Committee: Committee on the Peaceful Use of Outer Space

Issue: Removing technological barriers between countries and promoting international cooperation in space exploration

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Introduction

Even in an era full of rapid advancements of technology, innovations by companies such as SpaceX and Blue Origin, leaders in the private space industry, hallmark human scientific progress of the 21st century. Space exploration research, conducted by these companies and beyond, has had a massive benefit to humanity. This research has had a domino effect on improving technology in other fields such as healthcare. For example, studies of astronauts' health conditions in space have aided in research of conditions like osteoporosis and cardiovascular problems. [1] The technology on the International Space Station (ISS), specifically the robotic arms designed by the Canadian Space Agency, transformed surgery on Earth. Canadaarm and Dextre were the basis for surgical robots like neuroArm, allowing surgeons to operate with higher efficiency and precision.

Space exploration also has led to a greater understanding of Earth and the ongoing climate change crisis. Satellite imaging, for example, showcased evidence such as the shrinking of the Aral Sea and the decline in the Arctic Sea ice extent. [2] This technology is allowing us to monitor and study air, water, and soil pollution. Furthermore, this technology can be used to locate and examine the extent of oil spills to quickly minimize environmental harm. Everyday technology such as air purification systems, smoke detectors, and scratch-resistant glass has been developed because of space-based research. [3]

Since space exploration has proven to have a tangible positive effect on society, it makes it ever more important to remove technological barriers between countries and promote international cooperation. In 2007, "The Global Exploration Strategy: The Framework for Coordination" was developed by 14 countries. This document tackles future coordination of human and robotic space exploration. As a result, 27 space agencies including NASA participated in the International Space Exploration Coordination Group (ISECG) to strengthen collaboration and foster partnership opportunities. [4] However, greater efforts are needed to adequately promote international cooperation. Frameworks such as the one mentioned should be updated, and measures should be taken to promote space research in developing countries without an established space agency.

Definition of Key Terms

Technological Barriers

Technological barriers are obstacles or limitations that arise from technological differences, disparities, or restrictions that hinder the flow of information, resources, or collaboration between countries. In space research, there is a stark contrast between developing and developed countries in comparison to other technologies.

Interoperability

Interoperability is the ability of computers to make use of and exchange information. Interoperability allows organizations to coordinate accordingly and facilitate international cooperation. This technology should be further developed to facilitate space exploration development.

Data-Sharing Agreements

Data-sharing agreements refer to formal agreements between countries or organizations that define conditions under which space-related data, research findings, and information are shared. Data-sharing agreements are oftentimes subsections of wider international agreements. In these international agreements, countries outline the rights, responsibilities, and obligations of countries and organizations engaged in space exploration and use, ensuring cooperation, and preventing conflicts.

Space Inclusivity

Space Inclusivity refers to the concept of countries of all levels of development having equal opportunities to access and benefit from space technology, research, and exploration.

History

Space race and collaboration

The space race was a 20th-century competition between two Cold War rivals, the United States and the Soviet Union, to achieve superior spaceflight capability. On October 4, 1957, the Soviet Union launched Sputnik 1, the world's first artificial satellite. This event marked the beginning of the space race and the start of space exploration. Less than a month later, the U.S. responded with Alan Shepard's suborbital spaceflight. Later, President John F. Kennedy's commitment to land on the Moon was followed by the Apollo project.

Apollo-Soyuz test project

Apollo–Soyuz was the first crewed international space mission carried out by the United States and the Soviet Union in July 1975. This project showed the potential for collaboration in space

exploration and set the stage for future cooperative efforts. It was a significant diplomatic achievement and for future international collaborations in space, including the International Space Station. It demonstrated that countries with political differences could work together for the common goal of peaceful space exploration. [5]

UN treaties and international partnerships

The Outer Space Treaty (1967)

The Outer Space Treaty, or the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, is a multilateral treaty that forms the basis of international space law. Key provisions of the Outer Space Treaty include prohibiting nuclear weapons in space, limiting the use of the Moon and all other celestial bodies to peaceful purposes, establishing that space shall be freely explored and used by all nations, and precluding any country from claiming sovereignty over outer space or any celestial body.

Article 1, paragraph 1

"The exploration and use of outer space … shall be carried out for the benefit and in the interest of all countries, irrespective of their degree and in the interests of all countries, irrespective of their degree of economic or scientific development."

The Moon Agreement (1979)

The Moon Agreement, like the Outer Space Treaty, outlines the benefits of sharing information among countries. [6] Paragraph 7(d) explicitly mentions the need to meet the interest of developing countries.

Paragraph 7(d)

An equitable sharing by all States Parties [to the Moon Agreement] in the benefits derived from those resources, whereby the interest and needs of the developing countries, as well as the efforts of those countries which have contributed either directly or indirectly to the exploration of the Moon, shall be given special consideration.

Key Issues

Technology transfer

Technology transfer refers to the transfer of space technology from technologically advanced countries to developing nations to reduce the technological gap and promote equal participation in space exploration. Types of transfer include hardware and software materials and design, as well as data information.

Compulsory cooperation, such as mandatory technology transfer, are not widely called for. The method in which this technological transfer currently works is that countries engage in bilateral agreements. For example, between Brazil and a French company in 2013, a Memorandum of Understanding concluded that to construct a geostationary satellite, the company must select Brazilian engineers and transfer a certain amount of technology. [6]

Outside of bilateral agreements, the third UN Conference on the Exploration and Peaceful Uses of Outer Space has promoted the use of space technologies to support developing countries. Despite the benefits, including cost reduction, enhanced capabilities, and mutual advancements, issues related to intellectual property rights, export control, and security prevent rapid implementations of such agreements.

Space Security and Peaceful Use

Space security refers to safeguarding space assets, activities, and interests from threats, including intentional and unintentional harm. The main threats to space security can include those with man made origin, such as artificial space debris and anti-satellite weapon tests, as well as natural space hazards, such as asteroid collision with satellites.

Space security and peaceful use has a mutual effect: ensuring space security is essential to enable the peaceful use of outer space, and the peaceful use of outer space ensures space security. The peaceful use of outer space is a fundamental principle contained in the Outer Space Treaty of 1967. The treaty emphasizes that outer space should be used for peaceful purposes, such as scientific research, exploration, and international cooperation. Efforts to ensure the peaceful use of outer space should be further developed to ensure security in space. Frameworks in preventing the weaponization and militarisation of space must be made.

Capacity Building and Education

Training programs and educational opportunities are key in enhancing the technical and scientific capabilities of developing nations. Prominent space agencies should implement job positions to less developed countries for a gradual incorporation of technology. For example, In 2018, Japan has recruited Rwanda engineers for the development of satellites. Likewise, capacity building and education should be

fostered to develop an emerging skilled workforce with expertise in aerospace engineering and related skills.

Major Parties Involved and Their Views

Nations

United States of America

The United States has been actively involved in space research since the Cold War, being the first country to land on the lunar surface. The United States has demonstrated dedication to international cooperation by collaborating by funding NASA to maintain and operate the ISS. The growth of the private space industry in the USA also reflects the nation's dedication to advancing space research. [7]

However, barriers between international collaboration persists. One example is the Wolf Amendment. Without prior approval from the FBI and US Congress, this amendment prohibits the National Aeronautics and Space Administration (NASA) and the Office of Science and Technology Policy (OSTP) from using government funds for projects with China. [8] Many scientists continue to consider this implementation to be unnecessary. In 2013, a NASA conference was boycotted when Chinese nationals were rejected from attending.

China

China has expressed its openness to international collaboration on its lunar missions. For instance, the Chang'e-6 mission aims to land at the South Pole-Aitken Basin on the far side to explore and collect samples from different regions and ages. According to the CNSA, the Chang'e-6 mission will carry payloads and satellite projects from different countries and regions - France's DORN radon detection instrument, the European Space Agency's negative ion detector, Italy's laser retroreflector, and Pakistan's miniaturized satellite CubeSat to promote international cooperation. [9]

Japan

Japan actively participates in various international collaborations and partnerships in space exploration. The Japan Aerospace Exploration Agency (JAXA) has contributed the Kibo laboratory module to the ISS and is actively involved in scientific research, technology development, and crewed missions. Japan has also been part of international lunar exploration missions. For example, it provided instruments for India's Chandrayaan-2 mission to the Moon. Japan's space industry, through organizations like Mitsubishi Heavy Industries, also provides launch services for satellites from various countries. [10]

South Korea

The Korean Aerospace Research Institute (KARI) actively participates in the international space community, not just with developed countries but with emerging nations. [https://www.kari.re.kr/eng/sub06_01.do] Since 2010, KARI's International Space Training Course (KARIST) has brought space experts from around the world. The 2nd Korea-US Civil Space Dialogue and the Latin Ambassadors Workshop are other examples of which KARI bolsters the global partnership in space exploration. In January of 2023, Minister Lee Jong-Ho of MIST signed the ROK-UAE arrangement on space cooperation. [11] Thus, KARI shows its dedication to promoting international efforts.

"The UAE's stunning development in space, achieved in a relatively short period of time, is very impressive. Given that our two countries clearly have distinct characteristics and strengths in space development, we expect that Korea and the UAE can become strategic partners to one another in our efforts to realize the space economy, especially with the amendment of the MOU that we sign today."

-Minister Lee Jong-Ho of MSIT

Russia

Due to Russia's Ukraine invasion, international space cooperation has become increasingly worrying. According to European Space Agency Director General Josef Aschbacher, organizations in Europe have imposed "very serious sanctions" against Russia. In November 2021, Russia initiated an ASAT weapon test that poses a threat to the future of responsible and safe use of space. Russia is also the greatest contributor to space debris. However, Russia is actively involved in space-related affairs. In the 78th session of the fourth committee of the general assembly, the Russian Federation representative stated that discussions on the peaceful use of outer space must not be politicised. [12]

Space Agencies

National Aeronautics and Space Administration (NASA)

NASA's work in aeronautics has made decades of contributions to aviation, national security, and our economy. For instance, NASA data helps predict the weather, monitor natural disasters like hurricanes and wildfires, and study long-term climate trends. NASA has consistently expressed its support for removing technological barriers between countries and promoting global partnerships as it serves as a

platform for space diplomacy, fostering international relationships and diplomatic engagements through cooperative initiatives.

Roscosmos

As the main successor to the Soviet space program, Roscosmos' legacy includes the world's first satellite, the first human spaceflight, and the first space station (Salyut). Roscosmos has been a key contributor to the International Space Station (ISS) program, partnering with NASA and other space agencies in its development, operation, and utilization. It has expressed its intent to participate in lunar exploration initiatives, including NASA's Artemis program.

European Space Agency (ESA)

ESA places importance on multinational collaboration in space exploration, promotes technology and knowledge exchange among nations, and strives to bridge technological gaps by facilitating the transfer of space technologies and expertise between countries. One example is ExoMars. ExoMars is a collaboration between ESA and Rosocosmos that aims to study the Martian terrain to harvest data for laboratory analysis. [13] The European Union stresses the need for transparency for responsible behavior in space. [14]

Private Companies

Companies such as SpaceX and Blue Origin have focused on ensuring sustainable space research as well as manufacturing. Both companies have developed reusable rocket technology to reduce both the monetary and environmental costs of launches. Falcon 9 and Falcon Heavy rockets have been tested to land and reuse their first stages numerous times. SpaceX has been developing ways to produce propellant in space. This makes long-term space travel more sustainable. Both companies collaborated with NASA to foster knowledge sharing and leverage resources. For example, the SpaceX Dragon spacecraft carrying solar arrays and cargo was launched from NASA's Kennedy Space Center in June 2023. These companies offer numerous internship opportunities internationally to foster future space collaboration in developed countries.

Timeline of Relevant Resolutions, Treaties and Events

Date	Description of event
December 12, 1959 November 27, 1961 December 13, 1963	After the first artificial satellite Sputnik was launched, the United Nations General Assembly (UNGA) decided, in its Resolution 1348 (XIII), to create the Committee on the Peaceful Uses of Outer Space (COPUOS).

January 27, 1967	First meeting of the United Nations Committee on the Peaceful Uses of Outer Space
	First Legal Principles governing Outer Space adopted by the General Assembly
	Outer Space Treaty was signed
August 14, 1968	First United Nations Conference on the Exploration and Peaceful Uses of Outer Space
July 15, 1975	First international spaceflight that brought the United States and Soviet Union
December 14, 2006	UN-SPIDER established
January 19, 2007	Inter agency meeting on outer space affairs
December 7, 2022	Destructive Direct-ascent Anti-satellite Missile Testing

Evaluation of Previous Attempts to Resolve the Issue

Since the 20th century, there have been various attempts to resolve technological barriers and promote international cooperation, such as the ISS and the Outer Space Treaty. ISS is a joint project involving space agencies from multiple countries, including the United States (NASA), Russia (Roscosmos), Canada (CSA), Japan (JAXA), and several European countries. Although the ISS has also faced challenges, including funding issues, geopolitical tensions, and maintenance complexities, it has played a significant role in promoting international cooperation.

COPUOS was established in 1959, which played a central role in facilitating discussions related to space exploration. The Outer Space committee made major strides in enhancing the understanding of regulatory frameworks related to the “Space2030” Agenda. While it brought out positive consequences, it also faced challenges in achieving consensus among its member states on critical issues. Some argue that it needs to address contemporary space challenges more effectively.

There also has been a series of workshops on the topic of international cooperation by the American Institute of Aeronautics and Astronautics (AIAA). Participants from the international space sector were divided into working groups to address specific topics. These workshops have been important in understanding the rights and wrongs in the past, and how to move on in the future. [15]. In this workshop, the group believed that no single structure should be imposed to dictate the entirety of this topic, but rather emphasized that minimum governmental intervention is needed. They also believed that there should be a high-degree of flexibility when it comes to space-science cooperation.

Possible Solutions

A possible solution is to foster the transfer of technology from technologically developed countries to developing nations. Encouraging collaboration agreements that promote knowledge exchange and joint

technology development is a method to achieve such a result. A new standardization or regulation could also be made. Specifically, the open sharing of space-related data, research findings, and information needs to be encouraged. Guidelines should be agreed upon by nations to ensure common understanding and adherence to outer space. Continuous joint missions related to space exploration could facilitate the joint development of countries. These missions can focus on scientific research, lunar or Mars exploration, and asteroid deflection, among others.

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