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Research report

Forum: GA1

Issue: Strengthening international cooperation in space exploration to amplify scientific discoveries and benefits for all humanity

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Introduction

Imagine a world where we live without GPS to guide us in the right direction, where one can't communicate with friends on the other side of the earth, and without any doubt that the early-morning sunshine may fade—a world without space exploration. In the words of Buzz Aldrin, "Exploration is wired into our brains." In the great unknown of space, humanity's search for discovery is boundless, with worldwide space agencies like NASA and JAXA and the cooperative efforts of multiple countries to engage in research and development of activities related to space. According to Elon Musk, as we "are at the dawn of a new era in ... space exploration," the question remains: Are international collaborations a boon or a bane? In a cost-benefit analysis, international collaborations would, perforce, provide a viable stimulus for magnifying space exploration while harbouring a sagacious comprehension of celestial events. Universal collaborations provide the gate to remarkable gains by dramatically increasing the scientific efforts of space exploration through sharing resources and inclusion of diversity while also contributing to broader societal and diplomatic objectives.

Definitions of key terms

Space exploration

“Space exploration is the ongoing discovery and investigation of celestial structures in the universe using continuously evolving and growing space technology, with both manned and unmanned robotic missions.”

International cooperation

“A collaborative relationship between entities to work toward shared objectives through a mutually agreed division of labour.”

Outer space

There is no legal definition of the boundaries of outer space such as where it begins above our atmosphere. Outer space can generally be described as the physical universe beyond the earth's atmosphere.”

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Launching State

“Launching State is a term used to define the role of different states in the content of space. The Launching State is the state responsible for the launch of an object.”

General overview

What an International Cooperation Consists of in Space Exploration

International cooperation refers to the collaborative efforts between countries to address global challenges and achieve common goals. It involves the sharing of resources, knowledge, and financial mechanisms to overcome barriers such as lack of capital and good governance.

International cooperation is essential for promoting sustainable development and ensuring equity and fairness in the global context. The topic "Strengthening international cooperation in space exploration to amplify scientific discoveries and benefits for all humanity" covers the issue of collaborative effort among nations to advance space exploration, to maximise scientific knowledge and ensure that its benefits are equitably shared. Space exploration seeks not only to discover new worlds and technological milestones but also strives to interpret our universe in order to put this acquired knowledge toward the betterment of life on Earth. Collaboration in space through international cooperation offers the option to pool resources, expertise, and knowledge to attain much greater discoveries and innovations than any single nation would achieve in isolation. Furthermore, with space having been commercialised and becoming competitive, such cooperation would ensure that it remains a field for peaceful research, where all the many benefits lying in space—be it in terms of technological development, economic gains, or scientific knowledge—are at everybody's disposal, independent of the development level of whoever the country is.

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Advantages of International Collaborations Compared to Private Companies in Space

Exploration

First and foremost, international collaborations increase both the scope and scale of space exploration by pulling together national resources. The International Space Station (ISS) serves as a testament to the power of global cooperation since 15 countries actively maintain this orbiting laboratory. By pooling monetary funds and scientific knowledge, the International Space Station has thrived, attaining its longevity with 21 years of operation—portraying the ability to sustain human life in the challenging environment of space, while also facilitating scientific research and international cooperation. On the other hand, a private company could not obtain such enormous financial resources easily, and even if it did, the vagueness, accountability, and transparency because of issues surrounding confidentiality would not inspire public trust. More specifically, in the case of private firms, the need to protect certain information derives from the competitive advantage of confidentiality in the market, since making specific information public might have a negative effect on the profitability of the corporation or even end up in a bad market perception along with reduced shareholder interest. Conversely, international partnerships tend to be more open with regards to their operations because of regulations and ideals of democratic rule, though matters of national security or even intelligence may still remain confidential but in relative comparison, this is negligible. As a result, it creates this domino effect of reassurance and comfort to another most urgent stakeholder: the public. Moreover, such a collaborative model not only actively demonstrates the power and position of technologically advanced nations but additionally provides a window of hope to LEDCs who are invited to participate in groundbreaking research. The emphasis on an inclusive process goes further to ensure that the fruits of space exploration remain not in a few hands, but shared among nations, giving the sense of ownership and responsibility over humanity's deeds beyond Earth. That is, this collaborative model serves the principles of diplomacy and peaceful communication on a

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global scale. From another perspective, this collaborative model aligns with the principles of diplomacy and peaceful communication on a global scale.

Unlike private corporations, which may prioritise profit margins over diplomatic relations, international partnerships foster mutual understanding and cooperation among nations. This can particularly be seen when companies like Rocket Lab compete for contracts to launch satellites into orbits, which are often awarded based on factors such as cost and reliability, and so private corporations may prioritise offering lower prices for launch services, even if it means potentially undercutting diplomatic relations with other countries. In the same way, private corporations may focus on commercial opportunities, such as deploying satellite constellations for global internet coverage, rather than participating in international collaborative projects. This diplomatic aspect of international collaborations in space exploration highlights the importance of fostering peaceful relations and addressing global challenges collectively. Overall, international collaborations not only amplify the collective capabilities of participating nations but also enhance clarity and fortify diplomatic ties, thereby laying the groundwork for enduring partnerships that transcend the extraterrestrial realm.

Secondly, international collaborations drive innovation and problem-solving in space exploration by promoting diversity of opinions and knowledge. The European Space Agency (comprising 22 member states) exemplifies how diverse backgrounds and experiences lead to innovative solutions, with the European Research Institute and the European Space Astronomy Center contributing to paramount discoveries in astronomy. By bringing together industry experts and policymakers such as scientists, astronauts, and government representatives from numerous cultural and professional backgrounds, international collaborations spark creativity and resilience in addressing the challenges of space exploration while also ensuring that space missions are informed by a range of perspectives, enhancing their relevance and impact. In a wider context, this aspect of international collaboration outshines private space exploration, amplifying the participation of underrepresented groups in space exploration. Surprisingly, despite numerous

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studies concluding that the female form is the most efficient body type for space exploration, out of 634 total space travellers, only 73 have been women.

In the presence of international collaboration, this visible inequality would be resolved through legislative pressure. For example, the European Space Education Resource Office was created with the aim of inspiring and engaging students from diverse backgrounds in STEM fields and space exploration to cultivate a new generation of scientists who bring fresh perspectives to the space industry. International collaborations' decision-making processes are often subject to public scrutiny and debate, so the likelihood of them having affirmative action policies and quotas is increased as opposed to private corporations, which have limited regulatory oversight. By ensuring that space missions are informed by a range of perspectives, these collaborations enhance both the relevance and impact of scientific discoveries. Ergo, the inclusive nature of international collaborations in space exploration not only promotes diversity of perspectives but also addresses concerns regarding representation and inclusivity, ultimately paving the way to a more equitable journey of exploration.

However, a possibility overlooked in the previous arguments is that international collaborations may face bureaucratic challenges and contradict legislations or interests among participating nations, threatening multinational space projects. For instance, the Galileo satellite navigation system serves as a cautionary example of how geopolitical complexities can impede multinational space projects, as the unfortunate communication delays hindered the production of Galileo satellites for a whole year. While such challenges exist, the most impactful refute lies in the fact that these are not intrinsic weaknesses of the collaboration itself but rather reflect the complexities of geopolitical relationships and emphasise the need for consensus-building among nations. Furthermore, accepting that these barriers simply exist and therefore dismissing them as insurmountable obstacles is an unconstructive effort to combat them, as resolving them through such international collaborations could lead to further future cooperation and equitable solutions in space exploration. An environment of communication and peace would have historically been

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life changing, as humans have long prioritised competition over collaboration, leading to the USA losing \$30 billion in the Space Race and seven astronauts aboard the Challenger not having survived in 1986. Furthermore, these newly acquired cooperations could perhaps even provide a moral security net in the science fiction scenario for humanity needing to inhabit another planet, whereby international collaborations would accommodate equitable solutions for all and facilitate peaceful coexistence beyond Earth. In summary, navigating bureaucratic obstacles and divergent national interests in international space collaborations underscores the importance of fostering consensus, potentially reshaping the trajectory of space exploration and promoting harmonious coexistence beyond Earth.

Historical Background

International cooperation in space exploration dates back to the beginning of the Space Age, which started in the middle of the twentieth century. In the early years, space exploration was dominated by the Cold War rivalry between America and the Soviet Union. The Soviet Union launched an artificial satellite named Sputnik 1 in 1957, thereby initiating what is called the Space Race, which at that time meant competition instead of cooperation. However, even at the height of this rivalry, there were numerous instances of cooperation. An example of the latter would be the Apollo-Soyuz Test Project in 1975, which was the first international human spaceflight mission in the world and marked the first step toward détente between the United States and the Soviet Union; it paved the way for future cooperation.

The end of the Cold War opened a new chapter for international cooperation in space. The most prominent example of such cooperation is, of course, the International Space Station, whose building began in 1998. Contributors to the ISS program include NASA from the United States, Roscosmos from Russia, JAXA from Japan, ESA from Europe, CSA from Canada, and a long list of many other dedicated participants. It is the platform for scientific research across various disciplines and has become a symbol of what nations can achieve by working together. Beyond the ISS, many international missions and collaborations have included the joint effort between

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NASA and ESA on the Hubble Space Telescope and exploration of Mars under different space agencies.

Of late, however, it has been checked; not all countries have equal share in space. A few spacefaring nations dominated the scene and brought forth a feeling of equitable distribution of the benefits coming out of space exploration. This has made people call for stronger international frameworks that will allow all of humanity to share in the scientific and economic benefits accruable from outer space.

Case Study: The Artemis Program

The Artemis Program is a perfect example of how international cooperation can influence space exploration. The Artemis Program is a space mission launched in 2017 for the return of man to the Moon by 2025, with its long-term objective of establishing a continual presence of humans on the lunar surface and, from there, sending astronauts to Mars. Notably, the program emphasises international collaboration. Through the Artemis Accords, NASA has signed agreements with many countries that establish principles to guide the peaceful exploration and use of space. Countries like Japan and Canada, and many in Europe, have taken part in the Artemis program with the pooling of technology, expertise, and financial resources. For example, the European Space Agency is building the service module for the Orion spacecraft, while the Canadian Space Agency is providing advanced robotics for the Lunar Gateway, a space station that will be in orbit around the Moon. The Artemis Program is a marvellous example of what can be accomplished in space through international cooperation. This program has harnessed strengths from multiple countries to meet objectives that would otherwise be unreachable by any one country working alone. In so doing, it also gives a fitting precedent to future cooperative efforts in space with respect to its commitment to inclusiveness and transparency.

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Major parties involved*United States of America*

The United States of America has been a space explorer since time immemorial, especially through the efforts of the National Aeronautics and Space Administration, famously known as NASA. In essence, the U.S. has an intention to stay on the forefront in space, while supporting space exploration with the view of advancing science, augmenting the economy, and enhancing national security. Recent policies have been leaning towards international cooperation, specifically through the facilitates in the Artemis Accords. The ISS stands as a historic cooperation between the United States, Russia, Japan, Europe, and Canada. Although the U.S. has generally fared quite well in forging international collaboration through the ISS, unilateral decisions have highlighted the problems of reconciling national interest with global cooperation.

European Union

The European Space Agency (ESA) is an independent organisation focused on the peaceful exploration of space. It operates independently, but it maintains strong ties with the EU and collaborates closely on the associate level with the EU member states. International cooperation, scientific research, and the development of space technologies are reflected in the ESA's policy. It works on cooperative missions with NASA, Roscosmos, and other space agencies. The agency has played quite an important role in the domain of international cooperation through its participation in the ISS and missions under joint collaboration, such as the Rosetta mission with NASA. The participation of the ESA in the Copernicus program further the role it plays in space cooperation on a global scale. The collaborative nature of ESA has been almost synonymous with success, as seen in missions such as Rosetta and the ISS and has spurred enormous leaps in scientific and technological areas. However, the budgetary constraints, and every member state's different priority sometimes come in the way of ESA's actions as one entity.

Brazil

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Brazil is an emerging spacefaring nation that has focused on the development of its space potential for peaceful purposes, mainly by its space agency, the Brazilian Space Agency. Regional cooperation, especially within Latin America, is paramount in the space policy of Brazil, together with cooperation with more space-advanced countries. Under Brazil, international cooperation in space has been contributed through participation in the China-Brazil Earth Resources Satellite program, CBERS. This is a joint program between Brazil and China, aiming to provide satellite data for environmental monitoring and natural resource management in both countries and beyond. The CBERS Program is impressive in the sense that it has managed to help manage the environment with the data obtained, as it assisted in showing the ability of Brazil in satellite technology. However, this general space program of the country faces several challenges following limited funding into the program, thus affecting the capacity to extend its influence in international space cooperation.

Russia

The Russian space policy is driven by the Russian space agency, Roscosmos. Russia has a long history of space exploration, initially begun in the Soviet era. Currently, Russia pays the greatest attention to maintaining its space potential, participating in international space projects like the ISS, and developing new technologies for the exploration of outer space. Russia has been a core partner in the ISS, providing essential elements of the ISS structure and expertise. Despite geopolitical tensions, Russia has kept up cooperation with the U.S. and other nations in space exploration. However, plans like building its own space station indicate a possible trend or shift away from international cooperation. Furthermore, with political tensions and plans for independent projects in the pipeline, the future of Russia in international cooperation remains in a haze.

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China

The China National Space Administration is the governing body of the space program in China. Its space policy has singled out the goal of becoming one of the chief space powers, and massive investments have been made in human spaceflight, exploration of the moon, and the development of space stations. China stresses self-reliance in its space deeds but at the same time aspires to international cooperation, especially with developing countries. The Chinese space program, Tiangong, has shown rapid progress. This is coupled with cooperation with countries like Brazil under the CBERS program and the overtures made toward developing countries, which also testifies to their rising popularity of international space research. Indeed, China has been very successful in attaining desired goals set by it for space-related objectives and very rightly assumed the position of a leading space power. However, its exclusion from the ISS and limited cooperation with Western countries underline the challenges that it has to overcome in being accepted by the greater international space community.

United Nations Office for Outer Space Affairs (UNOOSA)

The UNOOSA is a UN body that promotes international cooperation through the peaceful use of outer space. It facilitates international dialogue, develops guidelines on space activities, and assists countries, particularly the developing nations, in building up their space capabilities. UNOOSA has been instrumental in promoting cooperation among nations through efforts such as the UN Committee on the Peaceful Uses of Outer Space. It has drafted some important treaties and guidelines, like the Outer Space Treaty and the Space Debris Mitigation Guidelines, structuring international space law and norms. UNOOSA's efforts have succeeded in creating a framework for international space cooperation. However, mechanisms for enforcement that are yet to exist and difficulties in compliance remain major challenges yet to be surmounted.

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International Telecommunication Union (ITU)

The ITU is a UN specialised agency that plays a paramount role in regulating satellite communications. It controls the orbital slots and manages the radio-frequency spectrum. It makes sure that space activities do not interfere with global telecommunications and that countries have a fair share of the resources. This has been very instrumental in averting controversies related to orbital slots and frequencies, which are both quite significant for satellite operations. The ITU has thus been successful at handling international cooperation in space telecommunications, making sure that space activities go on in a coordinated way. Thus, an increase in private sector participation and, at the same time, growing demand for orbital slots challenge the ITU regulatory framework.

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Timeline of Key Events

- 1957 The USSR launches the first artificial satellite, the Sputnik 1
- 1958 NASA is established
- 1962 The USA and UK collaborated to create Ariel 1, the first international satellite
- 1966 The GA adopts the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies
- 1972 The “Agreement Concerning Cooperation in the Exploration and Use of Outer Space for Peaceful Purposes” is signed by the USA and USSR
- 1975 First crewed international space mission took place, led by the USA and USSR, the Apollo-Soyuz project
- 1986 The USSR launched the first modular space station, called Mir
- 1998 The first piece of the ISS was launched, starting the construction of the biggest space station
- 2000 The first crew arrived at ISS
- 2003 China launched their first crewed mission into space
- 2014 China and the ESA collaborated on the SMILE mission for research
- October 2020 Multiple countries signed the Artemis Accords
- 2021 Russia and China agreed to collaborate on the International Lunar Research Station
- 2022 The James Webb Telescope was launched, starting a new major international collaboration

Previous attempts to solve the issue

The Committee on the Peaceful Uses of Outer Space is the main UN forum for the development of laws regarding space. The Committee has produced five main international treaties. These five treaties cover many subjects, which will be named below. They all stress the notion that outer space, the activities carried out there and whatever benefits might be gained should be used to enhance human well-being. They have a strong emphasis on promoting international cooperation. All these treaties can be found under the appendices. There are of course other previous attempts, but these are five very important treaties.

The “Outer Space Treaty”

This was the first of the treaties, which suggests a legal framework surrounding activities in space. It also declares celestial bodies not to be owned by any one agency and declares that space be only used for peaceful goals. 10 October 1967, full name: “Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies”.

The “Rescue Agreements”

The Rescue agreement asks all States to take all possible measures to rescue astronauts in danger and return them to the launching State. States will also, if requested, provide assistance in recovering space objects that returned to Earth outside of territory of the launching State. 10 October 1967, full name: “Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space”.

The “Liability Convention”

This convention took longer to negotiate and was only finished in 1972. This convention states that Launching States shall be completely liable to pay for any damage by its space objects on earth or to aircrafts. This convention therefore adds important laws to the legal framework. 1 September 1972, full name: “Convention on International Liability for Damage Caused by Space Objects”.

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The “Registration Convention”

This convention builds upon the expressed desire by States in the previous agreements to create a mechanism to assist in the identification of space objects. This convention expanded upon the United Nations Register of Objects Launched into Outer Space and addresses issues related to Parties' responsibilities. 15 September 1976, full name: “Convention on Registration of Objects Launched into Outer Space”

The “Moon Agreement”

This agreement reaffirms and elaborates on many topics in the Outer Space Treaty specifically applied to the Moon and other celestial bodies. This agreement provides that they should exclusively be used for peaceful purposes, their environments should not be disturbed, and that the UN is to be informed of the location and purpose of any station established on those bodies. The agreement also provides that the Moon and its resources are the possession of entire humankind and that an international regime should be established to govern the exploitation of these resources when this becomes feasible. 11 July 1984, full name: “Agreement Governing the Activities of States on the Moon and Other Celestial Bodies”

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Possible solutions

Mankind has always looked up to the skies and wondered what was there. Today, countries are looking to one another, hoping they adhere to the frameworks to protect space. The past 50 years, the frameworks provided ample cover of activities in space. However, as technology evolves and space becomes more and more useful for tactical advantages in potential wars, we must improve upon these treaties.

In attempting to increase cooperation, delegates must make sure to remain diplomatic and try to get as many countries as possible to agree with their resolutions. It would of course be ideal if every country would simply agree with all clauses, but that sadly rarely happens. Therefore, delegates must try their utmost best to negotiate and work together to find common ground.

There are some things in the treaties that are sometimes viewed as not sufficient that delegates must look to fix. Firstly, there are some issues with the Liability Convention. This convention states that states are liable for the debris they generate. However, the Outer Space Treaty views nations as responsible for private space-faring companies in their country. Therefore, countries can now be held accountable for debris generated by private companies, whilst the companies face no consequences.

The Outer Space Treaty also lacks preciseness in certain areas. For example, there is no clear rule as to where international airspace ends, and outer space begins. This brings some issues as in accordance with the rules, no one country can own space. However, countries do own their airspace. The Treaty therefore has questionable capabilities for preventing countries from claiming low-earth orbit as their own. This also leaves room for loopholes where low-orbit missile strikes are technically not under the Treaty, as they can be said to be in airspace.

There are also certain areas which are sometimes circumvented, specifically regarding long range nuclear weapon testing. The Treaty prevents any use of outer space that is not peaceful and should therefore also prevent nuclear weapon delivery system tests in space. However, when these delivery systems are not in any way armed with weapons, they are technically considered a peaceful of space. This enables countries to test their nuclear delivery systems in space, something the Treaty fails to prevent.

Lastly, delegates can also choose to focus on sharing technological developments with other countries. Delegates must ensure close regulations and prevent negative repercussions of these shares. This is not easy, but it can have great effects. This can ensure the UN works together in space exploration and therefore progresses way faster. This can be advantageous in protecting humankind from various threats.

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Further reading

1. Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies
2. Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space
3. Convention on International Liability for Damage Caused by Space Objects
4. Convention on Registration of Objects Launched into Outer Space
5. Agreement Governing the Activities of States on the Moon and Other Celestial Bodies
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