



Research Article

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The Responses of China, Russia, and the United States of America to Space Policy of India

Mohamad Hery Saripudin¹

Mansur Juned^{2*}

¹International Relations Department,
Universitas Padjadjaran, West Java,
Indonesia

²International Relations Department,
Universitas Pembangunan Nasional Veteran,
Jalan RS. Fatmawati Raya, Pd. Labu, Kec. Cilandak,
Kota Depok, Jawa Barat 12450,
Indonesia

*Corresponding Author

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Abstract

This study aims to analyze the responses of three developed countries, namely China, Russia, and the United States to India's ambitions to develop its space program and policy. As a developing country with huge domestic challenges, India prioritizes its space development amid global space power. This research is interested in investigating this phenomenon. The research tries to answer the question of how China, Russia, and the United States respond to India's space policy. This study employed a qualitative method by making use of data from literature studies and interviews. The analysis has revealed that each of these developed countries responds to India's space policy using various approaches by building competition and cooperation with India. Competition and cooperation significantly influence major developments in the space sector in the future. In addition, the competition and cooperation have domestically challenged India to develop its space technology and pass space policies that will result in national development.

Keywords: Space security, India's outer space Policy, China, Russia, The United States

1. Introduction

India's commitment to develop their space industry was confirmed when it started building space industry-focused agencies. The country started with Indian Space Research Organization (ISRO), which was founded in 1969. ISRO is a space agency operating under the Space Department of India. India produces and develops space missions, such as designing satellites, launching rockets, leading India's space programs, and accomplishing its notorious missions to the moon and Mars (Gregersen, 2019). India's ambition to grow as a developing country has encouraged it to develop its space industry.

As a developing country with high ambition in space technology, India has proposed a new

perception of dominating international order in the 21st century (Juned, 2019). India can be considered a rising global power because it can extend domestic economic development and accelerate to be a superpower country. Hence, India can position itself as a major power and pioneering nation for developing countries, especially in Asia.

India's biggest challenge in pursuing its ambition is the demographic problem. The COVID-19 pandemic hit India's economy and has increased poverty up to 75 million. This situation makes India one of the biggest contributors to the world's poverty by 60% in 2020 (CNBC Indonesia, 2021). The big question now is whether India will be able to develop a space policy, which undoubtedly requires a large sum of money amidst the economic recession. This question arises especially after India recently accomplished the Mangalyaan Mission in 2013 and served as the first Asian country, which successfully sent unmanned spacecraft to Mars (Dooling, 2016).

Many parties criticize India is working in expensive missions even though 30% of its population lives under the poverty line, children are living with malnutrition, and half of the population lack access to health and sanitation (Lele, 2017)., India's Mars mission is relatively cheaper than other countries' Mars missions because India only spends 74 million US dollars. This project is considered the lowest-cost unmanned Mars mission in the world (Amos, 2014). This fact has made India win the effective cost to operate a spacecraft mission.

As a developing country, India's ability to launch space programs has drawn the world's attention, especially from countries that share similar ambitions in space missions. Space is a promising industry, can be an investment magnet for private sectors, and can draw up to 500 billion euros in the next decade (Gili & Fanciulli, 2020). These benefits have motivated many countries to join the space race. Meanwhile, China, Russia, and the United States have competed in the global space earlier and paid close attention to India's space policy.

The Asia Giant, China, responds to India's space policy by showing the power of their stable position in the Asian region and by targeting domestic audiences with their space programs (Hickert, 2017). The United States, which holds an important position in the global space industry, also responds to India's ambition with practical approaches through space technology cooperation and policy on the use of extraterrestrial resources (Mohan, 2021). At the same time, Russia responds to India's ambition by creating strong partnerships with India. Russia has helped India launch its first unmanned satellite (Aryabhata) and its first milestone of the space program. Both countries have worked together for years to develop space technology, and they are recently planning to launch a manned space mission, namely the Gaganyaan mission (Ministry of External Affairs Government of India, 2022).

Therefore, India's ambition in developing a space policy amidst the global competition with China, Russia, and the United States is worth to study. This study aims to investigate how China, Russia, and the United States fight for their national agenda on space missions against India as a newcomer and examine India's responses to the three countries' reactions.

Previous studies show that India's space policy aims to place its profile. The country utilizes space technology and plays an important role in the global space field to give an impact. India's unique geography and social conditions in South Asia hold a big track record in space and give them an advantageous position to play important role in South Asia (Rohera, 2021). Lele (2016) adds that India's investment in space missions started with social and scientific biases. The country is involved with France, Russia, the United States, and even the United Nations. India considers space research as a collaboration instrument by investing in the space industry; this action has made the country independent to make a policy and enabled the country to determine its national development (Lele, 2016).

Rajagopalan states that the fast development of India's technology has contributed to changes in the space race pattern, especially in the South Asia regions. This condition pushes India to produce new space programs and renew its space technology to compete at the global level (Rajagopalan, 2019b).

The competitive global space technology development triggers and motivates India to improve

its space regulations and implement more effective space policies. India forms its preferences in the space policy process based on its technological capacity. As a result, the country can show its strength in the global arena through the implemented space policies (Goswami, 2020). This policy has made India realize the urgency of developing space technologies. The country has been aware that space development can give a better impact on their social and economic conditions. The growth of India's space technology improvement denotes that the country attempts to create diversifications on space technology utilization and make its space programs cost-effective (Lele, 2016).

Despite its domestic development difficulties, India has strong motivation and ambition to explore the opportunities of space technologies and become an important space player at the global level. This study focuses on investigating how developed countries, such as China, Russia, and the United States, respond to India's ambition to develop space technologies and policy amidst its struggle for economic development.

This paper will be divided into four segments. The first segment focuses on concepts and theories used in this study. The second segment focuses on the study method. The third segment focuses on the readiness of India's space policy by analyzing its capabilities and programs amidst its challenge for economic development. Lastly, the fourth segment focuses on developed countries' responses to India's space policy.

2. Research Method

This study employed qualitative research. According to Creswell and Creswell (2018), qualitative research emphasizes on research writing processes that start with inductive thinking; this research interprets facts and social phenomena, extracts the findings through direct observations to gain data, and analyzes data with relevant theories. Meanwhile, Moleong (in Herdiansyah, 2010) explains that qualitative research aims to understand a social phenomenon in which the process uses in-depth communication to observe the main problem.

This current study collected data through literature study and in-depth interviews. This study employed primary and secondary data. The primary data included documents and reports on India's space policy. Meanwhile, the secondary data included books, journal articles, and research reports on relevant topics. Meanwhile, relevant informants were interviewed to observe India's space policy.

3. Theory and Concepts

3.1 Space Concepts

The vast development of space technology and modernization call us to include space in geography. The space discipline is an instrument that was created from technological and modern civilizations. Dickens and Ormrod (2016) explain that space has become more important in social and humanity studies; the studies start to include space in both disciplines because of technological development. NASA (2017) reports that man's comprehension of space is increasingly formed by the imaginative configuration of space as unprecedented development, even in astrophysics.

Space is a general term that refers to the whole universe located outside the earth's atmosphere. However, there is a legal limitation in space flight processes that can be launched. Neger and Walter (2011) state that space refers to parts of the universe where humans can do practical activities, such as rocket launching, satellite launching, or space missions (Brünner & Soucek, 2011). The vast space and technological development have made space utilization an instrument of technological development. This condition assumes that only financially and technologically-developed nations can develop and explore space. Sheppard and McMaster (2004) assert that space has required urgent attention since men found space advantages in culture and politics. Space can be utilized to actualize national interests and technological developments for mankind. For example, the launch of satellites has fulfilled our needs for telecommunication, and the launched satellites have enabled people to

communicate remotely (Sheppard & McMaster, 2004).

3.2 Foreign Policy

Foreign policy is heavily related to domestic-political influence in form of national interests. National interests can push foreign policy based on related interests (Kissinger, 1966).

Rosenau et al. (1976) explain that foreign policy is depicted as a national effort to gain benefits from foreign parties by making significant policies to pursue their interests. Rosenau also believes that there are external and internal factors. According to Holsti (1997), external factors refer to all conditions from foreign nations and include a nation's foreign policy, global and regional problems, and international structures. Moreover, Holsti (1997) asserts that internal factors refer to all domestic aspects, such as social needs, government structure, and national interest. Holsti (1995) considers these factors as strong motivation and encouragement for a nation to act, and these factors should finally realize national interest.

Based on the explanation above, this study will also investigate India's foreign policy on space programs. India's huge commitment to space programs is initiated by internal and external motivations. As a developing country, India is highly motivated to compete with big powers that have previously dominated the global space.

3.3 Space Security

Space security includes access and ability guarantees to utilize space independently for national needs. Space is utilized by an entity that makes space an instrument for technological utilization. Lupton and Al (1998) argue that space security refers to a nation's ability to exploit space for national interests and goals, and space security is adjusted by the nation's astronomy capability.

Space security is not only about access guarantee in utilizing the space realm freely but also about the impact of the utilization. The increase in massive technology utilization in space should be sustainable to avoid threat to humankind (Sheehan, 2015); for example, technologies that greatly impact our daily life, such as GPS that heavily relies on satellites.

The International Code of Conduct for Space Activities regulates space utilization. This Code of Conduct was first proposed by the European Union in 2008 and became a full proposal in the United Nations in 2015. The proposal aims to provide norms and regulate space-able member states as well as bind all member states. One of the points included in the proposal, namely Point 4.2, regulates that member states should conduct their space activities by avoiding direct or indirect damages and destruction, such as 1) conducting space activities and considering people's safety; 2) reducing space debris, and 3) fulfilling individual and collective rights. These points are regulated to minimize space debris that could endanger people when it attracts the earth (European Union, 2014).

4. Results and Discussion

As a developing country, India has ambition for space policy, and this policy shows a significant comparison. The country faces urgencies to form national development, economy, and political conditions. India's economic condition classifies the country as one of the countries with high poverty rates because many of its citizens live under poverty lines. Such a condition triggers many countries to doubt India's space ambition as it is known that space missions require high costs. The contrasting conditions between India's domestic-economic condition and space ambitions have put the country into a serious question of how India realizes its ambition amidst its economic condition. The Government of India realizes this problem and tries to develop technology as a solution by building space infrastructures (Pant & Gopalswamy, 2008).

Politically speaking, India's technological development competes with that of developed countries, such as China, Russia, and the United States. India's position as a developing country still

enables the country to compete in terms of space policy; thus, the country can be granted a global role. However, India's requirement should have comparable technological development with that of other developed countries; this development can be projected to answer India's domestic problems, such as utilizing space technologies for domestic development (Foust, 2008). As one of the most populous countries, India has developed faster than other developing countries. Despite high poverty rates, the country's growth consistently increases, and its development mirrors the decrease in global poverty (Fischer, 2003). India's development is also influenced by its serious actions to develop space policy.

4.1 *India's Progress in Space Policy*

ISRO is projected on commercializing India's space activities through program applications. The country shows civil and military space utilization and invests a lot of resources to develop the program. In the civil sector, India launched its first satellite in 1980, namely Aryabhata, as a trial. This mission brought India the sixth country that successfully launched its satellite (Ravi, 1989). Later, India launched an advanced version of satellite, namely the Indian National Satellite (INSAT). This satellite marks a newer system of the country's program application. INSAT is also the biggest domestic satellite in the world and functions to broadcast television, tele-learning, and telecommunication network in rural areas, collect meteorology data, and rescue mission aid (Pant & Gopaldaswamy, 2008).

In satellite development, India also has the Polar Satellite Launch Vehicle (PLSV), a satellite launcher that can orbit a remote sensing satellite up to 1,400 kilograms to sun polar synchronous orbit. Moreover, India has Geo Synchronous Launch Vehicle (GSLV) that can launch a satellite up to 2.5 tons into geostationary transfer orbit. These achievements have made India one of the six countries that have a geostationary system. The existence of PSLV and GSLV are globally recognized in the satellite launch market to provide a satellite launching service for commercial projection. To date, India has launched an Italian astronomical satellite (AGILE) and an Israeli intelligent satellite (Tec-SAR) (Gupta et al., 2007).

In the military sector, India used to hold high idealism and refuse to be involved in the space race. Moreover, the country used to reject military requests in forming aerospace commands. However, after China regarded a space race as a military operation, India started to give up its idealism. India has realized that arm race is inevitable, especially in its position as one of the global space technology players. India has exerted space technology utilization as an integrated part of space-based arms for military goals and launched the Technology Experimental Satellite (TES) in 2001. Many parties speculate that this satellite was launched for military objectives (Pant, 2008). Before then, India was only able to use aerial reconnaissance to collect intelligence and Pakistan's nuclear data. However, this ability is high-risk move as aerial reconnaissance involves planes and missiles. In contrast, the use of satellites almost has no risk.

According to Roseanu, Boyd, and Thompson (1976), a nation's actions and ways to gain benefits from the external environment are done by creating policies that can defend its position and put national interests into reality. The space projection of India's national program shows that the country prioritizes being technologically independent and breaking the stigma that only developed countries can be technologically developed. With space technology power, India can be an elite entity that has space infrastructure and can find benefits from significantly exploiting space (Rajan, 2008). India creates space policy-making patterns with a slow-but-sure approach by concentrating on policy development. The country built infrastructures first and then gained space technology experience only in a decade. India was able to test satellites and exploit space for development (Clegg & Sheehan, 1994).

India's space activities focus on development programs in almost all spectrum areas. The space exploitation is not only on some spectrums; as a result, India's policies can give advantages to its development and can surpass space-developed countries (Mama, 1980). Lupton's (1988) space

security concept postulates that India pursues space exploitation and technological development to meet its national interests adjusted with its capabilities. On this matter, India focuses on space's technological ability and allocates the matter for national interests through projected space policies (Lupton & AL, 1998).

4.2 Responses of China, Russia, and the United States

The recent key players in space exploration and technological development are China, Russia, and the United States. These three countries welcome India as a new player with different approaches, either positive welcome or with the competition. Although the three countries have more advanced technologies than India, India's significant technological development growth cannot be taken lightly.

India's ambition makes its space program development has grown fast. The country focuses more on technological development that affects domestic interests. With the cost-effective method, India could launch space programs, accomplish missions to the moon and Mars, and launch a satellite; these efforts have increased its global status. Moreover, India's space contribution and expanding technology footprint have also increased its global economy (Lele, 2016). Basically, space technology is one of the most important technologies that support people's needs, such as telecommunication; therefore, many countries are motivated to pursue space missions despite their limited capacities.

To understand India's position among the three space superpowers, this article illustrates the relationships between India and China, Russia, and the United States in terms of space ambitions. Moreover, this article explores how India builds relationships with the three countries, either with cooperation or competition. The relationships between the four countries are illustrated as follows.

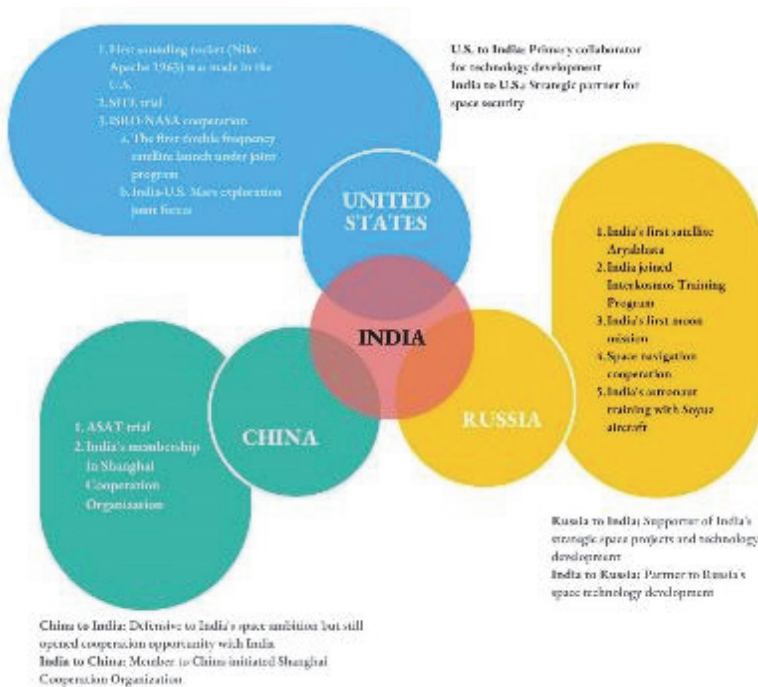


Figure 1. India's Relationships with the Three Space Superpowers

It is known that China contributes to India's space technology development. Both countries are key players in Asia's space sector. However, China has more advanced technology than India does. In the Indo-Pacific region, China is quite ambitious to compete with the United States. China calls on India to increase its security and balance its powers. China also calls for India's concentration to change its space technological development from space technology utilization for development to indirect development. However, in India's case, its missions to the moon and Mars are not globally acknowledged (Rajagopalan, 2019a).

China's efforts to offend the United States' weaknesses in space technology depend on satellite communication, intelligence, and espionage. By targeting the dependency, China focuses on space technological development via cyber and electronic wars (Rajagopalan, 2019b). China has been developing military programs that focus on space programs of the United States. Such a condition has shifted India's security from a stable position. This action puts India's economic infrastructure and space-based national security insecure. For example, in 20017, China's Anti-Satellite (ASAT) made India worried and triggered India to equate external pressure by building their space-based military capacity. India did an ASAT trial in 2019 at the same time when China was building space-based military capacity. Although China's main focus is the United States, India's ambition on building space technologies for the military has called China to work harder and stay on top of the space race among Asian countries. The competition between China and India is visible and could put India's position insecure (Goswami, 2020).

China is a formidable opponent to countries with space technology capacity, including India. The ASAT project of China has drawn negative responses as it triggers an arm race in the space sector and left 3,000 pieces of space debris. It is the highest number of space debris ever recorded in history, and many countries questioned how China's command worked in its space programs (Kulacki, 2014). This issue made international society and rival countries have lost their trust in an ASAT trial and China's advanced technological development.

To gain the public's trust back, China built cooperation under the Shanghai Cooperation Organization (SCO) with some joining member states, such as India and Russia. This cooperation aims to boost space technological development. India welcomes this cooperation with a warm heart because it can boost India's technological development and expand its economic cooperation in the Asia-Pacific region. For example, the commercialization of the technology market has benefited India. The SCO also provides security benefits because it provides a platform for India to play an active role with key players in the region (Sufriana & Utami, 2019). So far, China's responses to India's space policy are mostly competition despite not being their main rivalry focus.

As China's rival, the United States has responded to the newcomer India as the main collaborator since India's first commitment to space missions in 1960s. India's first rocket, Nike-Apache, was built in the United States and launched in 1963. Moreover, the Satellite Instructional Television Experiment (SITE) trial by ISRO in the mid of 1970s was under cooperation with NASA. Lele and Sharma (2014) state that the cooperation has expanded India's television coverage to more than 2,400 villages; this is one of the biggest space programs for social needs. Today, India's satellites are still built by American companies with adjustments to India's specifications (Khalid, 2021).

The United States considers India a strategic partner. India's appearance as a global player has called for the United States to improve its security cooperation with India and many other countries (The White House, 2017). The warm welcome from the United States on India's space ambition is strengthened with cooperation during Trump's reign. The two countries developed space components and space technology industry partnerships. ISRO and NASA did joint programs on developing and launching missions planned in 2022 with the first double-frequency satellite, Synthetic Aperture Radar to observe Earth and Mars as well as to explore planets, heliophysics, manned space flight, and space commercialization (The White House, 2020). ISRO and NASA have also projected a joint mission on Mars exploration to pursue the two countries' goals. The missions include coordinated observation and spacecraft development for the future joint Mars missions (Press of Trust India, 2016).

During Barack Obama's reign, India's Prime Minister, Narendra Modi, announced that India is the United States' primary strategic partner in security as shown by the increase in constitutionalizing both countries' cooperation. The United States facilitated trade, cooperation, and technological development in the space sector at the primary partner level (OUSD, n.d.). This facilitation was even more visible in 2021 when the Prime Minister of India established the Indian Space Association (ISPA) as a global space center. ISPA was built on cooperation between an American private space company, NewSpace, and NewSpace India (NSIL). The cooperation has shown promising growth with a potential of deeper convergence on the space development of India and the United States through private sectors, such as ISRO and NASA (Goswami & Garretson, 2022).

The United States responds to India's space policy by building more cooperation and acting as a collaborator in India's key space programs. Similar to the United States, Russia acts as another key player in the space sector to provide and support India's initial space programs. Russia also employs a collaborative approach to respond to India's space policy by supporting its space projects. The United States and Russia supported India's first satellite launch, moon exploration, and astronaut. For example, India's first satellite, Aryabhata, was launched using Russia's technology, namely the Kosmos-3M launcher (The Editors of Encyclopaedia Britannica, 2021). Meanwhile, India's first astronaut, Rakesh Sharma, went to space through Soviet Union's program, namely the Interkosmos Space Program (Prasad, 2015). Lastly, India's first moon mission, Chandrayaan 2, was launched in cooperation between ISRO and the Russian Federal Space Agency (Department of Space India, 2019).

Russia considers that India has gradually become a strategic partner. India uniquely develops its space strategy because its development has been based on European, Russian, and American technologies since the 1960s. Russia chose to show a positive response via cooperation and support, such as providing Cyro KVD-1 for India in the 1990s. Russia, represented by the Global'naya Navigatsionnaya Sputnikovaya Sistema: Global Navigation Satellite System (GLONASS), cooperated with India in the space navigation field in 2006. Moreover, India collaborated with Russia in the science field to launch Russia's solar satellite, namely Koronas-Foton, in 2009. Russia's positive responses show their openness and interest in India's space ambition, and two countries' cooperation for space programs will possibly go further.

India's relationship with Russia grew better when they planned to develop manned space missions. India has realized that manned space missions are prestigious, and the country has started the program in the past decade. India approached Russia to train its astronauts who were sent to space with Russia's spacecraft, namely Soyuz (Mathieu, 2010). These actions show India's interest to participate in new Russia's manned spacecraft development.

Sheehan (2015) explains that all countries have the same access to utilize space despite their development status. Space policy should aim to create social and economic benefits for a nation so that space policy can play a key role in promoting and increasing national security (Sheehan, 2015). China, Russia, and the United States use their abilities and capabilities of utilizing space because they believe that space can provide benefits for their national interests. Therefore, the three giants' responses to India can conclude that these countries feel shared tensions of ambitions. India has adjusted its approaches to have a place in the global space field by building cooperation with Russia and the United States as well as by balancing rivalry with China. This phenomenon is a part of each country's effort to protect its space security with unique capabilities. We can also conclude that as a newcomer, India needs support and positive responses from other countries to achieve its national interests.

Estrabrooks (2006) believes that space security gives sustainable access. A nation can utilize space according to its law and international agreements and can do long-term practical activities in many sectors with space technologies. A nation should also embrace problems to utilize space effectively for people's welfare. Russia and the United States' responses that focus on collaboration can be considered as their space security efforts. The fast emerging power of India in the past decade can be a challenge for space-developed countries to uphold their position in space. Through collaboration, Russia and the United States can equate India's ambition by joining India's programs.

India can use these programs to pursue their national interests.

Unlike China, India focuses more on competition and leadership narratives in Asia. India can be exposed to space threats if China keeps on pursuing its space ambitions against the United States. Despite being a newcomer, India's numerous space programs have pushed China to uphold India's space security. India has taken several actions to target the United States, which defends its leadership values to stay above India.

Holsti (1995) divides two factors of foreign policy that affects a national issue: external and internal factors. India's foreign policy shows that these factors have pushed the country's decision to maximize its ambition and space capability of pursuing national interests. The internal factor refers to India's domestic condition; for this care, the country still puts the top priority on national development. The country has urgencies in economic development and equitable development for its people. India uses this internal factor to strengthen its space policy to build technological development, such as communication satellites for rural communities.

Furthermore, India uses external factors; for example, how developed countries use space as a vital matter for their national interests. China has become India's main trigger because both are considered key players in the Asia region. However, China's rivalry with the United States, India's prominent partner, has indirectly affected India's national security. In contrast, other players, namely Russia and the United States, support India's space activities.

Space technology utilization is a measure of success for countries to hold developed status. India considers that being a player in space programs can help the country achieve its national interests and give the country status in the international world. Each developed country's policy maneuver has triggered India to move and issue space policy.

5. Conclusion

A nation's capability of developing space technology has made space an exclusive field. If a nation is able to develop space policy, it would be considered technologically developed. Nowadays, the key players in global space are China, Russia, and the United States. These countries have advanced space programs to meet their national interests. India has emerged as a newcomer in the space industry and still faces several challenges. Although the country faces domestic problems, such as development issues, it still has a strong ambition to develop its space policy. India has successfully generated numerous space programs that could answer its domestic and development problems. Despite being costly and expensive, India could successfully implement its space policy.

India's policy has received responses from the key players in the global space industry. China, Russia, and the United States regard India as a decent opponent in the space race. As an important player from Asia, China still prioritizes competition and focuses on technological development to equate with the United States' power. The United States is a rival to China in the Asia-Pacific region, and, at the same time, is a partner to India. The China-U.S. rivalry has indirectly affected India.

Unlike China, which took the competitive approach, the United States has helped India through cooperation to improve India's space capabilities. As the oldest players in the space race, Russia and the United States take cooperative approaches and consider India as their partner. Moreover, they do not consider India as a threat but rather accept India's ambitions by building cooperations with this country to develop India's space programs and get involved in India's space projects. The United States supports India's space programs, such as satellite launch. Meanwhile, Russia provides facilities and infrastructures for India's initial space programs, such as its first satellite and astronaut launches.

References

- Amos, J. (2014). *India's Mars mission is so cheap—And thrilling*.
Brünner, C., & Soucek, A. (2011). *Outer Space in Society, Politics and Law*. Springer Vienna Imprint Springer.

- Clegg, E., & Sheehan, M. (1994). Space as an engine of development: India's space programme. *Contemporary South Asia*, 3(1), 25–35. <https://doi.org/10.1080/09584939408719725>
- CNBC Indonesia. (2021). Parah! Orang Miskin India Tambah 75 Juta. <https://www.cnbcindonesia.com/news/20210322144551-8-231926/parah-orang-miskin-india-tambah-75-juta>
- Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (Fifth edition). SAGE.
- Department of Space India. (2019). GSLV MkIII-M1 Successfully Launches Chandrayaan-2 spacecraft. <https://pib.gov.in/newsite/PrintRelease.aspx?relid=192082>
- Dickens, P., & Ormrod, J. S. (Eds.). (2016). *The Palgrave handbook of society, culture and outer space*. Palgrave Macmillan.
- Dooling, D. (2016). Mars Orbiter Mission. <https://www.britannica.com/topic/Mars-Orbiter-Mission>
- European Union. (2014). International Code of Conduct for Outer Space Activities and Space Debris Mitigation. https://eeas.europa.eu/archives/docs/non-proliferation-and-disarmament/pdf/space_code_conduct_draft_vers_31-march-2014_en.pdf
- Fischer, S. (2003). Globalization and Its Challenges. *The American Economic Review*, 93(2), 1–30. JSTOR.
- Foust, J. (2008). India and the US: partners or rivals in space? www.thespacereview.com: <https://www.thespacereview.com/article/1056/1>
- Gili, A., & Fanciulli, D. (2020). The Race for Space: Leveraging a Geopolitical and Economic Potential.
- Goswami, N. (2020). India's Space Program, Ambitions, and Activities. *Asia Policy*, 27(2), 43–49. <https://doi.org/10.1353/asp.2020.0022>
- Goswami, N., & Garretson, P. A. (2022). The Rising Salience of “NewSpace” in India: Prospects for U.S.-India Space Cooperation. *New Space*, 10(1), 87–100. <https://doi.org/10.1089/space.2021.0038>
- Gregersen, E. (2019). Indian Space Research Organisation. *Encyclopedia Britannica*. <https://www.britannica.com/topic/Indian-Space-Research-Organisation>
- Gupta, S. C., Suresh, B. N., & Sivan, K. (2007). Evolution of Indian launch vehicle technologies. *Current Science*, 93(12), 1697–1714. JSTOR.
- Herdiansyah, H. (2010). *Metode Penelitian Kualitatif untuk Ilmu-ilmu Sosial*. Salemba Humanika.
- Hickert, R. (2017). Space Rivals: Power and Strategy in the China-India Space. <https://www.schwarzmanscho-lars.org/events-and-news/space-rivals-power-strategy-china-india-space-race/>
- Holsti, K. J. (1995). *International politics: A framework for analysis* (7th ed). Prentice Hall.
- Juned, M. (2019). India's Foreign Policy in Indo-Pacific Region and Its Impact for Southeast Asia's Regional Interest. *Academic Journal of Interdisciplinary Studies*, 8(3). <https://doi.org/10.36941/ajis-2019-0029>
- Khalid, M. (2021). India-US space cooperation: Implications for the South Asian strategic stability. *Journal of Humanities, Social and Management Sciences (JHSMS)*, 2(2), 55–66. <https://doi.org/10.47264/idea.jhsms/2.2.5>
- Kissinger, H. A. (1966). Domestic Structure and Foreign Policy. *Daedalus*, 95(2), 503–529. JSTOR.
- Kulacki, G. (2014). An Authoritative Source on China's Military Space Strategy. *Union of Concerned Scientists*.
- Lele, A. (2016). Power Dynamics of India's Space Program. *Astropolitics*, 14(2–3), 120–134. <https://doi.org/10.1080/14777622.2016.1237212>
- Lele, A. (2017). India's policy for outer space. *Space Policy*, 39–40, 26–32. <https://doi.org/10.1016/j.spacepol.2016.11.009>
- Lupton, D. E., & AL, A. U. P. M. A. (1998). *On Space Warfare: A Space Power Doctrine*. Defense Technical Information Center. <https://books.google.co.id/books?id=c-sJkAEACAAJ>
- Mama, H. P. (1980, January). India's Space Program: Across the Board on a Shoestring. *Interavia*, 35, 60–64.
- Mathieu, C. (2010). Assessing Russia's space cooperation with China and India—Opportunities and challenges for Europe. *Acta Astronautica*, 66(3–4), 355–361. <https://doi.org/10.1016/j.actaastro.2009.07.026>
- Ministry of External Affairs Government of India. (2022). Gaganyaan gives a boost to India-Russia space partnership. <https://indbiz.gov.in/gaganyaan-gives-a-boost-to-india-russia-space-partnership/>
- Mohan, R. (2021). India's Space Program Inches Closer to America and the Quad. <https://foreignpolicy.com/2021/10/13/india-modi-space-program/>
- Mohan Sundara Rajan. (2008). *India in the space age*. Publications Division, Ministry of Information & Broadcasting, Govt. of India.
- NASA. (n.d.). Largest Batch of Earth-size Habitable Zone Planets Found Orbiting TRAPPIST-1. Exoplanet Exploration. Retrieved February 28, 2023, from <https://exoplanets.nasa.gov/trappist1/>
- Pant, H. V., & Gopalaswamy, B. (2008). India's Emerging Profile in Space. *The RUSI Journal*, 153(5), 66–71. <https://doi.org/10.1080/03071840802521952>

- Prasad, J. (2015, April 10). Iran deal spells good tidings for India. *The Hindu*. <https://www.thehindu.com/opinion/lead/Lead-article-Iran-deal-spells-good-tidings-for-India/article62116596.ece>
- Press of Trust India. (2016, February 26). India, US Discuss Collaboration on Space Exploration. *Gadgets360*. <https://gadgets.ndtv.com/science/news/india-us-discuss-collaboration-on-space-exploration-807139>
- Rajagopalan, R. P. (2019a). *India's Space Program: International Competition and Evolution (Vol. 111)*. Ifri. https://www.ifri.org/sites/default/files/atoms/files/rajeswari_pillai_rajagopalan_indias_space_program_2019.pdf
- Rajagopalan, R. P. (2019b, August 23). China extends terrestrial rivalries into orbit with new space race. *Nikkei Asia*. <https://asia.nikkei.com/Opinion/China-extends-terrestrial-rivalries-into-orbit-with-new-space-race>
- Ravi, K. (1989). The military implications of India's space programme: Some Observations. *Defense Analysis*, 5(3), 267-270. <https://doi.org/10.1080/07430178908405407>
- Rohera, M. (2021). Indian Space Policy for the Private Sector. *The Draft Space Activities Bill and its Challenges*. 1-13.
- Rosenau, J. N., Thompson, K. W., & Boyd, G. (Eds.). (1976). *World politics: An introduction*. Free Press.
- Sheehan, M. (2015). Defining Space Security. In K.-U. Schrogl, P. L. Hays, J. Robinson, D. Moura, & C. Giannopapa (Eds.), *Handbook of Space Security* (pp. 7-21). Springer New York. https://doi.org/10.1007/978-1-4614-2029-3_47
- Sheppard, E. S., & McMaster, R. B. (Eds.). (2004). *Scale and geographic inquiry: Nature, society, and method*. Blackwell Pub.
- Sufriana, A., & Utami, N. (2019). Asia - Pacific Space Cooperation Organization (APSCO) Sebagai Strategi Tiongkok Membentuk Confidence Building Measure Di Kawasan Asia Pasifik. *Jurnal Studi Diplomasi Dan Keamanan*, 11(2), 1-18.
- The Editors of Encyclopaedia Britannica. (2021). Aryabhata. *Encyclopedia Britannica*. In Britannica. Encyclopedia Britannica Inc. <https://www.britannica.com/topic/Aryabhata>
- The White House. (2017). National Security Strategy of the United States of America. The White House. <https://trumpwhitehouse.archives.gov/wp-content/uploads/2017/12/NSS-Final-12-18-2017-0905.pdf>
- The White House. (2020). Joint Statement—Vision and Principles for the United States-India Comprehensive Global Strategic Partnership. https://trumpwhitehouse.archives.gov/briefings-statements/joint-statement-vision-principles-united-states-india-comprehensive-global-strategic-partnership/?utm_source=link&utm_medium=header