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Responsibility of the Launching States for Space Debris Based on International Space Law

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Abstrak

Tujuan dari penelitian ini adalah untuk menguji implikasi hukum dari pertumbuhan puing-puing luar angkasa yang dihasilkan dengan meluncurkan tanggung jawab negara atas puing-puing luar angkasa di bawah Hukum Antariksa Internasional. Penelitian ini menonjolkan prosedur yuridis normatif dan menggunakan strategi penelitian kualitatif. Kerangka penelitian ini berangkat dari konsep tanggung jawab negara terhadap sampah antariksa, pengaturan negara terhadap sampah antariksa, konsep tanggung jawab kesalahan pemilik benda antariksa, konsep tanggung jawab bersama pemilik benda antariksa lebih dari satu negara atau lebih. badan hukum, dan kategori masalah benda-benda puing antariksa yang menghambat peluncuran satelit baru, mengganggu fungsi satelit aktif di orbit antariksa, dan menimbulkan kerugian dan kerusakan di antariksa dan Bumi. Hasil temuan mengungkapkan bahwa tanggung jawab negara terhadap space debris berdasarkan hukum antariksa belum maksimal karena terdapat berbagai kesulitan yang menghambat penerapan hukum internasional.

Kata Kunci: *Puing-puing Antariksa, sampah antariksa, Hukum Antariksa Internasional*

Abstract

The purpose of this study is to examine the legal implications of the growth in space debris produced by launching countries' liability for space debris under International Space Law. This study highlights the normative juridical procedure and employs a qualitative research strategy. The framework of this research departs from the concept of state responsibility for space debris, state regulation of space debris, the concept of fault liability to the owner of space objects, the concept of joint liability of owners of space objects from more than one country or legal entity, and the category of problems in space debris objects that impede the launch of new satellites, disrupt the function of active satellites in space orbit, and cause loss and damage in space and Earth. The findings revealed that the state's responsibility for space debris under space law has not been maximized because there are various difficulties that prevent the application of international law

Keywords: *Space Debris, Space Junk, International Space Law*

INTRODUCTION

Outer space is defined as a space or region above air space that is devoid of air. Specifically, all items that can fly in a vacuum because of the response of the air in the atmosphere. This information is provided in order to differentiate the understanding of air space and outer space (Arpangi, 2016). The term "airspace" refers to the space above the earth's surface that contains enough air to lift airplanes. It is clear from this understanding that there is a distinction between outer space and air space. As a result, one of the primary tasks of the United Nations in the sphere of law is the progressive development and codification of international law, which is accomplished through the work of the United Nations Committee on the peaceful uses of outer space. This is to make international interactions in space a reality, as well as to start the process of developing international rules to enable international relations in space (Malcom, 2008).

In the current era of globalization, some countries continue to develop existing research and enhance existing technology in the country, which aids in the creation of something new. The process of establishing Space Law is based on international law, and international cooperation, as well as space exploration and exploitation, cover a very broad field. Given the magnitude and importance of these efforts, it is natural that countries believe that all activities in this activity must be contained in a legal container. Thus, the activities of the states clearly reveal that the nations have assisted and cooperated for the formation of international law and, eventually, the space law that is now in force among the worldwide community The acts and consensus of the states are resulting in legal agreements that foster international cooperation (Christina et all, 2021). The growth in the number of space objects always increases from year to year, which causes an increase in the failure rate of rocket launches into space to reach Earth orbit. Furthermore, it may increase the likelihood of collisions between space junk, also known as

(space debris), and satellites, astronauts, and the International Space Station (Johnson, 2022). Briefly In a nutshell, the impact of space debris on Earth's life is as follows:

a) Space junk could collide with a satellite or spacecraft, damaging it;
b) An operational satellite may fail to enter orbit due to a collision with space debris.
c) For low-orbiting space debris, there is a possibility of debris fragments entering the Earth;
d) For geostationary orbits, junk from inoperative spacecraft will linger in those orbits, reducing the orbital placement of future satellites;
e) A satellite that is no longer in operation may still have its transponder turned on, causing interference with other satellite transmissions.

Space garbage (Space Debris) is a broad term for any component of a defunct satellite. Of course, the more debris in space, the narrower the space available to launch more rockets and satellites. Such circumstances are commonly referred to as the Kessler Syndrome (Wibowo, 2021). The coal bag, slightly to the left of South Cross, is a notable Southern Hemisphere dust cloud. Today, in space, there occurs the creation of manmade space debris that orbits around the earth as a result of human space activities, producing challenges for space activities themselves. There is a population of natural space junk debris (meteoroids) that, while not orbiting the Earth, passes through all orbital heights. Even NASA expended much effort in attempting to assess this risk. Visual observations and ground-based radar were investigated, and the majority of early satellites were equipped with meteoroid detectors. In the worldwide space community, space debris has become a significant problem. Outside of the space industry, space junk material such as failed rocket stages, outdated satellites, objects discharged during space missions, and thousands of microscopic particles formed by impacts are becoming well known. In real life, space debris incidents are no less spectacular, beginning with the unintentional collision of two communications satellites, Cosmos 2251 and Iridium 33 in 2009, resulting in over 140, 000 pieces of debris (space debris) and significantly contributing to the total number of debris fragments taken into account today (Crawford, 2012).

Because of the tremendous speed with which space debris cycles in Earth orbit, even little pieces of material can cause significant damage when they collide with functioning spacecraft such as satellites or the International Space Station. In 2018, news outlets worldwide covered the tale of Tiangong-1: the Chinese-operated Space Station malfunctioned and reentered Earth's atmosphere uncontrollably, potentially endangering space infrastructure and life on Earth (Ribbelink, 2009). This new risk awareness is especially strong in Europe, with the European Space Agency (ESA) aiming to take the lead in space debris removal efforts (ESA 2013) and EU institutions repeatedly calling for action to reduce potential space debris emissions even as space infrastructure is being built. Space debris is a space phenomena that has become a concern because it has crossed the border between the planet and its orbit in space. According

to astronomers, space debris now makes up 93% of the planet's overall population. This is due to space debris, which reaches millions, if not billions, of people. The event of Space Debris entering the Earth's atmosphere and falling on the Earth's surface occurs several times, some of which cause losses in the form of certain damage and do not rule out the possibility of taking a person's life, as well as causing damage to existing resources, such as forests (Naibaho, 2019). Furthermore, due to the large amount of space debris flying around the Earth's orbit, which causes a high rate of collisions in space between satellite launchers and (space debris) when conducting exploration in space around the Earth's orbit, Space Debris can cause disruption and inhibition of countries' space activities. The International Space Station (ISS) had to shift to avoid colliding with (space debris). The Earth is threatened by so much space. Objects with no function will crash to Earth at any time. Approximately 30 Close Encounters of satellites with space trash in orbit have to be avoided during the space station's 23-year orbital span. Three of them came very near to collapsing in 2020. Space junk garbage has become the primary focus of all spacecraft orbiting the Earth. This research is written in the form of a thesis entitled "The responsibility of the launching country against Space Debris based on International Space Law". This research approach has an important role in writing a legal scientific paper. Type of approach that the authors used in this study among others, namely: a). Legal approach (Statue Approach) b). Historical Approach c). Conceptual Approach d). The Case Approach. namely research whose object of study is to use library data in the form of books as a source of data. Read, study, and analyze a variety of existing literature, in the form of books, scientific journals, international journals, legislation and research results.

RESEARCH METHOD

Normative research as a literature study, basically serves to show the way to solve research problems. In this writing the author uses normative legal research (doctrine) which is descriptive in nature, namely normative research which can be interpreted as a problem-solving procedure studied by describing or describing the state of the object or subject matter under study at the present time based on the facts that appear or as they are. In legal research there are several sources used to examine a legal issue. The main source is legal material rather than data or social facts, because in normative legal science research what is studied is legal material containing normative rules.

The types of approaches that the author uses in this research include: Statue Approach, Historical Approach, Conceptual Approach, Case Approach. In legal research there are several sources used to examine a legal issue. The main source is legal material rather than data or social facts, because in normative legal science research what is studied is legal material that contains normative rules. In this study, the authors used several research sources, namely, primary legal materials, secondary legal materials, tertiary legal materials.

This research is a type of library research, namely research whose object of study uses library data in the form of books as a source of data. Reading, reviewing, and analyzing various existing literature, in the form of books, scientific journals, international journals, laws and regulations and research results.

RESULT AND DISCUSSION

1. Regulation of the responsibility of the launching state to the harm caused to space debris in space law

One of the grounds for making use of space that cannot be utilized as ownership by any party is that it is a shared inheritance of mankind, often known as the shared inheritance of Mankind. Countries are competing to take advantage of the natural resources contained in space for the benefit of space transportation, communication, remote sensing, weather forecasting, and humanitarian aid, as well as military bases that are prohibited from making the space environment a very profitable thing. The growing amount of space debris is a concern to the space environment, which can risk human survival if a celestial objects falls to the Earth's surface, as well as satellite collisions and radiation (Mardianis, 2012). Fragments of space objects (space debris) are space objects (space objects) that are no longer functional, such as former rocket launchers, satellite fragments, objects derived from payloads, satellites, and payloads that are no longer operational. As is well known, heavenly body pieces scatter and may fall and reach the Earth's atmosphere at any time. However, not all of them will be destroyed by fire (Sumardi, 1996).

State responsibility states that if one state performs an act against another that violates international law, international accountability must be imposed between the two. Violations of international responsibilities will result in the requirement to take corrective action. The International Liability for Damage Caused by Space Objects (Liability Convention 1972) has been used as a basic guideline for claiming or filing liability for space garbage or other objects that fall to Earth. The 1972 Liability Convention has four (four) points of view: the extent of objects (material), functional or personal, geographical, and time. By analyzing these four points of view, it is possible to understand that: this convention can apply in any region of space; it can be imposed on anybody and anything that is the goal of the convention; and finally, the time of coming into force of the convention can be seen.

The operations of international organizations of which the country is a member are also included in the responsibilities of the state. Every government that launches, finances launches, and provides territory and facilities for the launch of space objects must be held internationally accountable for losses caused by the operations of space objects on Earth, in space, and on other celestial bodies. According to Article IX of the Space Treaty of 1967, the obligation of the

launching state is to encourage all governments to sign the agreement and conduct proper space exploration studies in order to avoid hazardous pollution or cause changes or damage to the environment. Anti-satellite weapon experiments are thus related to multiple international space accords, in violation of the 1967 space treaty. The subject matter set forth in the seventeen articles set forth in the Outer Space Treaty of 1967 can be concluded to be related to the right of obligation, prohibition for countries in carrying out the exploration and use of space, including the moon and other celestial bodies contained in the principles of some countries in using and exploring space, including the moon (Putra, 2001):

1. Freedom of exploration and use of outer space All states are free to explore and use outer space without discrimination, in conformity with international law and the principle of equality. Countries have complete access to celestial bodies.
2. The law Outer space's status as a humanitarian region (the province of all people) Outer space is not subject to national ownership, whether through claims to sovereignty, use, occupation, or other means.

Enactment of international law and the Charter of the United Nations The exploration and use of outer space including the moon and other celestial bodies is subject to the provisions of international law, including the Charter of the United Nations, for the maintenance of international peace and security and the promotion of international cooperation and mutual understanding. The concept of state responsibility in space law in one party can be formulated in the form of restrictions on the freedom to carry out activities, including for commercial purposes, and other parties in the form of an obligation to compensate if the activity causes harm to the other party. The main restrictions are (Wiradipradja & Kantaatmadja, 1988):

1. Activities shall be carried out for the benefit of all states in accordance with the principle of nondiscrimination (Article I of the 1967 Space Treaty);
2. Prohibition on space appropriation (Article II of the 1967 Space Treaty);
3. The peaceful use of outer space, including the moon and other celestial bodies (Preamble and Article IV Space Treaty 1967, Article 3 Moon Agreement);
4. Obligation to maintain the space environment and other peaceful space operations (Article IX Space Treaty of 1967, Article 7 Moon Agreement, and ITU Convention);
5. Comply with the processes and conditions for natural resource exploitation in space (the regulations of the ITU Convention and the Moon Agreement). The triangle of activities undertaken by the country in order to meet its international obligations

In this scenario, the country involved must do the following:

1. Licensing and continuous control of its national operations (Article VI of the Space Treaty); exerting jurisdiction and oversight over spacecraft registered in its country, including their crews (Article VIII of the Space Treaty);
2. Spacecraft registration (Article XI of the Space Treaty, Registration Convention, and Moon Agreement Article 5);
3. Allow other countries to undertake surveillance in accordance with the principle of reciprocity (Article XII of the Space Treaty).

The state is required to pay the damaged party for activities that cause harm to third parties. The Liability Convention of 1972 establishes these indemnification concepts and processes. The duty of states in international judicial bodies' rulings is articulated in two propositions:

1. Breach of an international responsibility, suggesting an illegal act or international tort;
2. The wrongful act is related to the requirement to make a recovery (reparation).

In this context, the draft state responsibility (Draft International Law Commission) defines state responsibility as an obligation stemming from an unlawful act. According to Article I of the 2001 ILC draft, every internationally wrongful act committed by a state implies that state's international responsibility. The wrongful conduct, according to the ILC draft, is an act that may be legally attributed to the state and is a breach of the fulfillment of international duties because there is a disagreement between the action carried out by a state and internationally specified norms of action. Various symptoms have evolved in the evolution of international activities that show that a country does not always carry out forbidden activities, and the losses that result are not necessarily losses that result from actions that may be blamed. There are also losses resulting from actions justified by international law, such as those resulting from the impact of general environmental use and those resulting from spatial activities.

In this scenario, state responsibility is centered on the fulfillment of state obligations against activities that are not in line with international law provisions, where the responsibility for preventative steps before the impact is established in the Liability Convention 1972. When exercising a country's jurisdiction, it is vital to consider the repercussions, such as the extraterritorial consequences and the state's duty. The exercise of jurisdiction is seen in the case of extra-territorial consequences when a citizen is in the territory of another state and is affected by the activities of another citizen. Losses that give rise to a state's liability can be of numerous forms, such as violations of treaty duties, which, according to J.G. Starke, can be either: deed or comission.International law specifies the conditions under which states are entitled to compensation. As an example of state accountability, consider principle 21 of the 1972 Stockholm Declaration on the Human Environment, which states that a state is accountable for: “To ensure that activities under their authority or control do not harm the environment of other nations or extend beyond the boundaries of national jurisdiction."

2. Losses are caused by space debris items

Objects created as a result of human space launches will become obsolete. Man-made objects circling the Earth that are no longer functional are referred to as space garbage. The majority of this rubbish may consist of bits of former rockets (rocket bodies), debris (debris), and other items. Space junk is defined by the Inter-Agency Space Debris Coordination Committee (IADC) in the Space Debris Mitigation Guidelines (United Nations: Office for Outer Space Affairs) as "all man-made space junk objects that include fragments and elements in Earth orbit or that entered the atmosphere that are no longer functioning." The presence of space junk arises during a satellite's launch or when the satellite malfunctions in orbit. Space debris can impair the launch of new satellites and the operation of existing spacecraft by creating collisions or interference. Man-made garbage in orbit around the Earth is referred to as space junk. According to NASA, despite the size of a rocket launch vehicle that is left as little as a paint stain, such space debris can pose a substantial threat to astronauts and spacecraft functioning in Earth orbit. Although satellites provide numerous benefits in modern life, they can also cause harm in space and on Earth in a variety of ways, including:

a. Space junk

   Space trash can come from dead or damaged satellites. This space debris can endanger active satellites in orbit as well as personnel in space. Many things can be caused by the presence of space trash, such as satellite events that collide with space objects, causing damage to satellites that are or are no longer in operation. There were no casualties as a result of the incident. This is, however, a disadvantage for the owners of these satellites.

b. Losses from falling to Earth

   A satellite descending to Earth can cause physical and economic loss, such as property damage and accidents. Satellites bearing dangerous materials can likewise represent an environmental risk if they crash to Earth. To compensate for these losses, efforts must be made to maintain space security and order, improve satellite technology, improve space waste management, and develop more environmentally friendly and socially responsible technologies.

3. Space Law specifies a framework for dealing with space trash.

The presence of an institution of nationality of some items is known based on the constellation of international and national law, where this issue is strongly tied to a registration of these objects. In the realm of maritime and aviation law, for example, the institution of nationality is known for ships and aircraft. The issue of registering certain objects is critical in order to establish legal order. If the question of registration is not given due consideration in the creation of legal order, it is unthinkable that legal relations forming against these objects will result in numerous conflicts. Similarly, human activity in space remains a relatively elite

activity, but if the question of registering items launched into space is not taken seriously, the activity will ultimately be directed to the harm of the peoples of the nations themselves (Martono, 1987).

The principles stated in the recommendations contained in (A/Res/62/217, 2008) are the principles of the United Nations guidelines on the reduction of space debris:

a. Reducing the amount of space debris released during normal circling. Space systems must be designed to avoid releasing space junk during operation.
b. Minimize the potential for debris during operation.
c. Minimize the chance of accidental collisions in orbit.
d. Avoid deliberate vandalism and other harmful activities.
e. Minimize the potential for pieces after the mission ends.
f. Limiting the mission's long-term presence of spacecraft and launch vehicles in intermediate Earth orbit (LEO).

The principles outlined in the 1972 Convention on Liability for Damage Caused by Space Objects (Convention on Liability for Damage Caused by Space Objects) and the 1992 Code of Conduct for Outer Space Activities (Code of Conduct for Outer Space Activities) govern objects classified as space debris. The procedures for dealing with space objects classed as space garbage under international space law are as follows (Azizah, 2017):

1. Prevention (avoidance)

   This mechanism involves measures to prevent space debris by regulating and controlling activities in space, such as prohibiting anti-satellite missile testing and limiting satellite operation.
2. Monitoring and tracking (monitoring and tracking)

   This mechanism includes efforts to track the movement of space objects and detect the existence of space debris. Radar and other tracking devices can be used to do this.
3. Elimination (remediation)

   This process includes efforts to eliminate space objects classified as space debris. To collect and remove these things, one method is to utilize a spacecraft outfitted with robotic arms or other tools.
4. Accountability and funding

   The mechanism includes efforts to establish states' or individuals' culpability.

4. Resolving disagreements over compensation claims for space debris caused by human activity

A claim for the settlement of waste disputes in space is a claim submitted by parties who feel disadvantaged as a result of the existence of garbage or debris in space. This space debris can result from satellite or rocket launches, as well as other objects left in orbit. These claims can be submitted by governments, space organizations, private firms, or individuals who believe

they have been harmed by space trash. These claims typically include demands for compensation for losses caused by space trash, such as damage to infrastructure or precious artifacts. Claims disputes over garbage in space may be settled through talks between the parties involved or through legal means. It is critical to develop a fair and mutually beneficial solution for all stakeholders, as well as to prevent future space debris damage. In relation to compensation for losses caused by trash from space activities, Article IX of the 1972 Liability Convention states:

A demand for damage compensation must be filed to a launching State through diplomatic channels. If a State does not maintain diplomatic relations with the launching State in question, it may request that another State convey its claim to that launching State or otherwise represent its interests under the terms of this Convention. It may also present its claim to the Secretary-General of the United Nations if both the claimant and launching states are members of the UN.

Article IX of the Liability Convention states that claims for compensation of damages must be submitted to the launching state through diplomatic channels, which include diplomatic representations and bilateral relations between states that have diplomatic relations with the launching state or the United Nations secretary-general. If compensation is required, the claimant state and the launching state may use such diplomatic processes to reach an agreement on the specific amount of compensation (Sitompul, 2021). If the claimant state and the launching state fail to resolve the dispute within one year of the claim proceeding, either party may request the formation of a commission of claimants, which shall consist of three members: one appointed by the launching state, one appointed by the claiming state, and the chairman of the commission of claimants, who shall be jointly elected by both parties. If there is more than one claimant state or country, the number of commissioners will not increase, but they will appoint one member of the claimant Commission collectively.

The prosecuting state and the launching state have two months from the moment the request for the establishment of the prosecuting Commission is made to appoint the members of the prosecuting Commission and four months to ratify the appointment of the prosecuting Commission's chairperson. If the parties fail to appoint a member of the claimant Commission within the given period, the other party may request that the chairman constitute a single-person Claim Settlement Commission. If the parties cannot agree on a chairman, either party may request that the chairman of the prosecuting Commission be appointed by the Secretary of the United States.

According to Article XII of the Liability Convention, the claimant Commission is solely responsible for deciding the merits of the claim for compensation and setting the amount of compensation to be awarded. The procedure is determined by the prosecuting Commission, except that it is decided by a majority vote. One of the most serious criticisms leveled at the

procedures followed by the commission of claimants as outlined in the Liability Convention is that, unless the parties agree otherwise, the decisions reached by this commission of claimants are merely laudable, which the parties must consider in good faith (Yusvitasari 2020) . Some critics have stated that this is little more than a guaranteed conciliation procedure under the Liability Convention, and that if the parties agree to be bound by the claimant commission, the procedure will resemble an arbitral tribunal.

The launch of a space item does not always have a beneficial influence. Of course, there are many benefits for a country, particularly the country of the launcher and the countries linked with the launch, but we cannot deny that mishaps due to the launch of space objects continue to occur. An accident involving a third-party state or an aircraft of a state in operation, resulting in absolute liability for the launching state. This accident produced damage, which led to a dispute between governments; in general, the resolution of conflicts governed by space law is the same as the resolution of disputes governed by international law. Because space law is part of international law, disputes are resolved through the International Court of Justice (ICJ), which can be done when one party reports it and if both parties are members of the United Nations (Yusvitasari 2020).

Arbitration can also be used to settle disputes. Arbitration is an out-of-court dispute resolution method, whereas the ICJ (International Court of Justice) is an official court but not a traditional judicial process; in ICJ proceedings, one side must file the case and the process must be approved by the opposing party. If there is no settlement of the prosecution within one year from the time the claimant submits the claim documents, the process in the claimant Commission is basically the same as the arbitration process, but the commission is not a judge but is appointed by one party and approved by the other party, and the appointment must be through diplomatic channels (Yusvitasari 2020).

CONCLUSION

Based on the above discussion, it can be drawn some conclusions in this thesis in accordance with Based on the preceding discussion, the following conclusions can be derived in this thesis in accordance with the framing of the problem:

The outer space treaty of 1967 regulates the type of regulation of the launching State's responsibility for losses caused by space debris. The launching state's responsibility takes the form of obligation rights, prohibitions for countries carrying out exploration and use of space, including the moon and other celestial bodies, as outlined in the principles of several countries in using and exploring space, including the moon and other celestial bodies. While the 1972 Liability Convention has four points of view, they are the extent of material things, functional or personal, geographical, and time. Thus, in every region of space, this convention can be applied to anybody and anything, and ultimately, the time of coming into force of the convention can

be seen. The guidelines outlined in the Liability Convention 1972 and the Code of Conduct for Outer Space Activities 1992 regulate the handling of items classified as space debris. Pre-prevention, tracking and monitoring, remediation, liability, and finance are some techniques for dealing with space objects.

Each launching country, which finances launches and provides territory and facilities for the launch of space objects, is held worldwide accountable for losses incurred as a result of the actions of its space objects on Earth, in space, including the moon, and on other celestial bodies. This is why the procedure for dealing with space debris in the arrangements for the launch of space objects that are still in effect or are not governed by the 1972 Liability Convention does not give the necessary firmness. In this circumstance, each country has a distinct level of responsibility; every country with this right is authorized to bear responsibility.

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