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SPACE DIPLOMACY AND SOCIAL DYNAMICS: CHARTING INDIA'S TRAJECTORY IN GLOBAL COLLABORATIONS

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ABSTRACT

Space diplomacy involves utilizing space science and technology to achieve foreign policy goals and enhance national space capabilities. The objectives of space programs in the Global South include applications in agriculture, water resource management, weather forecasting, telecommunications, telemedicine, and education. With over seventy countries having space agencies, particularly in the Global South, cooperation in space endeavors relies on diplomacy, international treaties, and agreements to ensure peaceful uses of space technology. While many countries control satellites, only a few possess launch capabilities, with regional and multilateral bodies playing key roles in technology development and regulatory frameworks. Countries in the Global South are striving to enhance their space capabilities through agencies, bilateral agreements, and participation in regional space bodies like the African Space Agency and the Latin American and Caribbean Space Agency.

Through this paper, an attempt is made to analyse India's space diplomacy and social dynamics and its trajectory in global collaborations. The research focuses on Major space diplomacy initiatives in the Global South; Space diplomacy challenges in the Global South; and the politics of India's space programme and its growth trajectory.

Keywords: Space Diplomacy, Space Law, India's Trajectory

1. HISTORY OF AIR AND SPACE LAW

The Paris Convention of 1919 marked the inception of international air law, establishing principles for civil aviation regulation. It led to the creation of the International Commission for Air Navigation (ICAN), later becoming the International Civil Aviation Organization (ICAO) in 1947. ICAO has been pivotal in shaping international air law, producing conventions and protocols governing diverse aspects of civil aviation. In 1967, the Outer Space Treaty became the first legal framework for outer space activities, setting fundamental principles for space exploration. Subsequent agreements addressed various aspects, such as astronaut rescue, liability for space object damage, and the registration of space objects.[1]

1 The International Civil Aviation Organization, *available at:* https://applications.icao.int/postalhistory/1919_the_paris_convention.htm (Visited on 25 January 2024)

2. INTERNATIONAL CONTEXT OF AIR AND SPACE LAW

Air and space law constitutes a highly specialized field, shaped by a complex network of international treaties, conventions, and regulations. This legal framework addresses diverse issues such as air traffic control, aviation safety, airport security, space exploration, and the utilization of space resources.

The International Civil Aviation Organization (ICAO) serves as the primary global entity overseeing the regulation of civil aviation. It plays a central role in formulating international conventions and protocols that establish rules and standards for various aspects of civil aviation, encompassing airworthiness, airspace management, and air navigation safety. The ICAO collaborates closely with national governments and regional organizations to advance the worldwide safe and efficient operation of civil aviation.

The United Nations Office for Outer Space Affairs (UNOOSA)[2] holds a pivotal role in fostering global cooperation and coordination regarding outer space activities. This agency actively supports member states by offering technical assistance in the formulation of national space policies and legal frameworks. The Committee on the Peaceful Uses of Outer Space (COPUOS)[3] stands out as the principal United Nations body tasked with the development of international space law.

3. INDIAN CONTEXT OF AIR AND SPACE LAW

In India, the regulation of civil aviation falls under the purview of the Directorate General of Civil Aviation (DGCA), which has aligned itself with various international conventions and protocols. These agreements outline rules and standards for diverse aspects of civil aviation, covering areas like airworthiness, airspace management, and air navigation safety.[4]

India has also made substantial strides in shaping its national space policy and legal framework. The enactment of the Indian National Space Promotion and Authorization Center (IN-SPACe) Bill in 2017 represents a significant development. This legislation establishes a regulatory structure for the authorization and oversight of space activities within India. IN-SPACe is entrusted with the responsibility of granting licenses, monitoring space endeavors, and fostering the commercialization of space activities in the country.[5]

4. INDIAN SPACE PROGRAM

The Indian space program, initially launched for socioeconomic purposes, quickly incorporated space-based applications. Over the years, the program has developed significant expertise, allowing for the independent execution of diverse space missions. The Indian Space Research Organization (ISRO) has not only enhanced existing programs in remote sensing, meteorology, and telecommunications but has also introduced new space missions, marking substantial growth over the past decade.[6]

5. INDIA'S GROWTH TRAJECTORY

India is prioritizing space as a significant aspect of its global engagement strategy. The country is focused on establishing lasting international partnerships, reflecting its commitment to non-aligned multilateralism.

2 The United Nations Office for Outer Space Affairs (UNOOSA), *available at:* https://www.unoosa.org/oosa/en/aboutus/roles-responsibilities.html (Visited on 25 January 2024)

3 The Committee on the Peaceful Uses of Outer Space (COPUOS), *available at:* https://www.unoosa.org/oosa/en/ourwork/copuos/index.html (Visited on 25 January 2024)

4 Directorate General of Civil Aviation (DGCA), available at:, https://www.dgca.gov.in/digigov-portal/?page=jsp/dgca/topHeader/aboutDGCA/aboutUsDetail.html (Visited on 9 May 2024)

5 The Indian National Space Promotion and Authorization Center (IN-SPACe), available at:, https://www.isro.gov.in/Authorization.html (Visited on 9 May 2024)

6 Indian Space Research Organization (ISRO), *available at*:, https://www.isro.gov.in/profile.html (Visited on 25 January 2024)

India's space diplomacy has developed by engaging with various international partners and facilitating a commercial avenue for the private space sector. While policy reforms are still needed to enhance private sector participation, India's recent endeavors in space have positioned it as a resilient and influential player on the global stage.

India has taken a leadership role in fostering South Asian cooperation by actively promoting innovation among its neighboring countries. An illustrative instance is the launch of the GSAT-9 satellite in 2017, specifically designed for the member states of the South Asian Association for Regional Cooperation (SAARC).[7]

The collaboration between India and its neighboring nations in the space sector is thriving, aligning with the country's growth. The ongoing privatization policies in the space industry are expected to create additional opportunities for international relations. To comprehend India's influence in the space sector and its implications for future diplomatic relations, let's analyze the following points step by step.

India's advancements in space assets and in-house production capabilities have the potential to initiate a wave of partnerships and enhance cooperation in the global space supply chain.

6. GRASSROOTS APPROACH

The space technology domain demands significant risk-taking capabilities and substantial financial investments. The emergence of the NewSpace wave has lowered overall costs and created opportunities for the private sector. However, the uncertainty persists regarding the ratio of investments to the return on investment across various verticals in the space industry.

In the 1960s and 1970s, India began prioritizing its economy, civil development projects, and education, distinguishing itself from some neighbors who were allocating significant funds to the military domain. This marked a distinct path for India during that period.

Returning to 2023, India currently boasts one of the most influential and dynamic young forces propelling the economy on both national and international fronts.

A grassroot approach is deemed essential in establishing a sustainable framework for space assets. While the ongoing privatization of the space sector is progressively benefiting the downstream market, there's a need for greater flexibility in the upstream market to foster innovation in the supply chain.

Enhancing policies in the upstream space market diminishes outsourcing, fostering the acceleration of financial and technological innovation. Additionally, it positions the nation to either invite or supply upstream space products to international partners. India's supply chain necessitates greater flexibility, encompassing both government support and financial considerations. This flexibility is anticipated to play a pivotal role in shaping future international relations through the lens of space technology.[8]

7. EXPLORING A BROAD SPECTRUM

India, being one of the world's leading consumer markets, has attracted numerous satellite communication operators and service providers over the past two decades. Direct-to-Home (DTH) services, particularly popular across the country, have been offered by prominent players such as Airtel, Dish TV, and Tata Sky, catering to both urban and rural areas.

In a similar vein, it is crucial to comprehensively engage with private space companies to unlock their potential and foster the robust development of the space sector. Notably, companies like SatSure are addressing critical challenges in agriculture and other industrial sectors, leading to significant impacts on both the space industry and enhanced productivity at the grassroots level.

Unlocking the high potential of companies in various space verticals is feasible but necessitates robust government support to initiate market momentum. India has recently established multiple agencies, such as the Defence Space Agency (DSA), dedicated to crafting space assets for military applications. While this signifies progress, enhancing

7 GSAT-9, available at https://www.isro.gov.in/GSAT_9.html; (Last modified May 05, 2017).

8 SPACEIndia, available at https://www.isro.gov.in/media_isro/pdf/ResourcesPdf/SpaceIndia/publication(38).pdf:, (Last modified July, 1994)

resilience in the upstream supply chain demands a more substantial push to streamline the overall development and manufacturing processes in space technology.

8. DIPLOMATIC SPOTLIGHT POSITION

Developed nations, in particular, closely monitor India, not just due to its vast consumer market but also because of its substantial resources that enable active participation and amplification of international relations on a global scale.[9]

In the year 2022, India announced its intention to create military satellites for its Air Force, Army, and Navy, showcasing its ambitious aim to incorporate space technology into the military domain. While defense collaboration has primarily involved military exercises, strengthening the upstream space market could potentially pave the way for India to initiate military satellite cooperation with allied nations.[10]

In the realm of international relations, the evolving geopolitical landscape is placing India on an unstable tectonic plate. The country is increasingly pressured to form alliances, a practice it has largely ignored for decades, a stance that has been a crucial factor in its emergence as an independent nation.

The Quadrilateral Security Dialogue (QUAD), comprising Australia, India, Japan, and the United States (US), recently signed a Memorandum of Understanding (MoU) for Space Situational Awareness (SSA). While this move may be perceived as a step towards alliance building, it's crucial to recognize that the geopolitical interests of each QUAD member do not completely align.[11]

At present, China and India are recognized as key nations in the Asian region. The United States views India as a potential partner to address challenges in its presence in Asia. However, India tends to maintain an independent stance in international affairs, preferring not to align too closely with any single geopolitical power.

Joint-military space asset development may not be a top priority, but the United States and India are actively enhancing bilateral cooperation in the space domain. The collaboration spans areas such as earth and space science, human space exploration, global navigation satellite systems, spaceflight safety, space situational awareness, and policies related to commercial space.

Given recent developments, India finds itself in a situation presenting both challenges and opportunities. Amidst the complexities of international relations, space cooperation, whether from civil or commercial perspectives, emerges as a strategic avenue for India to maintain an independent and influential global position.

9. PROSPECTIVE HORIZONS

India's future in the space sector, intertwined with its international relations, holds substantial potential to explore uncharted territories globally. The crucial element supporting this prospect is India's autonomy in decision-making and its emphasis on supporting partner nations rather than being solely dependent on allies. This approach has positioned India in a diplomatic hot seat, enabling the country to navigate and cultivate healthy relationships with multiple nations.

India's progress in developing space assets and in-house production capabilities has the potential to catalyze partnerships and enhance cooperation in the global space supply chain. Moreover, gradual changes in private policy reforms, coupled with increased government support in the upstream market, are expected to propel India's private space sector to new heights.

10. SPACE DIPLOMACY HURDLES IN THE GLOBAL SOUTH

Despite the growing interest in the Global South to develop space capabilities and technology, numerous obstacles highlight the necessity for a more concentrated and strategic approach to space diplomacy.

Difference in priorities and limited understanding complementaries:

9 Integrated Defence Staff, available at: https://ids.nic.in/content/vision--history:, (Visited on May 9, 2024).

10 "Military satellites, Space fighters: How IAF plans to transform into a superpower in space" *The Economic Times*, Dec. 15, 2023.

11 Capt Prashant Agnihotri, "Shared Situational and Domain Awareness as an Initial Framework for Strengthening the Quadrilateral Security Dialogue" *Official United States Air Force Website*, Aug. 1, 2022.

The Global South faces challenges in space diplomacy due to differences in priorities, challenges, strengths, and requirements among nations. These disparities can lead to competition for space resources, and the limited understanding of complementaries hinders the development of mutually beneficial partnerships. The lack of political will or the pursuit of space diplomacy as part of a larger geopolitical strategy may contribute to this restricted understanding.

Over dependence on top space agencies:

The development of space technology is resource-intensive and involves significant risks, leading to a reliance on top space agencies primarily situated in the Global North. Countries in the Global South often lack the necessary human and financial resources for substantial investment in space endeavors. Consequently, in situations of budget constraints and various crises, other sectors take precedence over space diplomacy. Even countries with relatively mature space programs, such as Mexico and Pakistan, continue to depend on developed nations for services based on space technology. This over dependence on advanced countries poses a risk to the technological sovereignty of developing nations and limits their influence in negotiations regarding space-based treaties, norms, standards, and regulations.

Increasing competition from private industry:

The space activities landscape is undergoing rapid changes due to the entry of the private industry. Private companies often provide satellite-related services and launch vehicles at a lower cost compared to state-owned space agencies, potentially diverting investment from national space programs. The space industry generates substantial revenues, and commercial spaceflight has become a lucrative niche for private players, including SpaceX, Blue Origin, and Virgin Galactic, who are investing significant amounts in this sector.

Lack of strategic approach for space diplomacy:

Many countries in the Global South lack a comprehensive, long-term strategy or policy framework to effectively utilize space diplomacy for achieving their strategic and socio-economic objectives. Instead, space cooperation tends to be ad hoc and may not align consistently with a country's long-term strategic interests.

11. STEPS TO FURTHER SPACE DIPLOMACY IN THE GLOBAL SOUTH

Several instances of science diplomacy in the Global South are highlighted, including Brazil using India's launch capabilities for its Amazonia-1 satellite in 2021 and the collaborative development of the South Asian Satellite. The content suggests that to initiate space diplomacy among space agencies, joint committees and working groups should identify complementaries and shared interests. Additionally, expanding exchange programs for space professionals and encouraging the loaning of space facilities can strengthen collaboration. The next steps involve developing resource-sharing agreements for satellite data, research, training, and launch facilities, along with the bilateral or multilateral sharing of training modules for satellite development and data management.

There is a need for a platform to systematically catalog requirements, challenges, resources, and facilities across the Global South. The suggestion is that space agencies in the Global South can collectively establish such a platform through global forums like the UNOOSA or UN Office for South-South Cooperation. Increased outreach efforts are crucial to inform all stakeholders, including government officials, space administrators, technologists, and diplomats, about the opportunities and challenges associated with space diplomacy.

International forums such as the G-20 and BRICS which is an intergovernmental organization comprising Brazil, Russia, India, China, South Africa,[12] are identified as potential facilitators for North-South space cooperation, helping to establish regulations for the peaceful sharing of space resources. BRICS, in particular, is seen as a suitable forum for addressing the demands and needs of several emerging economies in the space technology realm. The Association of Southeast Asian Nations, commonly as ASEAN,[13] is a political and economic union of 10 states in Southeast Asia is cited as another example of North-South and South-South space cooperation, supported by initiatives through joint committees and working groups. Additionally, the network of UN-affiliated regional centers for space science and technology education should be expanded and better integrated.

12 Evolution of BRICS, available at https://brics2021.gov.in/about-brics:, (Visited on May 9, 2024).
13 The Founding of ASEAN, available at https://asean.org/the-founding-of-asean/:, (Visited on May 9, 2024).

The emergence of new state and non-state actors in space activities can bring about cost reductions and increased cooperation opportunities. However, it also underscores the need for new regulations in space, particularly addressing issues such as competition, commercialization, debris management, and militarization. Several countries have signed initiatives like the Artemis Accords,[14] which focused on regulating the commercialization of space. The increasing number of developing countries entering the space race may be seen as neocolonialism and discriminatory in the Global South. The space gap is defined as a capabilities disparity between developed and developing states, where the latter either lacks access to space technologies or must pay high amounts to foreign governments for basic access.

Furthermore, there is a growing trend of militarization in space, leading to competition not only between major players like the United States and China but also among other nations such as Russia, India, Japan, and South Korea. Managing space strategies in the Global South amid the evolving dynamics of militarization in this new space age, alongside the integration of novel space technologies, presents a significant challenge.

12. CONCLUSION

Air and space law, a specialized legal field, governs activities in both airspace and outer space. Its historical evolution and international context demonstrate that technological advancements and the globalization of the world economy have been influential in shaping this legal domain. India has actively pursued the development of its national space policy and legal framework, indicating a growing role in the global regulation of air and space activities in the foreseeable future.

Considering the growing space-related interests and capabilities of the Global South, there is a call for these nations to actively contribute to the establishment of new rules, regulations, and norms in space activities. Space diplomacy is identified as a crucial instrument for countries in the Global South looking to peacefully enhance their capabilities in space technologies.

India's space program, ISRO, is a key economic driver, contributing to economic growth, job creation, and technological innovation. With the right strategies, India's space economy could achieve unprecedented growth, unlocking a brighter future for the nation.

14 The Artemis Accords, available at https://www.nasa.gov/artemis-accords/:, (Visited on May 9, 2024).