International Space Strategy

DEVISING NATIONAL SPACE POLICY IN PAKISTAN

Mohammad Ali Zafar

Ayesha Zafar

In 1962, Pakistan initiated a satellite research program—the first South Asian country to do so. Since then, Pakistan's space program has been subject to emerging security threats, abrogation and then restoration of the Constitution, a shift toward military use of space technology, and confusion over the structure of the national space program. In addition to these internal factors, there is a rising concern about the Indian quest for space technology. The growing diplomatic clout of India's space program and its dual use of space technology leading toward the development of an antisatellite weapon (ASAT) capability raises challenges for Pakistan. Accordingly, Pakistan's policymakers need to analyze the growing developments in the Indian space program that act as a rationale for Pakistan to devise a national space policy. The current structure of the space program in Pakistan and challenges posed by the Indian space program require Pakistan to recalibrate its space program by devising a national space policy.

Pakistan's progress in the area of space research has remained quite stagnant. From the day of its independence on August 14, 1947, several issues including the leadership crisis, resource constraints, constitutional problems, and an indecisive government, have caught the state in a tightening rope. Likewise, emerging national security threats and political instability have affected space program development. Although the initial space program in 1962 was designed to satisfy domestic needs and intended to conduct scientific space research, three martial law rules in Pakistan have shifted the focus of the space program from civil and commercial purposes toward maintaining strategic military orientation. Even so, today, Pakistan is focusing on the socioeconomic advantages of space utilization and set a budget of Rs 7.36 billion for the Space & Upper Atmosphere Research Commission (SUPARCO) for fiscal year 2022.[1] SUPARCO is the executive and national space agency of Pakistan.

Compared to Pakistan, India has made colossal progress in space research. Six decades of research have provided New Delhi with a key edge over Islamabad. India's space program includes historical, cost-effective programs such as Chandrayaan-2

Mohammad Ali Zafar works as a research analyst at London Politica and as an assistant fellow at the Sichuan University China.

Ayesha Zafar is a columnist based in Islamabad,Pakistan and is also a research editor with the German-Southeast Asian Center of Excellence for Public Policy and Good Governance, Thailand.

1. "Development in Focus as PTI Unveils Rs8.5 Trillion FY22 Budget," *Dawn,* June 12, 2021, https://www.dawn.com/.

and myriad active satellites and commercial satellites of several countries. India's space program dates back to 1963 when India's launched its first rocket, the US-supplied Nike Apache. Since its inception, scientific research has been at the core of India's program because of a belief that it could resolve many problems for the newly created state.[2]

In 2004 during the inauguration of the satellite-linked Village Resource Centres, Prime Minister Manmohan Singh stated, "More than any other institution, the Indian space program has brought great prestige to India, especially among the spacefaring nations."[3] The credibility of India's space program is evident by its strong position in space research, where it is ranked among the top spacefaring nations and was the first Asian country to reach the orbit of Mars.

Most research on Pakistan's space program focuses on the need for legislation. Scholars have discussed the need for Pakistan to enter "into all the five space treaties" and formulate space legislation.[4] While Pakistan must introduce space legislation that accounts for regional space programs and international commitments like any spacefaring nation, legislation is not the primary need of the country. For instance India, with its leading space program, also lacks national space legislation.

Therefore, introducing legislative reforms is not the answer. Such reforms entail a lengthy process, especially considering the historical development of SUPARCO, situated under the National Command Authority (NCA), and the fact that the word "space" is not even included in the Federal legislative list of Pakistan. These factors create hurdles for national space legislation in Pakistan.

Scholars do understand the need for space development in Pakistan, however, the real challenge is to understand why and how Pakistan needs to recalibrate its approach toward space research.[5] The answer is based on Pakistan and India's historical asymmetry in the conventional domain. To maintain the balance of power in South Asia, Pakistan needs to understand the threat that exists from the militarization of space by India and the diplomatic isolation of Pakistan in space research. Then Pakistan must determine a way forward. This effort remains a challenge for Pakistan, which has already spent a decade working to transition from a conventional to a counterinsurgency army. Solutions require a deeper assessment of the threat posed by the Indian space program, which include reassessing the decades-long air-, sea-, and land-centric approach toward military technology.

Pakistan's security policy has focused primarily on the threat from its eastern neighbor, India. This has been the case since its inception. Moreover, four major wars, numerous border skirmishes, oppositional narratives, and diplomatic tussles at global

2. Michael Sheehan, *The International Politics of Space*, 1st ed. (London: Routledge, 2007), 142–50.

3. Sheehan, *Politics of Space*, 142–50.

4. Murat Cancan et al., "National Space Legislation: A Dire Need for Pakistan," *Journal of Statistics and Management Systems* 24, no. 4 (2021), https://www.tandfonline.com/.

5. Miqdad Mehdi and Jinyuan Su, "Pakistan Space Programme and International Cooperation: History and Prospects," *Space Policy* 47 (February 2019), https://www.sciencedirect.com/.

platforms demonstrate their mutual hostility. Additionally, when Pakistan tested its first nuclear weapon at Chagai in 1998, it claimed India's hostile posturing had forced it to acquire a nuclear weapon of its own.[6]

Therefore, history reflects that for Pakistan to devise a policy with a security orientation, it acknowledges the existence of an Indian threat to its regional interests. This is why an understanding of the Indian space program, especially the development of antisatellite weapons, is the most compelling reason for Pakistan to devise a national space policy.

Both states have the capability to deter each other in the traditional arms race, but in space research, Pakistan needs to make gains. It can do this by devising a comprehensive space policy. To analyze this, the article examines the beginning of Pakistan's space program, taking into account the tempestuous history, a major shift in Pakistan's space research, and SUPARCO's structure.

The article then discusses India's space program and its recent developments, especially the development of antisatellite technology (ASAT) and that country's rising diplomatic clout, which could pose challenges for Pakistan in the future especially considering no state except China questioned India's testing of ASAT capability. The article concludes with a few recommendations for Pakistan's space program development using the Indian space program as a benchmark.

Pakistan's National Space Program

Pakistan's space program was initiated in 1961 during the days of political instability. Military dictator and Pakistani President General Ayub Khan's decision to join the US bloc during the Cold War led to the foundation of Pakistan as a "security state." At that time, Ayub accepted the proposal of Nobel Prize winner Abdus Salam for the establishment of a space research program.[7] Hence, Pakistan's first-ever space agency, known as the Space and Upper Atmosphere Research Committee (SUPARCO), was established on September 16, 1961.

In the early years of the Space Age in the late 1950s, the US National Aeronautics and Space Administration (NASA) offered to establish rocket ranges in all countries on the Indian coastline.[8] Pakistan accepted the offer and, together with other developing countries, became the first to carry out an experimental rocketry program.

In 1962 in collaboration with NASA, SUPARCO worked on a two-stage sounding rocket, the Nike-Cajun, which was used to initiate a sodium-vapor payload from

6. "Hostile Posturing by India Forced Nuclear Testing in 1998, Says Pakistan," NDTV, May 28, 2018, https://www.ndtv.com/.

7. Mian Zahid Hussain and Raja Qaiser Ahmed, "Space Programs of India and Pakistan: Military and Strategic Installations in Outer Space and Precarious Regional Strategic Stability," *Space Policy Journal* 47 (2019), https://www.sciencedirect.com/.

8. NASA, "SP-4401 - NASA SOUNDING ROCKETS, 1958-1968: A Historical Summary," "VII: Sounding Rockets during the Heyday of Scientific Satellites: NASA's International Programs," n.d., accessed December 12, 2020, https://history.nasa.gov/.

Sonmiani Beach, Pakistan.[9] Salam made a significant contribution to this effort by creating a team of nuclear engineers and scientists. Within two years of its establishment, SUPARCO sent a two-stage, solid-fuel sounding rocket with an 80 pound sodium payload, Rahbar-1, 130 km into the atmosphere. With the assistance of NASA, this test made Pakistan the third state in Asia and the 10th in the world to initiate its first-ever rocket.[10]

Pakistan and NASA also cooperated on the testing of two hypersonic sounding rockets named Shahpar and Rukhnum. Shahpar was a 7-meter solid-fuel, two-stage rocket that carried a 70 kg (154-pound) payload up to 950 km, and Rukhnum was a liquid-fuel three-stage rocket that reached 1,000 km in the atmosphere.[11] This was a big achievement for Pakistan and further opened windows of opportunity by providing scientists with a chance to explore space beyond the atmosphere and study cloud formation, cyclones, and weather patterns over the Arabian Sea. During this time, Pakistan's cooperation with the United States in space exploration played a significant role in Pakistan's space program. Pakistan made these major achievements in the first phase of its space program.

Similarly, new developments resulted during the second phase of Pakistan's space program under General Zia ul Haq, who came to power by imposing martial law in 1977. When Zia took charge, it was opined that SUPARCO would no longer be able to accomplish its original goals. Yet as a result of India's successful launch of its Aryabhatta satellite on April 19, 1975, Pakistan's leaders were motivated to consider devising something similar to counter it. Accordingly, SUPARCO was rejuvenated in 1979, and it began working on a new satellite named PAKSAT.

When Zia visited SUPARCO in the subsequent year, all ongoing projects were terminated due to the lack of funding. But one year later in 1981, through a presidential ordinance, he ordered the reestablishment of SUPARCO, but this time its focus shifted toward military use of space technology.

Pakistan encountered a major hurdle to its space program when the United States imposed sanctions following its first nuclear test conducted on May 28,1998 in Chagai.[12] Because of Pakistan's focus on developing the atomic bomb and its changing political landscape, the country's space program moved away from the United States and shifted more toward China.

During the time of the sanctions (1998–99), China extended strong support to Pakistan, which included support for its space program. This led to the launch of Pakistan's first-ever digital communication satellite, Badr-1, in the 1990s. Relatedly but

9. Hasan Murtaza and Ahmad Khan, "Pakistan Space Activities," in *Handbook of Space Security: Policies, Applications, and Programs*, ed. Kai-Uwe Schrogl (Cham, Switzerland: Springer Nature, 2020).

10. "Pakistan Space & Upper Atmosphere Research Commission, History," SUPARCO (website), n.d., accessed December 12, 2022, https://suparco.gov.pk/.

11. NASA, "NASA SOUNDING ROCKETS."

12. (Name Redacted) Legislative Attorney, American Law Division, *Nuclear Sanctions: Section 102(b) of the Arms Export Control Act and Its Application to India and Pakistan*, R98-486A (Washington, DC: Congressional Research Service, October 5, 2001), https://www.everycrsreport.com/.

much later, in 2014, Pakistan became the first state to deploy China's BeiDou GPS network.[13] In 1991, SUPARCO and the Chinese Ministry of Aerospace Industry signed an agreement to strengthen space cooperation, yet it didn't gain much attention and was limited to personal training and infrastructure development.

Apart from this, the 2005 launch of the Asia-Pacific Space Cooperation Organization with Pakistan, Bangladesh, Iran, Peru, Mongolia, and China was intended to promote space programs developed together with the member states for peaceful purposes. In 2011, Pakistan and China achieved another milestone of cooperation when they launched a Chinese-manufactured communication satellite known as Paksat-1R, which provides broadband internet and tele-education services to South and Central Asia, Eastern Europe, East Africa, and East Asia. In 2019, the states signed a space agreement which facilities Chinese training of Pakistani astronauts and the establishment of a Sino-Pakistan space committee.[14] Overall, cooperation with China will enhance Pakistan's capability in space research and boost cordial bilateral relations.

Structure of National Space Activities

When General Pervez Musharraf took power in 1999, he laid the foundations of the National Security Council (NSC) and approved the creation of the National Command Authority. Consequently, SUPARCO Amendment Ordinance-2002 gave the federal government control over the commission through the NCA.[15] Before the implementation of the ordinance in September 2000, SUPARCO had operated under the Cabinet Division for almost 20 years.

The other related wings, the Space Research Council and Executive Committee of the Space Research Council, were dissolved and replaced by NCA's Development Control Committee. The NCA was given complete authority to control and command all space- and nuclear-related activities.[16] This power also includes supervision, management, coordination, and control of the budget, programs, and projects of the "strategic organizations."[17]

Similarly, SUPARCO, which, per the 2010 NCA, was given the title of a strategic organization, has the authority to look after special scientific and technological work. Maintenance of security matters and defense of Pakistan also come under the responsibility of the NCA. But following the 1973 constitution and the NCA Act of 2010, the

13. "Pakistan Becomes First Country to Deploy China's BeiDou GPS Network," *Tribune*, May, 2014, https://tribune.com.pk/.

14. "Pakistan Signs Space Cooperation Agreement with China to Enable First Pakistani Astronaut," Spacewatch Asia Pacific, n.d., accessed December 12, 2022, https://spacewatch.global/.

15. SUPARCO Amendment Ordinance (No. CXXVII of 2002); and The National Command Authority Act 2010 (Islamabad: the Gazette of Pakistan, Senate Secretariat, March, 2010), http://www.na.gov.pk/.

16. "National Security Council of Pakistan (NSC)," Nuclear Threat Initiative (NTI), last updated December 17, 2021, https://www.nti.org/.

17. Naeem Salik, ed., *Nuclear Pakistan Seeking Security & Stability*, Center for International Strategic Studies Security Series (Lahore, Pakistan: University of Lahore, 2018), 87–89, https://ciss.org.pk/.

prime minister is the chairman of the NCA. On paper, then, the command seems to be under the prime minister, but in practice, the whole structure is under military control. Moreover, considering the persistent political turmoil—no prime minister has completed a full term in office—it is clear the military has been managing the NCA and space program in Pakistan.

Apart from this, all space-related regulations are the responsibility of SUPARCO, which coordinates the policies and programs of the federal government. The research related to space and space development activities, except for launch and services, come under the authority of SUPARCO. Additionally, the committee has been instructed to (1) plan, manage, and direct all industrial or scientific space research programs and projects; (2) work to endorse the transmission of space technology; and (3) promote the exploitation of space technology, capabilities, and facilities for commercial purposes. In this way, the National Command Authority, after receiving reports from SUPARCO, directly reports to the prime minister of Pakistan.

Clearly, the structure of Pakistan's space activities experienced a shift in approach when the military dictatorship of Musharraf implemented structural changes in the governance structure of SUPARCO, emphasizing the military domain and using resources for programs such as the Rehbar spaceflight program, the Haft program, Shaheen 3, and many other localized military-centric space programs. Despite this shift of focus to the military, Pakistan has undertaken some important bilateral initiatives to advance its space program.

Space Vision-2047

In recent years, Pakistan has started giving more attention to space research. In July 2014 during the nineteenth meeting of the NCA, former Prime Minister Nawaz Sharif approved Pakistan's National Space Program 2040 with the objective of bringing the benefits of space technology to the Pakistani public.[18]

This space program was later renamed Space Vision-2047 to mark the anniversary of Pakistan's independence. A few important achievements of the space program include the launch of solid-fuel rockets, geostationary orbit communication satellites, remote sensing, low-Earth orbit experimental satellites, space study, and applications in Pakistan. Moreover, the space program undertook projects related to agriculture, disaster management, water resource management, mapping, environmental monitoring, and others.[19] This is an important development because Pakistan is vulnerable to climate change, especially in terms of droughts, famine, and cloud bursts. It needs a remote sensing satellite to monitor weather events and coordinate effective response strategies.

Pakistan imposed a national emergency as a result of locusts in January 2020. SUPARCO and the Space Application Centre for Response in Emergency and Disasters,

18. "NCA Okays Nuclear Power Prog 2050, Space Prog 2040," Geo News, July 14, 2011, https://www.geo.tv/.
19. Murtaza and Khan, "Pakistan Space Activities."

together with the UN-SPIDER Regional Support Office, used space-based information to identify desert locust habitats based on vegetation, soil type, and other factors.[20]

Pakistan is also facing multiple water scarcity issues. Pakistan's Council of Research in Water Resources has already generated a warning that the country will become water-scarce by 2025. Regionally, Pakistan is predicted to become the most water-stressed country in 2040.[21] Likewise, floods, droughts, and changing climate patterns have already created significant problems not only for the water sector but also for agriculture. Hence, Pakistan's commercial satellite PAKSAT MMI-38, which is expected to be placed in orbit in the year 2024, will aid in mitigating these threats.[22]

But a major challenge is Pakistan's dependence on China for space technology. As a 2020 report noted, presently, Pakistan's total communication satellite capacity usage is approximately 2,200MHz; Pakistani satellites supply 21 percent of this capacity and foreign satellites supply the rest. This means Pakistan spends a minimum of $35-45 million annually on access to these foreign satellites.[23] Therefore, in Pakistan, there is a greater need to invest more in domestic space research to close this loophole.

Rationalizing National Space Policy in Pakistan

Pakistan, like other states, is compelled to regulate space activities for specific national reasons. Initiating a national space policy would address key national security concerns. The first concern is the growing diplomatic clout of India's space program. The second is India's shift toward the dual use of space technology, leading to the development of India's ASAT capability. The third concern is the growing angst over the state's international responsibility for national activities in outer space.

Indian Space Program

The Indian space program is one of the most proficient in the world. India has been able to strengthen these proficiencies in space exploration due to investments worth billions of dollars.[24] The Indian Space Research Organization laid the foundations for their diverse space program. Despite initially pursuing commercial competencies, India's space program has evolved, and the country is now using space programs for constructive space diplomacy, socioeconomic applications, and most recently, a far-reaching shift from peaceful use to the militarization of space.

New Delhi has undertaken a multifaceted approach to expand its position in space research. International cooperation in this arena is key to India's surge as a space

20. "SUPARCO Maps Potential Desert Locust Habitats in Pakistan, United Nations," Office for Outer Space Affairs, UN-SPIDER Knowledge Portal, 2020, http://www.un-spider.org/.

21. "Water crisis: Why Is Pakistan Running Dry?," *News*, June 8, 2018, https://www.thenews.com.pk/.

22. "PakSAT-MM1R," SUPARCO (website), n.d., accessed December 12, 2022, https://suparco.gov.pk/.

23. Khalid Mustafa, "Govt to Raise $700m for National Space Programme," *News*, June 24, 2020, https://www.thenews.com.pk/.

24. "Global Space Economy Grows in 2019, to $423.8 Billion, the Space Report 2020 Q2 Analysis Shows," Space Foundation, July 30, 2020, https://www.spacefoundation.org/.

power. This has not only bolstered space experience, but it has allowed India to emerge as the sixth most effective space exploring nation. It has 226 space cooperation agreements with different states focused on capacity building; exploration; telemetry, tracking, and command; satellite navigation; satellite communication; remote sensing; and space laws.[25]

In India, space cooperation with Russia includes the Thumba Equatorial Rocket Launching Station; a joint venture on Aryabhata, in 1975; cooperation on Chandrayaan 1 and 2; deployment of the first Indian in space, and many other projects including a remote sensing satellite (IRS)-1A, Youthsat, GLONASS, and GLONASS-K.[26] All this expanded Indo-Russia space cooperation at the same time, increasing Russian interest in the Indian market. Such actions allow India to improve its unilateral space research capability while expanding prestige-related space activities for spaceflight programs.

In partnership with the United States, India launched the American Nike Apache from Thumba, a venture for the Satellite Instructional Television Experiment in 1976, and INSAT-1A, 1B, and 1D between 1982 and 1990 to support broadcast, meteorology, and remote sensing experiments.[27] Along with this, NASA and the India Space Research Organization have launched joint initiatives including working groups to explore the potential use of NASA-owned laser retroreflector arrays in Chandrayaan-2 to make precise measurements of the Moon's distance, and NASA-India Space Research Organization Synthetic Aperture Radar to obtain fine-resolution images of Earth. This collaboration has diversified Indian space cooperation.[28]

In such efforts, India has taken a central role on the regional stage in space research. India's regional hegemonic designs include space supremacy. At the 18th South Asian Association for Regional Cooperation (SAARC) summit in 2014, India announced South Asia would have a SAARC satellite. Bangladesh, Bhutan, Afghanistan, Maldives, Sri Lanka, and Nepal signed the agreement.[29] Despite Pakistan's opposition, the project was launched in 2017 and the name was changed to South Asia Satellite.[30] This development poses challenges for Pakistan since space surveillance is a national security concern, consequently raising policy questions about how to

25. Charlotte Mathieu, "Assessing Russia's Space Cooperation with China and India: Opportunities and Challenges for Europe," European Space Policy Institute, June 12, 2008, https://www.files.ethz.ch/.

26. Mathieu, "Russia's Space"; "Indian to Fly on Russian Spaceship?," *Times of India*, March 28, 2008, https://timesofindia.indiatimes.com/; Indian Space Research Organisation, *Annual Report* (Bengaluru: Official Printers, 2007), https://www.isro.gov.in/; and Sergey Revnivykh, "GLONASS: Status and Perspectives," Civil GPS Service Interface Committee, March 14 2005.

27. "Nike-Apache," Fandom, NASA wiki, n.d., accessed December 13, 2022, https://nasa.fandom.com/; and Kenneth I. Juster, "Unleashing the Potential of U.S.-India Civil Space Cooperation," address to India-United States Conference on Space Science, Applications and Commerce, Bangalore, India, on June 22, 2004, https://2001-2009.state.gov/.

28. "NASA-ISRO SAR Mission (NISAR)," NASA (website), n.d., accessed December 13, 2022, https://nisar.jpl.nasa.gov/.

29. "Prime Minister's speech at the 18th SAARC Summit," Ministry of External Affairs (MEA), Government of India (GOI) (website), November 26, 2014, https://www.mea.gov.in/.

30. "India Launches 'Invaluable' South Asia Satellite," BBC, May 5, 2017, https://www.bbc.com/.

counter India, which is taking an official lead in space research with the agreement of regional players.

Moreover, India has partnered with the European Space Agency and signed an agreement leading toward the launch of Europe's Ariane 3 rocket into space with India's first geostationary satellite, Apple.[31] The agency's support for India's lunar mission has allowed both to cooperate—a key to their space strategies. Further cooperation includes space programs for communication, navigation, and earth observation.[32]

India's major EU space cooperation effort is with France. The two nations have worked on Megha-Tropiques to study climate-related aspects, launched SARAL in 2013, and undertaken TRISHNA, a joint Franco-Indian mission to monitor the water status of Continential ecosystems.[33] Despite nascent cooperation with the EU vis à vis Germany, India's efforts illustrate its desire to widen its joint role in space research.

Similarly, India is now a space service provider. The Association of South East Asian Nations (ASEAN) is a case in point. India has provided Indian remote sensing data via a framework agreement with Vietnam in 2016, and it has established stations in Ho Chi Minh City. Additionally, China trains ASEAN members in satellite engineering.[34]

Scholars have discussed the diversity of India's space cooperation with other states, analyzing the country's evolution, challenges, and accomplishments in international space cooperation including bilateral and multilateral efforts.[35] All of this highlights New Delhi's intent to continue expanding its global ambitions: currently India has space cooperation operational agreements with multiple states and international organizations, including the United States, the European Space Agency, France, Canada, Israel, Brazil, Venezuela, Indonesia, Maldives, and Mongolia.[36]

India's increasing diplomatic clout means fewer states question India's militarization of space. In fact, Pakistan and China were the only two nations that raised their voices against New Delhi's 2019 ASAT capability test.[37] Moreover, India's strong relations with several spacefaring nations complicates Pakistan's efforts to forge ties with them in the space domain, especially when India builds threat hysteria regarding Pak-

31. "India – Europe cooperation," The European Space Agency (website), October 20, 2008, https://www.esa.int/.

32. Isabelle Sourbès-Verger, "EU-India Cooperation on Space and Security," working papers 16, no. 38 (Rome, Italy: Istituto Affari Internazionali, December 2016), https://www.gatewayhouse.in/.

33. "SARAL," India Space Research Organisation (ISRO) (website), 2013 https://www.isro.gov.in/.

34. "ASEAN-India Relations," MEA (website), n.d., accessed December 13, 2022, https://mea.gov.in/.

35. B. R. Guruprasad, "Understanding India's International Space Cooperation Endeavour: Evolution, Challenges and Accomplishments," *India Quarterly* 74, no. 4 (2018), https://www.jstor.org/.

36. "International Cooperation," ISRO (website), n.d., accessed December 13, 2022, https://www.isro.gov.in/.

37. Malcolm Davis, "Will India's Anti-Satellite Weapon Test Spark an Arms Race in Space? The Strategist, March 29, 2019, https://www.aspistrategist.org.au/.

istan's military arsenals and fosters misperceptions through disinformation regarding Pakistan's regional ambitions.[38]

Moreover, India's former national security advisor Ajit Doval's doctrine provides further justification of how India aims to use its defensive-offense mode, which includes the aim to internationally isolate Pakistan.[39] The doctrine promotes the use of diplomacy and military power to negotiate from a position of strength.

In addition to the increasing diplomatic clout of India in space research, other rationales exist for Pakistan to devise a national space policy, including the commercialization of the Indian space program. In 2014, India introduced attractive policies for high-technology innovation for the private sector, leading to the Make in India approach, which opened the door to a strong space-technology investment component for the space program.[40] This initiative offered 100 percent foreign direct investment for satellite construction and operations.[41]

The private sector backing of businesses in spacefaring countries, particularly Australia, New Zealand, Luxembourg, and the United Arab Emirates, demonstrates the democratization and privatization of space activities in India.[42] These activities increase India's relationships with international vendor suppliers, which will eventually allow India to improve and expand its domestic space research capabilities, thus raising potential challenges for the rise of new spacefaring nations, especially Pakistan.

As a result of 2020 space reforms, India established a new facilitating agency, the Indian National Space Promotion and Authorization Centre (IN-SPACe), to develop private-sector-friendly regulations.[43] To promulgate industrial policies that promote innovation and support using ISRO space infrastructure, the organization has initiated the Space Entrepreneurship & Enterprise Development project to support new space-related start-ups.[44] This will increase start-ups and technology companies' accrued investments and increase India's share in the space market beyond the current 2 percent.[45]

---

38. Mahnoor Saleem, "Indian Disinformation Operations against Pakistan and Its Implications," Centre for Strategic and Contemporary Research (website), December 29, 2021, https://cscr.pk/.

39. Abdul Rasool Syed, "Doval Doctrine & Covert Operations," Daily Times, March 18, 2019, https://dailytimes.com.pk/.

40. Narendra Modi, *Strategy for New India @ 75*, (New Delhi, India: NITI Aayog, November 2018), https://niti.gov.in/.

41. "Space," Make in India (website), n.d., accessed December 13, 2022, https://www.makeinindia.com/.

42. Chaitanya Giri, "A Space Exploration Industry Agenda for India" paper 23 (New Delhi, India: Gateway House: Indian Council for Global Relations, May 2020), https://www.gatewayhouse.in/.

43. Press Information Bureau (PIB), "Cabinet: Historic Reforms Initiated in the Space Sector: Private Sector Participation in Space Activities Approved," PIB – GOI (website), June 24, 2020, https://pib.gov.in/.

44. "Empowering India's Startups to Transform Space Sector with ISRO and AIM," ISRO, September 9, 2020, https://www.isro.gov.in/.

45. Antrix Corporation and PricewaterhouseCoopers India, *Preparing to Scale New Heights: Enhancing Private Participation in India's Commercial Space Sector* (New Delhi: Antrix Corporation and PricewaterhouseCoopers India, January 2020), 15, https://www.pwc.in/.

Military Use of Indian Space Activities

India's offensive military capabilities are alarming for Pakistan. Due to a lack of policy and technological development in space research, Pakistan has been unable to counter India's development of dual-use technology and protect its very few satellites. So far, Pakistan's only hope against the Indian belligerent approach is China, who is willing to protect Pakistan's satellites with its massively advanced space program.

Numerous Indian satellites in geosynchronous orbit and low-Earth orbit are used for technological and improved science support as well in support of the Indian armed forces. Currently through the collaboration of ISRO and the Defence Research and Development Organization, 15 satellites are designated for use by the armed forces .[46] Similarly, the Indian Army uses the SAT-2, RISAT-1, and SAT series-GSAT-9 and GSAT-7A-for border defense security, naval navigation services by the Indian Navy, and advanced military communications by the Indian Air Force.[47] Similarly, India has designated the Cartosat series as being used solely against Pakistan to monitor China Pakistan Economic Corridor developments.[48]

India's military use of space capabilities is also evident in its ASAT weapon development. On March 27, 2019, India's mission Shakti tested a kinetic kill antisatellite weapon and successfully achieved ASAT capability.[49] Antisatellite weapons allow India to attack enemy satellites, which would disrupt communication and blind the adversary. India had a policy of not engaging in the weaponization of outer space. Yet in early 2017, the Defence Research and Development Organization initiated the ASAT project and, in a span of two years, India successfully conducted an antisatellite test.[50] India's official stance behind conducting this test is to protect its assets in space against any foreign attack by maintaining credible deterrence.[51]

India has been working on ballistic missile defence since the 2000s, which made it possible for India to achieve ASAT capability in such a short time period. India's ASAT test is likely to initiate an arms race between its rivals, which would contribute to the weaponization of space. Moreover, India's ASAT test produced 400 pieces of debris that damaged the space environment. India's ASAT test is likely to encourage debris-causing tests by other states exacerbating harm to the space environment.[52]

---

46. Neelam Mathews, "India Ramps Up Military Satellite Plans," Shephard Media, May 31, 2021, https://www.shephardmedia.com/.

47. Mian Zahid and Raja Qaiser, "Space Programs of India and Pakistan: Military and Strategic Installations in Outer Space and Precarious Regional Strategic Stability," *Space Policy* 47 (February 2019), https://doi.org/; and V. Siddhartha, "Military Dimensions in the Future of the Indian Presence in Space," (powerpoint presentation to CAPS, September 17, 2010), https://www.academia.edu/.

48. Siddhartha, "Military Dimensions."

49. Ashley J. Tellis, "India's ASAT Test: An Incomplete Success," Carnegie Endowment for International Peace (website), April 28, 2021, https://carnegieendowment.org/.

50. India Ministry of Defence, *Anti-Satellite Missile* (New Delhi: Official Printers, 2020), 25.

51. "India Celebrates as Country's Newest Space Weapon Passes 'Hit-to-Kill' Test," ABC News, March 28, 2019, https://www.abc.net.au/

52. Tellis, "India's ASAT Test."

The international community was mixed in its response to the test. The United States did not condemn it, while hours after India's ASAT test, China and Pakistan issued statements that emphasized preventing the militarization of outer space.[53] Pakistan's view that other states must condemn Indian actions will remain unsupported by others in the international community due to India's strong diplomatic clout among spacefaring nations. Yet India's ASAT test is proof it aims to remove an adversary's orbiting remote sensing satellites if such an adversary attempted to offset India's space exploration.

Although Pakistan's strong ties with China indicate China's comparatively overwhelming satellite technology would come to its aid, Pakistan needs to build its defense in this regard. The increasing threat from India's ASAT requires policymakers in Pakistan to recalibrate their orientation towards space research.

International responsibility

The last major rationale for devising a Pakistan space policy is its international responsibility. According to international space law, every state is encouraged to activate outer space through commercialization policies and the formulation of specifics to protect the public interest. To allow private enterprises to invest and add to the space programs of a state, Pakistan needs to have a dedicated policy framework. As a signatory to the Outer Space Treaty, it is the fundamental duty under Article VI for Pakistan to provide for authorization and continuing supervision of private space activities.[54]

At the outset, this requires a transparent, effective, and comprehensive instrument under national space policy for private entities, which is a legal obligation arising from the Outer Space Treaty.[55] Only after the formulation of national space policy can Pakistan move toward an effective mechanism for the national licensing system as per Article VII of the Outer Space Treaty or a national registration for space objects for the monitoring and control of space-related activities.[56]

Recommendations

Pakistan needs a national space policy. The policy should outline the direction and supervision of space activity through a statutory framework. The framework should include comprehensive guidelines for the space sector regarding cooperation with international and regional partners.

Designated national space legislation ensures a comprehensive regulatory framework exists to deal appropriately with legal issues arising from interactions with commercial

53. "Mission Shakti: How China and Pakistan reacted," *Times of India*, March 27, 2019, https://timesofindia.indiatimes.com/.

54. Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies (Outer Space Treaty), U.S., U.K., U.S.S.R., January 27, 1967, art. VI, 18 U.S.T. 2410, https://www.unoosa.org/.

55. Outer Space Treaty.

56. Outer Space Treaty, art. VII.

space industries. The United States and Russia have introduced a such regulatory framework. Several other states, including Australia, Japan, Canada, France, and the UK, have national space legislation in place. Furthermore, India is nearing the end of the process of developing space laws; it has established a space policy to support its space program, particularly for commercial cooperation.

In the case of Pakistan, it lacks both designated legislation and space policy. As mentioned before, the word "space" is not even included in the Federal legislative list of Pakistan. Therefore, Pakistan must devise a satellite communication policy, a remote sensing data policy, a national telecommunication policy, a space-based communication policy, and others with proper guidelines and procedures for the parties that will be involved.

Pakistan's space cooperation has remained limited to China for the past few decades. It is the right time for Pakistan to diversify its joint ventures in space research to include European states that have much to offer. Such ventures will allow Pakistan to expand bilateral and multilateral space cooperation and establish joint working groups with private space companies. The limited nature of Pakistan's space cooperation and its military-centric view have made it unable to capitalize on several commercial opportunities, which are important for Pakistan to decrease its dependence on China and move toward strong domestic space programs like India's.

Domestically, SUPARCO must collaborate with universities such as Pakistan's Air University and the Institute of Space Technology to raise new start-ups for research and development. For this, Pakistan must establish a facilitating agency to promote space entrepreneurship and enterprises. This agency would provide access to funds for emerging space research.

Start-ups would supply components and subsystems—outsourcing that would reduce the time it takes to develop space projects. With a robust commercial space research sector, Pakistan will be able to expand bilateral and multilateral space activity. But the state needs to provide a policy, a level playing field, and a regulatory environment for the emerging start-ups and private players.

For example, India's ASAT test has created a dilemma for Pakistan, so it should design a roadmap to counter this emerging threat in outer space. This allows Pakistan to protect its satellites from destruction or denial of access by the adversary's use of electromagnetic radiation. As a member of the Outer Space Treaty, Pakistan should highlight the Indian militarization of outer space and how India's aggressive steps could initiate an arms race in this domain.

Raison d'état (national interest) guides a state's actions in any domain. Based on the shallow response of global actors, including the United States, toward India's development of ASAT capability and the threat it posed to global space security, it is important for Pakistan to balance its asymmetric capabilities. Therefore, Pakistan's focus should be on the development of dual-purpose satellites. Developing a kinetic kill ASAT would require decades, so Pakistan should develop a nonkinetic kill ASAT and a defensive weapon to maintain its deterrence equation even in space. Along with this,

Pakistan must build its reconnaissance, navigation, surveillance, and communication-related capabilities in space for conventional and strategic weapon platforms.

Conclusion

A national space policy in Pakistan will ensure exclusivity, where private entities will be allowed to cooperate with SUPARCO to build Pakistan's space program. This will provide depth to Pakistan's space research in the future, thus improving Pakistan's position in the international sphere.

This article addressed a pertinent concern for Pakistan that remains undiscussed in policy circles. No doubt Pakistan has several challenges to address including a crippling economy and governance problems, but considering its Indian-centric approach toward national security, it is important for Pakistan to reevaluate what it considers to be a national security concern. If Pakistan is unable to introduce a cohesive and comprehensive national space policy, it will be difficult for the country to match Indian space efforts in South Asia, especially when India, with its hegemonic designs, aims to utilize space as another pawn in the regional gamble for dominance. *Æ*