship, Spacetech Startups, ISRO, Liability, Outer Space Law, Legal Challenges, Indian Space Programme.

I. INTRODUCTION

Technology is not an objective to be aimed at, but a tool to be used for the benefit of the common man", believed Vikram Ambalal Sarabhai, the man who spearheaded India's space program. Technology entrepreneurship has been gaining prominence in India, with policymakers and private individuals coming together to promote national economic growth. India is no stranger to start-ups in the twenty-first century. Perhaps it is the third-largest base for high-tech startups in the world. However, this surge in start-ups has also revealed the lack of vital factors or infrastructure, to be more precise, legal infrastructure to survive, sustain and grow. The legal lacuna and associated insufficient understanding of high-tech start-ups like Space tech companies have dwarfed the strategies to be adopted or capable of adopting in its life cycle.

In the 70s in the USA, increased knowledge of workers, ability to master new technologies with that knowledge resulted in structural changes in the economy of developed countries like the USA, and since the 1990s, policymakers in the USA shifted focus from controlling large firms to promoting small entrepreneurial firms, which also evidenced decreased demand for less-skilled workers. It resulted in a fundamental change in the role of government

from an overseer of business to that of a partner in business. In India, state support has been limited when compared to the USA and Europe.

Recently, technological expertise development, enhanced investor interest, and improvement in India's local and government policies have instigated a revolution in Spacetech startups. The Indian Space Research Organization (ISRO) has created an enabling environment for private companies to launch their space objects by promoting a level playing ground and access to geospatial data and facilities. Notably, more than 100 active startups, with almost 70 percent of them, have emerged in the last few years. Nonetheless, the success of Spacetech startups is limited in scope compared to the state-owned space agency, with an insufficient definition of boundaries for the application of the Space Law and existing unresolved legal challenges since 1967 that impede their success.

The Need for Private Sector Participation

The private sector should join the ISRO in the party. The commitment of the ISRO thus far is remarkable in terms of exploration of the air spaces. However, the institution heavily depends on the state for its fund. India must expand with the growing need for analytics, earth observation, economics, space science, and navigation. Therefore, the organization projects must have financing from ulterior sources to see them to completion. With the heavy resources required for space exploration, the government has little to show for space exploration in the nationals' face. Space research will eventually lead to the betterment of the country, but it cannot realize its potential unless it has support from sources independent of government financing. The need for funding is mainly due to the heavy capital investment in installing space vehicles and projects. An analysis of established spacecraft is essential in the quest for settling in the proposal. For example, NASA proposes that each space tour cost the institution about 450 million dollars. The launch of the spacecraft, Russian Soyuz, cost \$81 million per seat. The cost is an indication of the significant expenditure to service the program.

Moreover, the statistics from the institution prove that ISRO has been resourcing materials from private industries. Polar Satellite Launch Vehicle 80% of the materials were



from the private sector. More than 120 institutions had a part to play in the manufacturing of the Mars Orbiter Mission satellite. Most of the harvested data benefit the National Atmospheric Research Laboratory, Regional Remote Sensing Centres, North Eastern Space Applications Centre, Development and Educational Communication Unit, and the National Remote Sensing Centre.

Apart from mission support, private sectors can help address the 5G backhauling and satellite broadband gateways. The Antrix Corporation, through the Department of Space, closely monitors Airspace and regulates the consumption of space information. The two corporation arms of ISRO have less than a percent contribution to the world space information consumption. Space global market stands at 360 billion from activities related to the downstream, midstream to the upstream. The Indian space industry is responsible for the contribution of a 7billion dollars to the world space market. Information mining through the assistance of the private sector can aid in the integration of machine learning and artificial intelligence. Such commercialization will improve agricultural studies, disaster management, oceanographic studies, weather forecasting, scientific research, and communication.

The private sector welcoming package into the industry insulates them from the possibilities of losses, thus service their entry into the market. The drive to attract the private sector into the running of the operations is suiting enough to entice one or two institutions in the lucrative investments. The ISRO aids the development, evaluation, and release of spacecraft. The ISRO signed the public-private partnership act to help more manufacturers raise before the curtains to realize such dreams. The agreements help the companies that were constitutes of major ISRO projects to soar to independent manufacturers. The body has also allocated and serviced 25 acres of land to settle the potential spacecraft manufacturers in Bengaluru. The likely manufacturers are, in fact, the large body of SMEs in the Indian spacecraft market. The ISRO contacts are responsible for the tier two/tier three project resource supply. Offering such a platform o the industries will ensure that the organization helps disseminate information in the development of the once independent suppliers. The organizations should take up the chance since the organizations can improve the end-to-end manufacturing process.

The Indian economy has to partner with the private sector to ensure that they reach its desired promotions. The world's budget is 99% less than the Indian economy. The Indian market, too, wishes to grow a GDP value of 5 trillion in the next four years. Therefore, to do so, they have to increase the CAGR value. The nation has to grow at 48% CAGR for the next four years to reach \$ 50 billion in the next four years. The growth rate is the roadmap to success.

Comparative Analysis of State-Owned Space Agency (NASA) Versus a Private Space Tech Startup (Space X)

Today, there is a new shift in human space exploration as the long-standing position held by governments on space travel is experiencing rapid infiltration by Spacetechn startups. According to Meyer (2021, 243), the changing dynamics bring enormous benefits and present NASA with new challenges and an uncertain role in its contribution to Safety Aerospace and Advisory. In particular, the founding of NASA in 1958 has remained a world-standing human spaceflight for a very long time. The organization has set the pace for the American space project, with its leadership in the industry remaining preeminent. However, the only concern is the evolution of its role concerning outer space risks and safety (How an international treaty signed 50 years ago became the backbone for space law, 2017, n.p). The organization is credited with how it fostered the space industry the same way it did with the aviation industry from the early 20th century. Spacetechn companies such as Space X, on the other hand, utilize private citizens with fewer experiences to visit space with funding from a few billionaires. Any private company can buy a ticket to orbit in this current Space age, with NASA just acting as an onlooker. The company highlights how private individuals such as Elon Musk are willing to fund space projects, intending to help businesses function (Sehgal, 2021, n.p). Therefore, the combination of innovative NASA programs and other private agencies is currently transforming the space industry to expand opportunities for the economic development of outer space.

Space Law (The Outer Space Treaty, 1967)

The development of Space laws sets the principles and rules that aim to regulate the activities beyond the aerial zone to help explain the concerns raised in the definition of boundaries. Such laws focus on improving the well-being of all the members of the international community (IC) and enhance cooperation. Notably, The Outer Space Treaty is one of the five treaties set by the IC to govern the exploration and use of outer space. In particular, Space Law ensures that any exploration space agencies conduct their businesses for the best interest of the IC, regardless of the nature of the aim of their exploration (The Outer Space Treaty, 2021, n.p). In essence, any nuclear weapon activities are prohibited in the cosmos, as the use of celestial bodies such as the moon must be considered for peaceful coexistence. Additionally, the treaty provides that outer space exploration is free for all states and is not a sovereign space or an object of occupation (Anon, 2021, 6). Any activities of private agencies within certain jurisdictions are answerable to their particular states for any activities they conduct in space. Therefore, states are accountable for actions within their boundaries (How an international treaty signed 50 years ago became the backbone for space law, 2017, n.p). The law offers startup companies an opportunity to fit well in the space exploration ecosystem.

Since compliance is to be adhered to by all agencies, such as NASA and ISRO of India, peaceful exploration of space and a lasting framework guides nations and all parties.

Legal Challenges for a Private Player in Outer Space Activities

The ISRO, since 1969, has been responsible for all space-related activities in India. The organization is solely responsible for building satellites and rockets before launching them into orbits. In particular, private players have since been limited to make rockets and spacecraft but offered limited scope in controlling and managing their operations (Anon, 2021, 10). Therefore, there still lacks a clear framework to define the scope of what is allowed and what is not. In this regard, there is a regulatory vacuum for operating, building, and launching satellites from India. In addition, the existing policy framework is not in line with the current global market demands and realities (Meyer, 2021, 246). Most startup companies are then shifting bases outside of the country to operate their space assets from those countries. Another significant legal challenge is funding opportunities provided by NASA, where private investors can get access to patents and easily access their customer base (Sehgal, 2021, n.d). Therefore, until recently, India lacks definitive laws of its own, aside from its ratification of four out of five treaties and signing one. In general, the Outer Space Treaty (OST) drafting set out rules that govern the interaction of individuals in space. However, these rules failed to factor in the extent of possible future interactions between individuals. The rules are deficient in how they give states the jurisdictional areas focused on governments without factoring in private players in the future. Therefore, innovative legal regimes need to be developed to control both private and public agencies in space.

Policymaking related to start-ups, more recently space tech startups, has evolved with time, reflecting the understanding of the contribution of knowledge and technology in the economy.

Conclusively, the development and emergence of Space-tech startups have created a technological disruption where more inhabitants of the earth are launching more satellites and other objects into space than before. However, for an extended period since the inception of the Space Law treaty, governments have neglected the regulatory advancements that need to fit with today's innovative startup companies that seek to launch the space. The existing legal frameworks limit the definition of boundaries and application of space law that has since remained a pressing challenge since 1967, restricting the success of private space companies.

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