

PAKISTAN'S SPACE POLICY: TAPPING INTO THE SPACE POTENTIAL

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(Views expressed in the brief are those of the author, and do not represent those of ISSI)



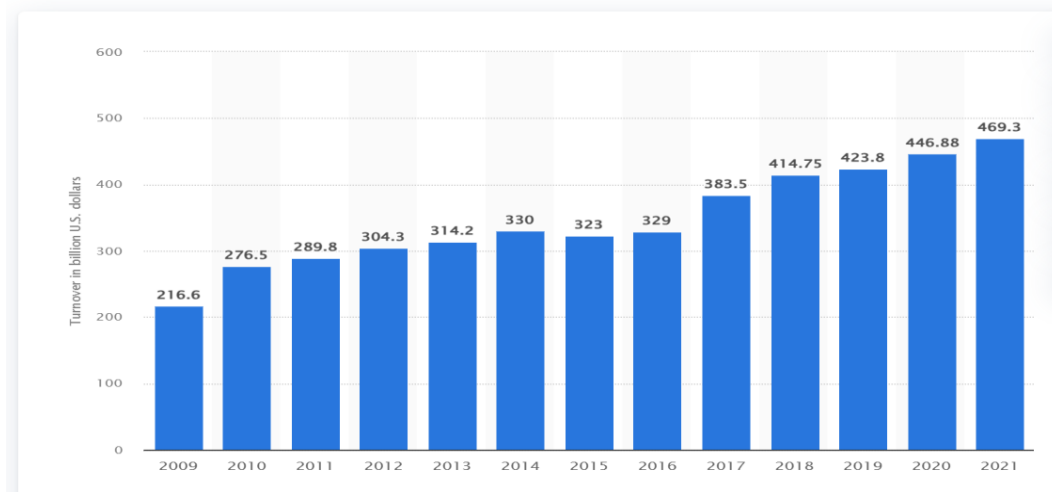
On December 13, 2023, the caretaker federal cabinet approved Pakistan's first space policy under which international companies would be allowed to provide communication services through low-orbit communication satellites. Information Minister Murtaza Solangi said that under this policy, Pakistan would also establish a space regulatory regime according to international standards. Ultimately, it aims to develop and enhance Pakistan's space industry, promote international collaboration, and strengthen domestic capabilities in space science and technology.¹ Today, tapping space potential is vital for both military and civilian use. Satellites play a vital role in every facet of life from navigation, agriculture, urban planning, disaster management, water resource management, health, and industry. It plays an important role in a nation's socio-economic development. It can also play a role in the promotion of UN Sustainable Development Goals. Most of all, it can be a lucrative way to boost a country's economy. According to one estimate, global space economy in 2020 was worth \$447 billion.² Despite having a modest space programme, Pakistan is increasingly leveraging its space-based

1 "Federal cabinet approves Pakistan's first-ever National Space Policy," *Dawn*, December 13, 2023, <https://www.dawn.com/news/1797548/federal-cabinet-approves-pakistans-first-ever-national-space-policy>

2 Global Space Economy, <https://www.statista.com/statistics/946341/space-economy-global-turnover/>

assets to achieve sustainable development goals and socio-economic development. It is thus important to explore what the Space Policy is, what it means for Pakistan's space programme and its potential to tap into socio-economic benefits of outer space.

Global turnover of the space economy from 2009 to 2021
(in billion U.S. dollars)



Source: Global Space Economy, <https://www.statista.com/statistics/946341/space-economy-global-turnover/>

While details of the policy are yet to be revealed, caretaker Minister for Information Technology and Telecommunications Dr. Umar Saif did say: "National Space Policy which will enable private-sector companies to offer affordable internet services in Pakistan, while enabling increased investment in our national space programme."³ Many companies like Starlink, Leo, OneWeb are offering these services through low-orbit satellites. He further reiterated: "The policy we made is a balanced policy. It means that SUPARCO and Paksat, which are government institutions, will provide satellite communication and imaging. Government institutions will avail their services but private customers will benefit from low-orbit technology in the private sector".⁴ If the policy is implemented private companies can be expected to start providing these services in a month or two. This is a much needed first step in involving the private sector. Mr. Saif said that the policy was drafted in a way that part of revenue generated from the private sector could be utilised by SUPARCO for research and development.

³ "Federal cabinet approves Pakistan's first-ever National Space Policy," *Dawn*, December 13, 2023, <https://www.dawn.com/news/1797548/federal-cabinet-approves-pakistans-first-ever-national-space-policy>

⁴ Ibid.

Pakistan's Space Journey

The Pakistan Space and Upper Atmosphere Research Commission (SUPARCO) founded in 1961 at the urging of Nobel laureate Professor Abdus Salam, was amongst the first 10 space agencies in the world with an active rocket programme in the 1960s. It was formed to oversee the country's public and civil space program, as well as aeronautics and aerospace research. Since then, Pakistan has successfully launched four satellites. The first of these was the Rehbar-1 sounding rocket, launched in 1961 for upper atmosphere research in collaboration with China and with technology assistance from space agencies in the United States, Britain, and France.

Over the following years, SUPARCO expanded its research and development efforts, focusing on remote sensing satellites for imagery and telecommunication. Its experimental satellites Badr-1 and Badr-B were developed during the 1970s. Badr-1, Pakistan's first digital communication satellite, was launched into Low Earth Orbit (LEO) in July 1990 with the help of a Chinese rocket. This satellite project was a joint effort by several Islamic countries under the Inter-Islamic Network on Space Sciences and Technology (ISNET) which was formed in 1986.⁵ Badr-B, or Badr-2, was launched in December 2001 with assistance from Russia. It was placed in a sun-synchronous circular orbit and primarily aimed to acquire earth imagery for experimental purposes and to support the scientific community in Pakistan.

China has played a significant role in Pakistan's space programme, offering access to its space technology and infrastructure. This collaboration resulted in the launch of Paksat-1R, Pakistan's first communication satellite, in August 2011. It provides broadcasting, internet, and data communication services not only in Pakistan but also in regions of South Asia, Central Asia, Eastern Europe, and parts of East Africa. One of SUPARCO's notable achievements includes the launch of two indigenous satellites, PRSS-1 and PakTES-1A, using Chinese assistance in 2018. The development of the PRSS-1 system for monitoring the China Pakistan Economic Corridor (CPEC), in collaboration with China, marks a significant milestone in the space cooperation between the two countries. Pakistan's earth observation, remote sensing, and communication satellites make Pakistan somewhat self-reliant in communication and high resolution imaging while providing a wide range of different services to the nation and valuable scientific data to global science communities.

Pakistan Space Vision 2040 was approved by the National Command Authority in July 2011. It subsequently became known as 'Vision 2047.' Under the vision, Pakistan plans to launch five GEO satellites and six LEO satellites by 2040 and also plans to send an astronaut into space with Chinese

⁵ Ajay Lele, *Asian Space Race, Rhetoric or Reality* (India: Springer, 2013), P. 46.

help. While Pakistan mostly uses Chinese launching facilities, it has ambitious plans to build its own launchers and be self-reliant in launching satellites.

Pakistan and Uses of Space Technology

Pakistan is using space technologies for socio-economic development already. The PRSS-1 and PakTES-1A Ground station, launched in 2018, have various applications both nationally and internationally. These satellites are particularly useful in remote sensing data products, agriculture, forestry, disaster management, water resource management, environmental monitoring, urban planning, cryosphere modeling, coastal and marine resource management, and geology and mineral prospection.

Agriculture

In the agriculture sector, space technologies are greatly benefiting Pakistan, a country heavily reliant on agriculture. Remote sensing technologies are currently being utilized to classify different crop types, estimate crop areas, monitor crop health and growth, assist in crop production and yield estimations, monitor droughts, water logging, salinity, and land degradation, and support precision agriculture. They also play a crucial role in identifying and eliminating pests and diseases in farmland. Moreover, remote sensing technology provides valuable information about soil moisture, aiding in planning irrigation needs.⁶ Another important aspect of remote sensing technology in agriculture is soil mapping, which helps identify soils unsuitable for crops.

Given the already substantial applications of space technology in agriculture, there is still potential for further advancements that can enhance Pakistan's socio-economic indicators.

Disaster Management

The use of satellites can assist in the management of natural disasters such as floods, droughts, deforestation, and forestation. SUPARCO has established the Space Applications Center for Response in Emergency and Disasters (SACRED) in 2013 to provide space-based technical support for disaster management. Additionally, SUPARCO hosts the UN Platform for Space-based Information for Disaster Management and Emergency Response (UN-SPIDER) Regional Support office since 2010, offering assistance to regional countries. Pakistan is also developing a National Catastrophic model and Disaster Management Information System to address various types of disasters. SUPARCO

⁶ Mahvish Malik and Misbah Arif, "Managing Non-Traditional Threats by Using Space Technology: A Case of Pakistan," NUST Journal of International Peace & Stability 2019, Vol. II (2), p. 40.

collaborates internationally for disaster management through memberships and partnerships in various projects and organizations.

Water Resources

In Pakistan, where water resources heavily rely on glacier melts and monsoon rains, remote sensing systems (RSS) are used to monitor and manage water resources. RSS provide valuable information on the health of watersheds, water bodies, dam sites, surface water resources, snowmelt, rainfall, river runoff, surface energy balance, evapotranspiration, hydrological modeling, surface water resource mapping, irrigation networks, ground water prospecting, wetland ecosystem modeling, and soil moisture estimation. According to Pakistan's Council of Research in Water Resources Pakistan will become water scarce by 2025 and it is predicted to become the most water-stressed country in the region by 2040.⁷ Thus, remote sensing satellites are imperative to manage the country's resources optimally.

Weather Forecast

SUPARCO operates the Pakistan Space Weather Centre (PSWC), equipped with state-of-the-art instruments to monitor space weather phenomena in real time. The center disseminates HF communication products to national users after processing.

Space Technologies for Mitigating Climate Change and Environmental Degradation

SUPARCO addresses climate change and environmental degradation issues through the integration of ground-based observations and satellite data. This approach allows for the forecasting of environmental indicators in different spheres, including the atmosphere, biosphere, cryosphere, and hydrosphere. SUPARCO operates four centers dedicated to monitoring and managing forest assets and operations, deforestation, changes over time, fog and smog patterns, and fire locations.

Navigating the Path Ahead

While Pakistan has utilized its space resources for the socio-economic benefit of the country, its space programme, one of the earliest in the region, has not flourished due to economic constraints and bureaucratic hurdles. Also the 1970s was the time when India developed the nuclear bomb forcing Pakistan to seriously consider developing a nuclear capability to defend the country.⁸ The

⁷ "Water scarcity in Pakistan," Pakistan Today, November 11, 2021, <https://www.pakistantoday.com.pk/2021/11/11/water-scarcity-in-pakistan/>

⁸ Feroz Hassan Khan, *Eating Grass: The Making of the Pakistani Bomb* (New Delhi: Cambridge University Press, 2013).

1970s and the 1980s thus saw a shift in Pakistan's policy towards the development of nuclear programme to build a deterrent capability. Funds were dedicated towards achievement of this goal and the space programme lagged behind countries like India that started their space programme well after Pakistan.

Today space programme is not an option but a necessity that is the engine of economic growth. The world space economy is growing each year. India's space economy is also expected to grow to \$10 billion by 2025.⁹ Pakistan has all the basic rocket technology that it can further develop to launch space vehicles and satellites. Once it develops its space industry, it can provide telecommunication, navigation and disaster management services to other countries as well. This will not only boost Pakistan's space programme but would also bring in much needed economic dividends. Commercial space industry is growing globally with many countries offering commercial space launch services for civilian use satellites that can earn a country billions of dollars.

Pakistan's National Space Policy is a step in the right direction and aims to tackle many challenges faced by its space programme. It encourages private sector involvement which could bring much-needed investment in the space programme. The public-private partnership may provide impetus to space programme. The space policy is characterized by its openness to international collaboration. By inviting corporations to operate low-orbit communication satellites, Pakistan paved the path to an emerging space economy.

However, there is much more that needs to be done in order to realize the true potential of space programme. Pakistan needs to develop the human resource, including education, research and training of personnel. It also needs to develop a space culture through educating and sensitising the public on the imperatives of an effective space programme. It needs to enact a regulatory framework that governs the space programme and also brings it in line with international standards. Internationally Pakistan needs to further develop collaboration with many states on peaceful use of space technology. Today nontraditional security threats like climate change are faced by multitude of countries and thus there is a need to collaborate to meet the challenges. Most of all there is a need to campaign to keep space from being weaponised and militarized.¹⁰ Pakistan has been an ardent supporter of Prevention of Arms Race in Outer Space (PAROS). Pakistan has always maintained that space is a global commons and needs to be preserved for human benefit.

⁹ Salman Hameed, "Can Pakistan Have its 'Sputnik Moment'?" *Dawn*, September 17, 2023, <https://www.dawn.com/news/1776295>

¹⁰ For more information see Ghazala Yasmin Jalil, "Securing the Final Frontier: Urgent Need for Arms Control in Outer Space" October 17, 2023, https://issi.org.pk/wp-content/uploads/2023/10/IB_Ghazala_Oct_17_2023.pdf

International community needs to come together for the pursuit of preserving space for peaceful activities for future generations.

Conclusion

Pakistan has made significant progress in utilizing space technology for peaceful purposes. However, its current space program is relatively small and has a long way to go in order to achieve full potential. It is crucial for Pakistan's policymakers to recognize the importance of establishing a strong space programme. Announcing a National Space Policy is a step in the right direction. However, a lot more needs to be done. Public-private partnership is important in invigorating the country's space programme and for bringing in much needed investment. Effective space regulations, human resource development, raising awareness and educating the public, as well as international collaboration are vital to the development of the country's space programme. An effective space programme is not an option but a necessity - being an engine for economic growth and socio-economic development today.