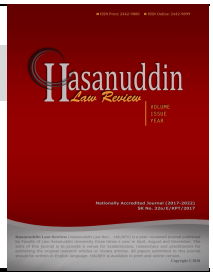
HasanuddinLawReview
Volume 6 Issue 3, December 2020
P-ISSN: 2442-9880, E-ISSN: 2442-9899
Nationally Accredited Journal, Decree No. 32a/E/KPT/2017.



Assessing the Liability Convention and the Indonesian Space Act in Light of Active Debris Removal

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ARTICLE INFO

Keywords:
Liability; Space Debris; Space Law

How to cite:
Ardes, R.P., Nugraha, R.A. (2020). "Assessing the Liability Convention and the Indonesian Space Act in Light of Active Debris Removal" Hasanuddin Law Review, 6 (3): 199-212

DOI:
10.20956/halrev.v6i3.2600

ABSTRACT

As the orbit in outer space becomes denser, the drive to actively preserve the outer space increases. Active debris removal is the answer to this issue. It serves solemn purposes to maintain the space environment and prevent collision between space objects. This action requires high-level technology and techniques which make it prone to accidents. This article examines the applicability of Liability Convention of 1972 and Indonesian Space Act of 2013 for active debris removal and whether its provisions are sufficient for any future legal issues on this matter. A normative juridical method is used for the analysis. The Space Act from other States like France and Austria will also be briefly mentioned and compared to. At the end, it is concluded that although both of the legal instruments are suitable and applicable for active debris removal, there are still some essential aspects that need to be defined namely property and proof of fault. The paper suggests that it should be emphasized that only catalogued debris can be regarded as property, and that the term "fault" at the minimum should have a modest definition that captures the "deviation from the normal operation".

1. Introduction

The outer space is congested. It is saturated with both functioning and non-functioning space objects. At the outset of space exploration, the overcrowded condition of orbits was unforeseen.[1] States, governmental or non-governmental, kept launching their objects into outer space. Consequently, there is not much space left in outer space.

[1] Joseph N. Pelton. (2015). *New Solutions for the Space Debris Problem,* London: Springer, p.1.

Active debris removal ("ADR") is one of the attempts to remediate space debris. Remediation is a way to reduce the amount of debris that is already afloat in space.[2] It is a more aggressive measure than mitigation since it requires actual efforts to retrieve the debris and drag them to burn in the atmosphere.[3] Due to the nature of space objects that are not always equipped with post-mission disposal capability, an external vehicle is needed to perform ADR. The technical methods performed in ADR are capturing and removal.[4] At present, ADR technology is aiming towards larger debris with a consideration that such objects have higher possibility to collide with other space objects.

Spacefaring nations are currently developing technologies to perform ADR. In 2012, the European Space Agency ("ESA") established the Clean Space initiative that focuses on safeguarding the sustainability of outer space environment. Private companies, e.g., Astroscale and The Aerospace Corp., also set their eyes to commercialize ADR.[5] Across the continent, Indonesia has yet to develop any mitigation or remediation efforts despite the fact that it has deployed 25 satellites in orbit, and around 15 of them are inactive.[6] Reflecting on the archipelagic state's growing reliance on satellite technology, and also the long-term plan to build space port near the equator for launching satellites, this number is expected to be increased in the future. Defining legal aspects on space debris in general should be considered by Indonesia to ensure long-term sustainability for space activities.

ADR serves as a practical solution for preserving the space environment. However, studies show that ADR is expensive and requires high technology capabilities.[7] Following such development, defining legal aspects of ADR becomes essential. Amongst them are jurisdiction and control, ownership, authorization, responsibility, and liability. With no proven success rate and its challenging remediation techniques, the operation of ADR may endanger other satellites in orbit, hence making ADR prone to accidents.

This paper shall analyse how the Convention on International Liability for Damage Caused by Space Objects 1972 ("Liability Convention" or "LIAB") and the Indonesian Law No. 21 Year 2013 on Space Activities ("Indonesian Space Act") accommodates ADR, and whether it is sufficient to do so. For the purpose of this article, the practice of unauthorized ADR will not be discussed.

2. Method

This paper uses normative juridical method to analyse and assess the suitability of the Liability Convention and the Indonesian Space Act in the context of ADR. The paper uses primary resources (such as international treaties, national legislations, international

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2 Joyeeta Chatterjee. "Legal Issues relating to Unauthorized Space Debris Remediation" on Michael Simpson (eds). (2016). *Space for the 21st Century: Discovery Innovation Sustainability (Aerospace Technology Working Group).* United States: CreateSpace Independent Publishing Platform, p.159.

3 A. Krolikowski & E. David. (2013). "Commercial On-Orbit Satellite Servicing: National and International Policy Considerations Raised by Industry Proposals". *New Space*, 1(1): 29-41.

4 Minge Shan, *et.al*. (2016). "Review and Comparison of Actve Space Debris Capturing and Removal Methods". *Progress in Aerospace Sciences,* 80(1): 18-32.

5 James Alver *et. al.* (2019). *An Analysis of the Potential Misuse of Active Debris Removal, On-Orbit Servicing, and Rendezvous & Proximity Operations Technologies.* United States: The George Washington University, p. 11.

6 CNBC Indonesia (2019). *Inilah 25 Satelit Milik Indonesia dari Waktu ke Waktu*. Available from: https://www.cnbcindonesia.com/news/20190224152921-4-57317/inilah-25-satelit-milik-indonesia-dari-waktu-ke-waktu [Accessed May 14, 2020].

7 Christophe Bonnal, *et.al.* (2013). "Active Debris Removal: Recent Progress and Current Trends". *Acta Astronautica,* 85(1): 51-60.

guidelines and resolutions) and secondary sources (books, journals, online news reports).

3. Current Legal Frameworks on Active Debris Removal

3.1. Global Regime

There are no specific regulations on ADR or space debris in the existing outer space treaties. Principles on space debris are available on the Inter-Agency Space Debris Coordination Committee ("IADC") Space Debris Mitigation Guidelines in 2002,[8] and the United Nations Committee on the Peaceful Uses of Outer Space ("UNCOPUOS") Space Debris Mitigation Guidelines in 2007.[9] These Guidelines, however, are both non-legally binding instrument that establishes no obligation.

In determining the laws that apply to ADR, the nature of this activity should be defined. As mentioned before, ADR requires an external vehicle to retrieve the aimed debris. The tug, which then launched into outer space, is classified as a space object. Thus, ADR falls under the scope of space activities, and the current outer space regulations apply.

Legal obligations on maintaining the space environment does exist. As the magna carta on space activities, the obligation to preserve the environment is stipulated under Article I para 2 Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space including the Moon and Other Celestial Bodies 1967[10] ("OST"). The article expresses that the outer space should be used in accordance with international law. Article III OST further elaborates that the State parties who undertake space activities should conform to international law.[11] The OST also stresses the importance of free and equal access to outer space.[12] Had the ADR not been conducted, the orbits will remain saturated and they might hamper other States from accessing the outer space.

Furthermore, Article VIII OST stipulates that States retain jurisdiction and control of their launched objects regardless of its position. The Article does not specify the lifetime of space objects, as long as those objects are still in the outer space or the re-entry phase.[13] In other words, States still possess jurisdiction and control of the space objects even if the status of their objects have become a debris. Consequently, States are still internationally responsible for their space activities and their space objects, whether it is conducted by governmental or non-governmental agencies.[14]

Finally, Article VII OST contains general principle on the international liability of States.[15] The article is then further stipulated comprehensively in the Liability Convention. The Convention covers a lot of aspects such as the definition of damage, liability principles, dispute settlement mechanism, and more. Since ADR falls into the scope of international space treaties, hence the Liability Convention applies to ADR.

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8 Inter-Agency Space Debris Coordination Committee. *Space Debris Mitigation Guidelines*, revised on 2007.
9 United Nations Office for Outer Space Affairs, *Space Debris Mitigation Guidelines of the Committee on the Peaceful Uses of Outer Space,* 2007.
10 United Nations. *Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space including the Moon and Other Celestial Bodies 1967*, entered into force in 10 October 1967.
11 Article 3 of the OST.
12 Article 1 of the OST.
13 Article 8 of the OST.
14 Article 6 of the OST.
15 Article 7 of the OST.

3.2. National Law

Domestic or national law could take the lead to promote active debris removal. During the last decade, numerous governments are increasingly referring to soft laws on space debris mitigation to be included within its national law.[16] Austria is one of the examples, whereas Article 5 of the Austrian Space Act of 2011[17] mentions,

> *The operator has to make provision for the mitigation of space debris in accordance with the state of the art and in due consideration of the internationally recognised guidelines for the mitigation of space debris. Especially measures limiting debris released during normal operations have to be taken*.

The French legal framework is more complex. The French Space Operations Act of 2008 together with the Decree of Technical Regulation of 2011 enacted pursuant to the space act that regulates technical requirements on space debris mitigation.[18] As both developed countries with long history in space activities, no doubt such provisions could exist earlier through national law.

Different approach happens with developing countries. Since the very beginning, Indonesia has put environmental protection issue on serious consideration. Indonesia has shown its support for both of the UNCOPUOUS and the IADC Guidelines in various UNCOPUOS meetings. Indonesia submitted its current position on the matter of space debris to the UNCOPUOS on 6 April 2017.[19]

According to the submission, Indonesia has yet to adopt any guidelines. The only mechanism that it has is a space debris tracking system that connects from Space Track. However, this monitoring system is merely a form of preparation for reentry.[20] Thus, at the international stage, despite its lacking mechanism and regulation, Indonesia still acknowledges the importance of preserving space environment.

When the Indonesian Space Act of 2013 was still in the making, its draft mentioned the importance of upholding *"environmental-oriented"* principles to support *"sustainable development"*. The original draft itself, consisting of 51 articles within 16 chapters, was publicly tested for the first time on 12 December 2003. Chapter 10 of the draft was solely assigned to regulate environmental preservation issue.

After the draft was finalized, it is currently known as the Indonesian Space Act of 2013, two articles are designated to regulate environmental protection issues – namely article 87 and 88 which are part of Chapter 12 on Environmental Preservation. The latter article specifically regulates environmental issues on earth which leads to environmental impact assessment (*Analisis Mengenai Dampak Lingkungan* or AMDAL) discussion. This situation leaves the former article as the main discussion. Article 87 of the Indonesian Space Act of 2013 specifically mentions, that any operators are obliged to maintain and ensure the function and preservation of environment.

Unfortunately, neither space debris nor active debris removal are mentioned. The phrasing of Article 87 stresses on general environmental preservation, thus opening doors for further interpretation and more active debris removal issues when the time

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16 Alexander Soucek. (2015). *Space Law Essentials*, Vienna: Linde Verlag, pp. 97, 133.

17 Austria. *Federal Law on the Authorisation of Space Activities and the Establishment of a National Space Registry*, adopted by the National Council on 6 December 2011, entered into force on 28 December 2011.

18 Alexander Soucek. *Op.cit.*, p. 97.

19 United Nations Office for Outer Space Affairs. *Op.cit.*, p.29.

20 *Ibid.*

comes. However, Chapter 12 does not mandate the drafting of any presidential nor any implementing (technical) regulation. This situation leaves a dependency on soft laws if active debris removal would become Indonesia's commitment.

The Indonesian Space Act of 2013 choose not to include such detail. However, both of the Austrian Space Act and the French Space Operation Act also do not point out clearly on active debris removal, but merely space debris mitigation efforts. It is equivalent to Article 8(e)[21] of the Indonesian Space Act of 2013 which prohibits any space activity that could damage outer space environment. Even though it speaks general norms only, Article 8(e) could be linked with Article 87 and the existing soft laws to further encouraging active debris removal.

Based on the States practices above, it is evident the legal framework on space debris does not go further into ADR. Furthermore, as ADR is not beyond conceptual stage,[22] the current situation could explain the absence of active debris removal provision within many national space acts.

4. Assessment on the Liability Convention of 1972 and the Indonesian Space Act of 2013

4.1. The Liability Convention of 1972

4.1.1. The Strengths

a. The concept of space debris is included in the description of space object under the Convention

Article I LIAB gives definition on damage and launching State, while it only describes the purviews of launching and space object.[23] Under the LIAB, space object encompasses "*…component parts of a space object as well as its launch vehicle and parts thereof*".[24] Whilst space tug is unquestionably a space object, discussion on the status of space debris as a space object have existed for a long time.

The principal argument is the lack of reference of space debris in the definition.[25] The provisions of the LIAB are generic, which makes the applications of its provisions are left for the interpretation of States.[26] However, some scholars see the lack of reference as an open gate to include space debris under the field of space objects.[27]

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21 The provision in original language (Bahasa Indonesia) mentions, "*setiap kegiatan Keantariksaan dilarang melakukan kegiatan yang dapat mengakibatkan pencemaran dan/atau kerusakan lingkungan hidup bumi dan Antariksa serta membahayakan kegiatan Keantariksaan termasuk penghancuran Benda Antariksa*".

22 Alexander Soucek. *Op.cit*., p. 100.

23 The LIAB uses the word "means" for "damage" and "launching State", whilst for "launching" and "space object" it uses the term "includes". See: Article 1 of the LIAB.

24 *Ibid.*

25 L. J. Smith & A. Kerrest. "Commentary LIAB" on S. Hobe, B. Schmidt-Tedd, Kai-Uwe Schrogl (eds.). (2013). *Cologne Commentary on S. Hobe, et. al. (eds). (2013). Cologne Commentary on Space Law, Volume II Rescue Agreement, Liability Convention, Registration Convention, Moon Agreement, Cologne: Heymanns*, p.115.

26 *Ibid.,* p.106.

27 Ram Jakhu. "Regulatory Aspects Associated with Response to Man-Made Cosmic Hazards" on Joseph Pelton & F Allahdadu, (eds). (2015). *Handbook of Cosmic Hazards and Planetary Defense*. Switzerland: Springer International Publishing. See also: A. Kerrest. "Liability for Damage caused by Space Activities" on Marietta Benko & Kai-Uwe Schrogl (eds). (2005). *Space Law: Current Problems and Perspectives for Future Regulation.* Utrecht: Eleven, pp. 91, 98.

The LIAB is a victim-oriented regulation. The incorporation of "component parts" into the scope of space object was intended to give an extensive interpretation and ensures that every relevant component of hardware is included. In other words, States cannot differentiate between objects of interest and objects of less interest. Consequently, States are liable for damages caused by both of their active space objects or the inactive ones.[28] Furthermore, according to the UNCOPUOS Guidelines, space debris is defined as "*all man-made objects, including fragments and elements thereof, in Earth orbit or re-entering the atmosphere, that are non-functional*".[29]

Despite the fact the UNCOPUOS Guidelines has no legal force, it depicts *"an international consensus on measures needed to enhance the long-term sustainability of outer space activities"*.[30] From that statement, it is evident that space debris is considered as an object, as long as it is man-made and no longer functioning. As a result, since the LIAB had the intention to extend the scope of space object to the fullest extent, and space debris is seen as an object under the Guidelines, space debris falls under the category of space object under the LIAB.

The incorporation of space debris as a space object is essential considering the nature of ADR. If the retrieved debris was slipped from the tug and hit a satellite of other State, then the latter can claim for compensation. This ensures a stronger protection for the affected State.

b. The convention offers thorough liability scenarios for ADR

The LIAB contains absolute liability, fault liability, and joint and several liability. According to Article II LIAB, absolute liability applies when the damage occurred on the surface of the Earth, or to an aircraft in flight.[31] Absolute liability is broader than a strict liability as it automatically applies with little exemptions.[32] The ground reasoning of this liability is that third party on Earth should be protected from the ultra-hazardous activity.[33] In the present case, the provision can be applied whenever the space tug fails to perform its mission, or when the re-entry of space debris is damaging the third party on Earth.

Article III LIAB specifies that fault liability applies if the incident occurs not on the surface of the Earth and it affects the space object or persons or property on board of other launching State.[34] Rather than damage on Earth, the probability of ADR causing damage towards other man-made objects on outer space is higher. Such contingency is expected since ADR is focusing on capturing debris on LEO, which is the most congested orbit to date. However, fault liability does not automatically apply since fault has to be determined by a Judge or other authorized committee.[35]

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28 L. J. Smith & A. Kerrest. *Op.cit,* p.109.
29 United Nations Office for Outer Space Affairs. *Op.cit.*
30 Ward Munters & Jan Wouters. (2017). *The Road Not Yet Taken for Defusing Conflicts in Active Debris Removal: A multilateral Organization.* Belgium: Leuven Centre for Global Governance Studies, p.6.
31 Article 2 of the LIAB.
32 L. J. Smith & A. Kerrest. *Op.cit,* p.121-2.
33 *Ibid.*
34 Article 3 of the LIAB.
35 L. J. Smith & A. Kerrest. *Op.cit,* p.133.

As for joint and several liability, it is divided into two different approaches; (i) when the damage is generated from a collision of two space objects;[36] and (ii) when the damage caused by a jointly-operated space object.[37] The first liability focuses on the damage caused by two different space objects. Article 4 LIAB opens an expectation that the accident may give harm to the Earth or space objects in orbit. In case of the former, both launching States are held liable,[38] and for the latter, the damage is paid by the State(s) at fault.[39] The apportionment of liability is discussed by both of the launching States involved.[40]

The second form of joint and several liability applies when there are two or more launching States.[41] The provision was included in the LIAB due to the concerns that State victim may find it difficult to identify the launching State.[42] The concept of launching States is defined under Article I LIAB.[43] In this respect, the launching States have to define their portion of liability by themselves through an agreement. Joint launching is a common form of cooperation in space activities, and this practice may continue to be conducted in ADR. Thus, this provision sets suitable guidance for the joint launching of ADR objects.

Article VI LIAB stipulates the exoneration from absolute liability.[44] The rationale behind the clause is the *nemo auditor propriam turpitudinem allegans*[45] which translates into "*nobody is heard recounting his own turpitude*".[46] Simply put, a claim from a victim may be disregarded if the damage partially or wholly arose from his fault. The contribution of fault can be in the form of gross negligence or from an act or omission.[47] The exemption, however, does not apply if the activity conducted by the launching State is against the rule of international law.[48] This provision is essential and gives balance to the LIAB as it protects the interest of the launching States.

The articles presented above depict profound concepts of liability as it fits the potential incidents that might occur in ADR. From this perspective alone, the LIAB is sufficient for ADR regulation.

c. The convention serves comprehensive mechanisms of compensation

The LIAB establishes exhaustive claim procedures as it appoints the State to direct the claim, sets the period of claim, and sets up an authoritative commission to settle the dispute. The procedure begins with the claimant filing its claim to the launching State. The claim can only be presented through diplomatic channels of their State, other State's

36 Article 4 of the LIAB.
37 Article 5 of the LIAB.
38 Article 4(1) of the LIAB.
39 Article 4(2) of the LIAB.
40 L. J. Smith & A. Kerrest. *Op.cit,* p.140.
41 Article 5 of the LIAB.
42 L. J. Smith & A. Kerrest. *Op.cit,* p.141.
43 Launching States consist of: "*…(i) a State which launches or procures the launching of a space object; (ii) a State from whose territory or facility a space object is launched*". See: Article 1(c) of the LIAB.
44 Article 6 of the LIAB.
45 L. J. Smith & A. Kerrest. *Op.cit,* p.149.
46 Aaron Xavier Fellmeth & Maurice Horwitz. (2009). *Guide to Latin in International Law*, United Kingdom: Oxford University Press, p.193.
47 Article 6(1) of the LIAB.
48 Article 6(2) of the LIAB.

representative who has diplomatic relations with the launching State, or the Secretary-General of the United Nations.[49]

The claimant may only present their claim up to one year after the date when the damage occurred, or a year after the launching State is identified.[50] However, if the victim State does not know the date of such occurrence or not yet able to find the launching State, the former period is extended to another year after they had figured the facts.[51] The LIAB does not require prior exhaustion of local remedies,[52] which reflects the victim-oriented nature of this Convention.

Had the diplomatic negotiations failed to achieve a settlement, the claimant State had to request to create Claim Commission a year after the claim is filed to the launching State.[53] The LIAB then sets the criteria, aim, and objectives of the Claim Commission.[54]These dispute settlement mechanisms are suitable for ADR.

d. The convention is not rigid

Irrespective of its nature that heavily relies on States, the LIAB extends not only to the States and its natural or juridical person but also to international intergovernmental agencies.[55] The liability should be apportioned between the member States of such organization. The provision is relevant since not only States that will conduct ADR, but also international intergovernmental agencies such as ESA. This provides larger warranty for the victim State. Furthermore, if the provisions of LIAB are inconsistent with other international agreements, the latter shall prevail.[56] Thus, the LIAB comes off as a regulation that is not rigid and suitable for ADR.

4.1.2. The Weaknesses

a. The classification of space debris as a "property" under Article 1(1) LIAB is contentious

Damage comprises of loss of life, personal injury, impairment of health, loss of or damage to property.[57] The definition, though at a glance seems complete, still leaves a legal debate. The sole mission of ADR is to remediate space debris, and in doing so, defaults may occur. Such failure can inflict damage to active satellite and other debris. This raises a question whether space debris is considered as property.

The LIAB and other space treaties did not consider space debris as a space object.[58] Albeit space debris is *ipso facto* a space object, it does not necessarily mean that it can be regarded as a property. The word *"loss of or damage to property"* literally implies that a compensable property has to have a value. If something has no value, there would be no loss incurred.

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49 Article 9 of the LIAB.
50 Article 10(1) of the LIAB.
51 Article 10(2) of the LIAB.
52 Article 11 of the LIAB.
53 Article 14 of the LIAB.
54 Article 14-20 of the LIAB.
55 Article 22 of the LIAB.
56 Article 23 of the LIAB.
57 Article 1(1) of the LIAB.
58 Corinne Constant-Jorgenson, *et. al.* (2006). "The IAA Cosmic Study on Space Traffic Management". *Space Policy,* 22(4)*:* 283-288.

Active satellites retain values to the State of registry, yet it is an ambivalent case for space debris. Inactive satellite may still possess functions or values according to the State who registers it. The functions can be in the form of sensitive technology or information, potential backup capability in hibernation,[59] or continued security interests.[60]

The existing definition of damage under the LIAB is like the two sides of a coin, it benefits the victim State, but its detrimental to the launching State. Without precise consensus on the term "property", the LIAB will leave uncertainty for ADR. For instance, orbital debris of France struck by Japanese satellite during its towing. France still valued the debris since it contains essential material to be further developed on Earth. If space debris is seen as property, then the French government could claim for damage.

b. Establishment of fault

It is often pointed out that establishing fault in the on-orbit collision is difficult.[61] The most notable case is the collision between Iridium and Cosmos. In 2009, the then-active United States' satellite, Iridium 33, ran into the inactive Russian Federation satellite, Cosmos 2251.[62] It was burdensome to establish fault since the LIAB had yet to define it back then. Eventually, this case was settled by both States without referring to the LIAB.[63] Considering that the LIAB was made generic to open broad interpretation from States, it is unfortunate that such *lacunae* hindered a potential jurisprudence of the LIAB.

4.2. The Indonesian Space Act of 2013

Prior to the enactment of the act, Indonesia has ratified the Liability Convention through the Presidential Decree Number 20 of 1996.[64] Consequently, the Indonesian Space Act stipulates liability in the same manner as the two international regulations. It covers various aspects on liability such as the parties involved (the government and operators), basic principles, general provision on transfer of ownership, and compensation.

4.2.1. Strengths

a. The Act establishes the obligation to preserve space environment

As mentioned earlier, the Indonesian Space Act requires space actors to conduct environmental preservation. Although the article context revolves around to environmental impact assessment (AMDAL) and does not directly related to ADR or space debris, the obligation to preserve the space environment also exists. Article 1 Paragraph (12) of the Indonesian Space Act stipulates,

> *Security means any internationally efforts and commitments for any Operators to maintain and/or ensure the use of Space and other celestial bodies for peaceful purposes and*

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59 Brian C. Weeden. (2011). "Overview of the Legal and Policy Challenges of Orbital Debris Removal". *Space Policy*, 27(1): 38-43.

60 Jan Helge Mey. (2012). "Space Debris Remediation: Some aspects of International Law Relating to the Removal of Space Junk from Earth Orbit". *Zeitschrift fur Luft- und Weltraumrecht,* 61(1): 251-272.

61 Franz Von der Dunk. (2015). *Handbook of Space Law*. United Kingdom: Edward Elgar Publishing, p.735.

62 Brian C. Weeden. (2010). *2009 Iridium-Cosmos Collision Fact Sheet*. Available from: https://swfound.org/media/6575/swf_iridium_cosmos_collision_fact_sheet_updated_2012.pdf. [Accessed March 31, 2020].

63 Ram Jakhu. "Iridium-Cosmos Collision and its implications for space operations" on Kai-Uwe Schrogl, *et.al* (eds). (2010). *Yearbook on Space Policy. 2008/2009*. Wien NewYork: Springer, pp. 254-275.

64 Explaination of the Act No. 21 of 2013 on Space Activities.

> *not to cause damage to the Earth and Space through the integration of the utilization of human resources, facilities, and procedures.*[65]

The obligation is further strengthened in several provisions. Firstly, Article 7 paragraph (2) point (b) requires any space activities to be conducted with regards to safety and security. Secondly, Article 8 point (d) forbids any activities that endangers the safety of space vehicle, and then point (e) specifically prohibits any activities that may cause contamination and/or damages to the space environment. Lastly, Article 51 paragraph (1) establishes the responsibility of space operators for the security in space activities.

Space debris mitigation and remediation fall into the category of international efforts and commitments as the UNCOPUOS and States have been conducting research and continuously building legal frameworks on space debris. In other words, the obligation to preserve the space environment exists in the form of security. This Act also protects the safety of space vehicle. Despite the lack of further mention regarding whether the protected vehicle belongs to Indonesia or other States, the article can also be read that operators should ensure that their space vehicles are safe and do not interfering other objects in space.

This logic is consistent with Article 8 point (e) that clearly obliges the operators to pay a concern to space environment. Moreover, the fact that space operators hold responsibilities to preserve space environment and security, any breaches to one of those two obligations certainly create liability. In conclusion, there is a strong ground to postulate the Indonesian Space Act covers ADR issues.

b. Inclusion of space debris as space object

The Indonesian Space Act also provides two separate definitions on space object and space vehicle. Space object is defined as "*…any object, whether human-made or natural-made related to the Space Activities*", whilst space vehicle is "*…any human-made object related to Space Activities and its parts.*"[66] The inclusion of "its parts" under the scope of space vehicle not only resonates with the definition of space objects under the Liability Convention, but also suitable for space debris and ADR activities. Moreover, since the Indonesian Space Act heavily reflects on Liability Convention, it is fair to regard that space debris is a space object for the same reasoning mentioned in the previous subchapter.

c. The Act applies the same liability principles as the Liability Convention

As Indonesia is a party to the Liability Convention, all principles on the Convention also applies to its national regulation. The Act acknowledges the three principles, namely absolute liability,[67] fault liability,[68] and joint liability.[69] In fact, there is no different wording between the provisions under the Convention and the Act. Thus, the Indonesian Space Act offers proper liability scenarios for ADR as the Liability Convention also provides the same scheme.

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[65] The provision in original language (Bahasa Indonesia) mentions, "*Keamanan adalah segala upaya dan komitmen secara internasional bagi setiap Penyelenggara Keantariksaan untuk memelihara dan/atau menjamin pemanfaatan Antariksa dan benda-benda langit lainnya untuk maksud-maksud damai dan tidak menimbulkan kerusakan bagi lingkungan bumi dan Antariksa melalui keterpaduan pemanfaatan sumber daya manusia, fasilitas, dan prosedur.*"

[66] Article 1 paragraph (7) and (8) of the Indonesian Space Act.

[67] Article 78 paragraph (1) of the Act No. 21 of 2013 on Space Activities.

[68] Article 78 paragraph (2) of the Act No. 21 of 2013 on Space Activities.

[69] Article 78 paragraph (3) of the Act No. 21 of 2013 on Space Activities.

d. The Act provides legal certainty on compensation

Article 79 paragraph (2) of the Indonesian Space Act requires space operators to pay compensation for any damages caused by their activities. The next paragraph points out that the compensable damages only includes physical and direct damages, including clean-up and rescuing fees. Then, the Act opens possible mechanism on dispute settlement through diplomatic relation, Claim Commission, and national tribunal.[70] In case of the claimant is an Indonesian citizen, then the claimant may file for compensation through national tribunals, arbitration institutions, or other dispute settlement institutions. The Government may facilitate the compensation settlement for Indonesian citizens. [71]

The Act also provides period of claiming compensation which is set at least a year after the damage occurred, or a year after the claimant learnt about the damage or aware of any expected damages.[72] Meanwhile, in case of joint liability, the Act gives a freedom for the operators involved in the activities to establish their own compensation mechanism.[73] All of these provisions are sufficient for claiming compensation.

e. Transfer of Ownership

Article 78 of the Act stipulates general provision in case of transfer of ownership involved. Transfer of ownership should be done through an agreement, and for governmental assets, it should be done in accordance to the national regulations on the matter. The Act transfers the liability to the new operator starting from the day the agreement becomes effective. Although the article is generic in nature, it serves a solemn purpose to provide legal certainty in any case possible.

4.2.2. Weaknesses

a. Space debris as property

Article 1 paragraph (13) defines damage as any condition that causes the loss of life and personal injury or other impairment of health, or loss of or damage to property of States or of persons, natural or juridical, or property of international intergovernmental organizations. Whilst space debris can be regarded as a space object, the similar debate on whether space debris can be classified as a property also occurs in the Indonesian Space Act.

b. The lack of establishment of fault

Akin to the Liability Convention, the Indonesian Space Act does not provide any details on proofing fault. This Act also does not refer or included any authorized entities to determine whose parties at fault. The Act merely states that the Agency (in this case LAPAN) is able to facilitate the process of claiming compensation for its nationals, but does not address its involvement in case of fault or joint liability scenario occurred. With no definite scope of fault and no assigned authorized agency to facilitate the determining process

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70 Article 79 paragraph (1) of the Act No. 21 of 2013 on Space Activities.
71 Article 82 paragraph (1) of the Act No. 21 of 2013 on Space Activities.
72 Article 80 of the Act No. 21 of 2013 on Space Activities.
73 Article 81 of the Act No. 21 of 2013 on Space Activities.

5. Conclusion

The Liability Convention is suitable for encouraging ADR. The international forum should come into an agreement on the degrees of property and fault in regards to the Liability Convention and ADR. The solution to the debate on "property" is by classifying the orbital debris. Not every tracked debris is catalogued noticing the origin of tracked debris at times is untraceable.[74] Since compensable properties should be valuable to the victim, therefore the emphasize that only catalogued debris will be compensable is needed. With regard to "fault", a modest definition that captures the "deviation from the normal operation" nature is sufficient, as long as thorough technical explanation exists. Transparency and confidence-building measure between States needs to be enhanced to lessen misconception in performing ADR and to simplify the investigation process.

Due to its similar nature with the Liability Convention, the Indonesian Space Act is also adequate for ADR. The Act successfully emphasizes on the importance of preserving the space environment and space objects respectively. Although there is no exact provision on space debris, the Indonesian Space Act reassures its commitment to any international commitments or efforts in order to ensure space sustainability. Finally, the Indonesian Space Agency or LAPAN as the administrator should extend its management and supervision to facilitate the process of determining fault. Due to the nature of contract in joint operation, the involvement of LAPAN should be voluntary in nature. To further strengthen the legal certainty, LAPAN is strongly advised to follow Austria and France steps to establish literal provisions on space debris, and then proceeds to specifically regulate ADR.

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Conflict of Interest Statement:

The author(s) declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.