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Plus Ultra: Judicial Analysis of Space Resources Utilization Mechanisms for Indonesia's Future Regulation

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Abstract. *The current development of outer space has reached a new beginning, marked by many space company leveraging the opportunities of the space economy. Outer space itself is governed by a set of international treaties known as the Corpus Juris Spatialis. However, with the rapid advancement of space commercialization, the provisions of the Corpus Juris Spatialis are deemed unable to accommodate all existing phenomena. Therefore, many regulatory frameworks are currently being established to fill the gaps in the Corpus Juris Spatialis, one of which is domestic law. Along with advancements in space technology in spacefaring nations such as the United States and Japan alongs with non space firing nations such as Luxembourg, and the United Arab Emirates, domestic regulations have been enacted to permit private ownership of extracted space resources. On the other hand, Indonesia, as a non-spacefaring nation, currently lacks a legal framework for space commercialization related to the utilization of outer space resources in space mining activities. The objectives of this research are, first, to examine the international legal framework, national laws, and those created by international organizations related to the utilization of outer space governance. Second, this research will attempt to provide a new perspective on a comprehensive and responsible national regulatory framework for commercialization. This study used a normative juridical method with a comparative and conceptual approach to evaluate regulatory mechanisms, particularly the application of the "systematic and organized" model. By analyzing international space conventions, as well as domestic instruments. The research findings indicate that there are several conceptual differences regarding space resources among countries with space licensing regulations, each regulating space resources slightly different. Ultimately, this research proposes the establishment of a comprehensive national legal framework in the future to regulate licensing, ownership rights, liability, sanctions, and taxation mechanisms for the utilization of outer space resources. This framework aims to ensure legal certainty and align Indonesia's interests with the norms of international space law.*

Keywords*: Resources; Space; Tax; Utilization.*

1. Introduction

Outer space is an infinitely vast expanse filled with celestial bodies that are continuously evolving. Immense breadt of outer space presents challenges for humanity to unravel (Mardianis, 2016). As natural beings, humans possessan instinct to explore new opportunity. This instinct can be seen in several renownd figures, such as Alexander the great quest for the edge of the world, Christopher Columbus's voyage to prove the Earth's shape, and Yuri Gagarin's struggle to test human capabilities in outer space.(Granath, 2015) All these daring explorations prove that human curiosity can be encapsulated in a motto “Plus Ultra” an effort to advance civilization(Plus Ultra, n.d.).

Space exploration was a consequence of the Cold War between the United States and the Soviet Union. This conflict triggered a competition in space technology, known as the "Space Race". On July 19, 1969, the United States successfully planted the Star-Spangled Banner on the Moon, effectively ending the Space Race, followed by the collapse of the "Red Bear" (Soviet Union) on December 31, 1991 (Anis & Voges, 2021). During and after the Space Race, five key space law instruments were established, collectively referred to as the Corpus Juris Spatialis. The Corpus Juris Spatialis was founded upon a “*magna carta*” of space law or the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies known as the Outer Space Treaty or OST (Wasser & Jobes, 2008). This treaty contains the fundamental principles of the legal regime governing outer space.

One of which fundamental principles governing the space regime is the freedom to explore and use outer space, including the Moon and other celestial bodies. The term "freedom" interpreted as the right of any entity or even individuals to explore and utilize space, even though the space regime remains state centric or etatis (Latipulhayat, 2024). This provision reinforces the dual duse nature of space technology, meaning it can be employed for military purposes or converted for civil commercial application. The commercial aspect of space technology has introduced new actors previously limited to governments now extending to private entities (non-governmental entities), leading to the privatization and commercialization of outer space. The era of space commercialization has given rise to terms such as space economy and cislunar economy (Carlos Manuel Entrena Utrilla, 2017). The space economy encompasses a range of space-related activities driven by business and commercial interests, including space mining.

The emergence of space commercialization and privatization stems from new space phenomena initiated by billionaire entrepreneurs such as Elon Musk, Greg Wyler, Jeff Bezos, and Richard Branson. These wealthy business figures are capitalizing on opportunities offered by outer space, including: High-speed internet services, In-orbit cargo refueling, Transportation to the International Space Station (ISS), Space tourism, and Future space ventures such as the exploitation of lunar and Martian resources (Latipulhayat, 2024). The rise of the space resource industry marks a pivotal innovation in the wave of space privatization and commercialization. From an economic perspective, transporting all necessary resources from Earth to sustain lunar infrastructure development is impractical. Thus, in-situ resource utilization (ISRU), harnessing

local lunar materials for construction has become essential (Frans von der Dunk, 2015).

Private companies have mobilized to meet this demand by Identifying resource rich lunar sites, Extracting and processing raw materials, and delivering finished products for lunar operations. To address regulatory challenges, the United States established the Artemis Accords, a treaty that provides interpretations and clarifications of the OST (Smith, 2021). These accords aim to foster international collaboration while promoting sustainable and lawful space resource utilization.

The regulation of space resource mining activities on the Moon and other celestial bodies cannot be fully governed by existing international space law (Kirby, 2024). However, space resource exploration involves not just human presence in space, but more importantly, the extraction and processing of extraterrestrial materials for transportation and utilization on Earth and other celestial body (de Zwart et al., 2023). This regulatory gap highlights the critical need for national space legislation to establish clear governance frameworks. Such domestic laws would ensure orderly, responsible space exploration and exploitation activities while maintaining compliance with international space law principles.

In recent years, several nations have recognized the urgent need for domestic legislation to regulate private sector involvement in space resource activities, including the United States, Luxembourg, the United Arab Emirates, and Japan. These countries have developed legal interpretations of the Corpus Juris Spatialis, particularly regarding the OST and Moon Agreement (known as MA), to address inherent ambiguities that challenge commercial space operations(de Zwart et al., 2023). Specifically, while Article II of the OST prohibits national appropriation of celestial bodies and the MA establishes the Common Heritage of Mankind (CHM) principle, these nations have adopted interpretations that distinguish between celestial bodies themselves and the resources extracted from them. They argue that while sovereignty claims over celestial bodies remain prohibited, extracted space resources can become private property. This legal distinction enables commercial space mining while maintaining technical compliance with international treaties (Giannoni-Crystal, 2024). As emphasizes, this approach highlights the importance of establishing clear national positions on interpreting international space law and developing domestic regulatory frameworks to govern space resource utilization, thereby facilitating private sector space activities within the boundaries of existing international legal structures.

Among the four countries with domestic laws on space resources such as the US, Luxembourg, and the UAE, the US and Japan are countries that can utilize the potential of the space industry very effectively (Bank, 2024). One approach taken by the US and Japan is providing regulatory certainty to private actors in every sector of commercial space activities or businesses operating in the space sector. This includes licensing and authorization for space mining, space financing, and space insurance (Mori Hamada & Matsumoto, 2023b) The legal impact of this licensing framework creates legal certainty, which leads to stability in the economic and business climate of the space sector in Japan. Following the enactment of the Act on the Promotion of Effective Utilization of Resources (Space Resources Act) in 2021, Japan's economic value growth from

2023 to 2035 is projected to range from $640 million to $1.8 billion (Yuna Yamada, 2024). Wile United States making growing investment in same sector(Janikowski, 2025). Thus, this creates a more favorable framework for the civil commercial sector in utilizing space resources and fosters a competitive environment in the domestic space industry.

From a legal standpoint, a state has the obligation to regulate its space activities under Article VI of the Outer Space Treaty. Such regulation aims to provide an Authorative and Continous Supervision as well as guidelines for all parties in exercising their rights and obligations in space activities while ensuring legal certainty and protection for relevant stakeholders (Von Der Dunk, 2023). Additionally, it establishes a strong legal basis for the state in enforcing the law (Supancana, 2020).

From an economic perspective, the absence of clear regulations could hinder investment and private sector participation in Indonesia's space industry. Given the rapid global development of commercial space activities on space mining. Indonesia must establish a robust legal framework to remain competitive. A well structured space law would not only attract investment but also support the growth of domestic space related industries, fostering innovation and economic benefits. Thus, Indonesia should consider formulating comprehensive space commercialization law that align with international law while addressing national interests(Suryaatmadja et al., 2020) .This includes provisions on licensing, liability, resource utilization, and private sector involvement to ensure sustainable and legally secure space activities.

Meanwhile, from an economic perspective, space activities are poised to become Indonesia's future emerging industry (*BRIN - BRIN Nilai Ruang Antariksa Akan Jadi Ekonomi Baru Masa Depan*, 2024). This potential is outlined in the strategic environmental considerations regarding global economic developments within Presidential Regulation No. 45 of 2017 on the National Space Master Plan 2016-2040. Indonesia holds significant opportunities in the space economy, with its geographical location along the equator providing a strategic advantage for spacecraft launches. Historically, Indonesia has strong experience in the design, development, and operation of rockets (Sumardi, 2020). This economic potential is further reinforced by plans to establish Southeast Asia's first spaceport, as mandated under Article 38(4) of Law No. 21 of 2013 on Space Activities. The Law No, 21 of 2013 encouraged the commercialization activity, then the urgency of establishing a comprehensive licensing regulatory framework lies in creating legal certainty and fostering a conducive environment for the future Indonesian space economy. A well-defined regulatory system will not only attract investment but also ensure that Indonesia remains competitive in the rapidly evolving global space industry. By strengthening its legal and infrastructural foundations, Indonesia can position itself as a key player in commercial space activities including Space resource utilization. Thus, proactive regulatory development is essential to harness Indonesia's full potential in the space sector while ensuring sustainable and secure international obligation

The author realizes that there are several studies related to the object of space law research in the context of commercialization and space mining. Therefore, it is important to explain the

distinguishing aspects between the research to be conducted and previous studies.. The utilization of space by states and flag of choice considering jurisdiction was explain by Francesa Giovani (Giannoni-Crystal, 2024) Japanese space regulations regarding privatization of Japanese Space Activities have been presented by Mori Hamada and Matsumoto(Mori Hamada & Matsumoto, 2023a). A comparison among countries with domestic laws on the rights to space extraction results has been explained by Morgan M. Depagter(Morgan M. DePagter, 2022). The research by Shannon Suryaatmadja, Vicia Sacharissa, Konrardus Elias Liat Tedemaking discusses the Indonesian legal perspective on the phenomenon of space mining as well as a regulatory framework for Indonesia(Suryaatmadja et al., 2020). Shannon Suryaatmadja's research, in particular, will serve as the foundation for thought and the development of the regulatory framework proposed in his study.

In this research, the author will provide a conceptualization of aspects that have not been discussed, such as the mechanism of conceptualization before moving toward a domestic legal framework, the addition of international laws, domestic laws, and others In this writing, the author will provide a rigid outline of the regulations framework to be implemented, such as licensing, rights and obligations, oversight, funding, attribution of revenue results, as well as administrative and criminal sanctions in the regulation of space commercialization in Indonesia.

2. Research Methods

The research used a normative method with comparative and conceptual approach. The conceptual approach is carried out by conducting a search and deepening concepts from theories, doctrines, principles, and statements by international legal experts. According to Peter Mahmud Marzuki, the conceptual approach is a method of legal study and research. Peter Marzuki explains that conceptual research is conducted when there are no or no legal regulations for the problems faced and in answering them it is necessary to develop a concept based on views and doctrines that develop in Legal Science. In this case, the problem is the ownership of outer space resources which will be answered through the views, theories, doctrines of national and international legal experts (Marzuki, 2021).

This disclosure can be used as a recommendation for the preparation or amendment of legislation. Therefore, the research writing is related to analyzing the conception and regulatory mechanism of outer space resource ownership from several countries through international space law experts and offering systematic and organized mechanism as a regulatory framework for Indonesia's outer space resource ownership. The legal materials used consist of three, namely, primary legal materials in the form of: international, bilateral, domestic and national (Indonesia) reguations, secondary legal materials consisting of scientific papers, books, journal articles, electronic media, theses, dissertations, and others, as well as tertiary legal materials which consist of encyclopedias and dictionaries(Muhaimin, 2020).

3. Results And Discussion

3.1. Conception of Outer Space Resources in International and Nasional Laws

The freedom of exploration and exploitation of outer space is regulated under Article I of the Outer Space Treaty (OST), Chapter 2, which states: "*Outer space, including the Moon and other celestial bodies, shall be free for exploration and use by all States*..." However, in the international landscape, there is ongoing debate regarding space activities related to outer space resources, specifically space mining. This is due to the provisions of Article II of the OST, which states: "*Outer space, including the Moon and other celestial bodies, is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means*." This implies that claims of ownership or control over celestial bodies by nation are prohibited. Nevertheless, the provisions of Article II are highly ambiguous, such as whether ownership/appropriation of outer space resources is possible for the private actors, although some experts argue that outer space resources also cannot be owned (B. Larsen, 2021).

In this regard, scholars such as Francesca Giannoni-Crystal have drawn conclusions based on the views of other experts, including Von der Dunk, who argues that there is no explicit prohibition on commercial exploitation in the OST. Furthermore, Article VI of the OST grants states supervisory authority over private entities, and if these conditions are met, the actions of private actors in space exploitation are legal(Frans von der Dunk, 2015). Thus, Von der Dunk suggests that it is better to interpret the prohibition on sovereignty over celestial bodies as not extending to a prohibition on ownership of commercially extracted resources in this case, space mining. This perspective is supported by research from the International Institute of Space Law (IISL) and the Institute of Air and Space Law of Leiden University, which essentially concludes that clarifying the provisions of Article II of the OST does not generally prohibit asteroid mining, nor specifically mining on the Moon.(Giannoni-Crystal, 2024) From this, it can be inferred that the absence of international objections to the commencement of space mining serves as a strong argument for implicit consent to such activities under the Vienna Convention. Thus, it can be concluded that the ownership of extracted space resources does not conflict with the OST. Consistent with the statements of many experts, the issue of ownership of space resources is not a matter of legality but rather governance, both in the international and national spheres. The challenge lies in establishing a regulatory framework that balances commercial interests with the principles of international space law.

Another crucial aspect requiring deeper examination is the provisions of the Moon Agreement, which many scholars consider a failure, as only 18 nations have ratified it—with none being major spacefaring nations (Delgado-López, 2015). Consequently, it has failed to achieve international consensus. This leads to the conclusion that the Moon Agreement does not provide a convincing legal basis for prohibiting national legislation on the utilization of space resources under international law (Giannoni-Crystal, 2024)This very limitation has prompted spacefaring nations like the United States through NASA to pursue alternative approaches, such as forming multilateral agreements, to establish a shared framework for space resource exploitation. These efforts align with the principles enshrined in the OST, ensuring that

commercial space activities adhere to international norms while allowing for national regulatory development.

The absence of broad acceptance of the Moon Agreement underscores the need for adaptable legal mechanisms that balance sovereign interests with the collective governance of space resources. As a result, nations are increasingly turning to Artemis Accords and similar initiatives to create a cooperative yet flexible regime for space exploration and resource utilization (de Zwart et al., 2023). Thus, while the Moon Agreement remains largely ineffectual, its shortcomings have catalyzed more pragmatic solutions that reconcile commercial ambitions with the foundational principles of space law. This evolution highlights the importance of dynamic legal frameworks capable of addressing the realities of modern space activities.

The Artemis Accords were born from the urgency to clarify the ambiguities in space law. This multilateral agreement has been signed by more than 50 countries worldwide, including four nations that have issued regulations on space resource utilization, and is closely linked to the Artemis program (*Artemis Accords - NASA*, n.d.). Article X of the Artemis Accords support the statement that ownership of space Exctracted resources is permitted under international law by affirming an interpretation of Article II of the OST that allows space mining. Article XII of the Artemis Accords create a "safety zones" concept for signatories in conducting their space activities.

This article try to explains that space resource extraction activities must benefit human interests, must not conflict with Article II of the OST, and must coordinate activities with the UN(Latipulhayat, 2024). The Artemis Accords represent a regulatory manifestation that emphasizes a shift from the rigid provisions of the Moon Agreement, which limits individual ownership and emphasizes the "*Common Heritage of Mankind*" principle. Thus, Artemis Accords in other hand focuses more on the potential for space development with a less rigid and more flexible approach while still considering applicable international space law provisions.

Furthermore, within the domestic legal framework, referring to the four countries that have established regulations on space resource utilization, we encounter various conceptions of space resources. Several nations like the U.S., UAE, and Japan clearly articulate their concepts of space resources, while Luxembourg does not explicitly emphasize this conceptualization. *51 U.S. Code § 51301 on Space Resource Commercial Exploration And Utilization* provides a preliminary concept of space resources as "*an abiotic resource in situ in outer space*." Article II of *Act on the Promotion of Business Activities for the Exploration and Development of Space Resources* conceptualizes space resources as "*water, minerals and other natural resources that exist in outer space, including the Moon and other celestial bodies*." *The Federal Law on the Regulation of the Space Sector of Uni Emirate Arab*, in Article I of its General Space Law, defines space resources as "*non-living elements and/or organic resources present in outer space, including minerals and waters*."

In this regard, the author argues that it would be preferable to adopt a definition of space resources as "*extractable and/or recoverable abiotic and natural resource[s] in situ in outer space*." As defined by many expert on The Hague International Space Resources Governance

Working Group. This definition places greater emphasis on all resources that can be extracted, regardless of whether they are living or non-living. Ultimately, the utilization of these resources will apply to asteroids, the Moon, and others celestial body (Sacksteder & Sanders, 2007). This comprehensive approach ensures that the regulatory framework remains adaptable to future technological advancements while maintaining clarity in legal interpretation. By focusing on extractability rather than biological status, the definition better accommodates the diverse range of potential space resources that may be utilized in forthcoming space exploration and commercial activities. The inclusion of both abiotic and natural resources acknowledges the full spectrum of materials that could hold economic or scientific value in humanity's expanding presence in space.

Having established the conceptual framework for space resources, it becomes essential to examine the legal conceptions of space resource ownership. Referring again to the regulatory approaches of the U.S., Luxembourg, UAE, and Japan, each jurisdiction has developed distinct legal interpretations regarding space resource utilization. The United States adopted a controversial stance through its Commercial Space Launch Competitiveness Act of 2015. Section IV explicitly states: "*A U.S. citizen engaged in commercial space resource activities is entitled to any asteroid or space resources obtained, including the right to possess, transport, use, and sell such resources in accordance with applicable law, including international obligations.*"

This provision reflects the common law tradition, where property is viewed as a "bundle of rights" (a collection of entitlements), allowing private entities to exercise ownership over extracted resources without claiming sovereignty over celestial bodies (Jhonson, 2007). In contrast, Luxembourg's approach under its space law framework declares "*Space Resources Are capable To Be Own*". This formulation aligns with civil law systems, which emphasize absolute property rights rather than a disaggregated bundle of rights.

While similarly permitting private ownership, Luxembourg's legal tradition frames it as an inherent attribute of the resources themselves rather than as a set of separable entitlements(Giannoni-Crystal, 2024). This analysis reveals that while legal traditions shape the phrasing of ownership rights, the operative outcome private utilization of space resources remains functionally equivalent. The key distinction lies in the doctrinal foundations: one treats ownership as a composite of rights (U.S.), while the other codifies it as a unitary legal status (Luxembourg). The Luxembourg may provide precedents for Indonesia to consider when developing its own regulatory framework as it used the same Tradition of Civil Law System.

The UAE does not explicitly declare the permissibility of owning space resources but incorporates them within the framework of space activities as "*the exploration or extraction of outer space resources, or the exploration and use of space resources for scientific, commercial, or other purposes*"(Morgan M. DePagter, 2022). Here, extracted space resources are implicitly treated as property (mal) subject to Islamic legal conceptions of ownership, which recognize lawful acquisition through permissible activities (e.g., extraction)(Giannoni-Crystal, 2024).

Meanwhile, Japan's Space Resources Act stipulates that "space resources, as defined, may be owned if authorized by the state" (Mori Hamada & Matsumoto, 2023a). This positions

ownership as conditional upon state approval, aligning with Japan's centralized regulatory approach. This analysis underscores that while legal traditions diverge, the core principle remains extracted resources become property only through state authorized processes, balancing commercial incentives with international treaty compliance.

Next, we will examine the licensing concept across the four countries. The U.S. does not explicitly regulate licensing and permits, while Luxembourg, UAE, and Japan provide regulations regarding licensing and liability. Essentially, all four regulations govern applicants who must be citizens (as in the U.S.) or include non-citizens (as in Luxembourg, UAE, and Japan). Regarding licensing and permit applications, the U.S. has not yet established comprehensive regulations, while the other three countries regulate it under the same framework (Giannoni-Crystal, 2024). It can be concluded that, fundamentally, applications must meet strict requirements regarding plans (including financial schemes, technical aspects, legal procedures, agreements, structured organizations capable of managing future risks, and organizational backgrounds free from harmful or criminal activities), as seen from Luxembourg's perspective, as well as the purpose, period, location, method, and content of space resource commercialization activities from Japan's perspective. Applications are submitted to the space agency and approved by the ministry, space agency chief, or even president.

Further is considering insurance and sanctions. Space resource extraction activities are high-risk endeavors, making it essential to examine how these four countries regulate this aspect. The United States still lacks licensing regulations, and Japan does not explicitly regulate insurance or sanctions for licensing violations (Mori Hamada & Matsumoto, 2023b). Therefore, Luxembourg and the UAE will be the focus. Luxembourg requires every license applicant to provide adequate financial resources commensurate with the risks of their space activities. These risks can be covered by banks, insurance policies, space operator resources, and other means(Bergstresser, 2021).

Meanwhile, the UAE mandates that activities aimed at utilizing space resources must obtain insurance coverage and be liable for compensating the government in case of international losses (Giannoni-Crystal, 2024). Article 18 of Luxembourg's Space Resources Utilization Law imposes criminal penalties on any operator conducting space utilization activities without a permit or engaging in activities that violate the law. Similarly, the UAE imposes criminal penalties on violators and holds both licensors and applicants accountable for regulatory breaches.

Von der Dunk explains that according to the provisions of Article VI of the Outer Space Treaty, states have the authority to regulate and supervise space activities of every space operator within their country, which are subject to International Space Law (Von der Dunk, 2018). However, Dunk further explains that a global framework is needed to clarify and ensure these space mining activities. Through Dunk's doctrine, it can be understood that it is important for a country, even non-spacefaring nations like Indonesia, to implement regulations and oversight for space activities, particularly space mining, to create certainty and avoid a "Wild West" situation in the future (Lavigne, 2024).

Ultimately, the author argues that the conception of space resource ownership and its mechanisms must still consider the existence of international space law or multilateral agreements agreed upon in international forums. This is because potential legal fragmentation could occur, leading to conflicts and injustice in the long run (von der Dunk, 2018). Therefore, international collaboration is necessary to ensure fairness in the utilization of outer space. According to the author, the implementation of national licensing regulations requires a preliminary step in the form of a conception of space resource ownership within the framework of international space law, though this will undoubtedly be challenging given that the conception of property ownership can vary across countries. Dunk's concept of imposing "slots" on space utilization activities is also noteworthy, provided that the distribution of these slots is fair.

In the end, Indonesia must act swiftly while still emphasizing the principle of caution in facing activities such as space mining. In space law, the state is the primary actor in space activities (principle of state primacy). The licensing state will inevitably be affected when losses or accidents occur in private space activities, though not entirely. Nevertheless, space utilization activities are not something we can reject outright, these activities will inevitably occur in the future, and proper regulation will ensure fair and orderly space utilization. Before moving toward space commercialization, Indonesia must first develop its national space industry, as reflected in the policies outlined in Presidential Regulation No. 45 of 2017 concerning the Master Plan for Space Activities for 2016-2040.

3.2. The Systematic and Well-Organized Mechanism in Formulating Space Resource Utilization Regulations

Indonesia's readiness in utilizing space resources, particularly space mining, may currently be questionable, as the existing Blue Print regulations have yet to fully address the challenges at hand (Suryaatmadja et al., 2020). However, to fill the legal void in space commercialization, the author will attempt to construct a mechanism that ensures security, certainty, and fairness. This includes security in space activities, public safety, the space environment, and international relations. Moving forward, Indonesia must coordinate with the international community to discuss space commercialization issues and explore opportunities for collaboration with multinational programs such as the UNCOPOUS or others international forum related with utilization of space resources.

In harmonizing the regulatory concepts for the utilization and ownership of extracted space resources, the author proposes the implementation of a Systematic and Organized mechanism. This approach is derived from the Free but Limited mechanism introduced by Zhao Yun in his research (Yun, 2020).The mechanism grants flexibility (freedom) to space actors to conduct exploration and exploitation while imposing limits on the methods, scale, and scope of these activities, as well as regulating the distribution of benefits within certain boundaries (Yun, 2020). Crucially, these activities must serve the interests of all humanity. The author narrows the scope of this mechanism, originally designed for multilateral frameworks, to fit national levels. At the national level, Indonesia must carefully consider the purpose and objectives of space

commercialization, ensuring that exploration and exploitation activities provide tangible benefits not only to private entities but also to Indonesian society and humanity as a whole. Thus, the formulation of licensing regulations should not solely focus on private sector interests but must also prioritize public benefits both nationally and globally as mandated by Article I OST, Space Benefit Declaration, and Law 21 No. 13 of 2013 on Space Activity.

The previously discussed concepts of space resources and ownership frameworks can be regulated through this mechanism in order to establish concrete Framework for Indonesia's own space resources regulation. The implementation of this mechanism must of course be adapted to Indonesia's existing laws, particularly the constitution and the nation's ideals embodied in Pancasila, as well as others legislation (Hidayat, n.d.). After synchronization with national laws, the formulation stage requires clarification of space exploration and exploitation concepts through the Systematic and Organized mechanism, while considering limitations on methods, levels, and scope of space exploration and exploitation, as well as whether the attributed benefits can contribute to Indonesian society and all humankind. Ultimately, Indonesia's space commercialization regulations could establish provisions regarding Concepts, Licensing/Permits, Rights and Responsibilities, Financing, Insurance, and Sanctions. Certainly, developing these regulations will take time, yet they are crucial given technological and scientific advancements in space. Thus, Indonesia cannot avoid the possibility of implementing similar regulations in the future(Suryaatmadja et al., 2020).

This process must be conducted carefully to ensure national interests align with Indonesia responsibility and International Liability and principles of global justice. Therefore, although these regulatory challenges are complex, establishing a comprehensive legal framework for space activities is imperative for Indonesia to actively and responsibly participate in this new era of space exploration and resource utilization. This would simultaneously position Indonesia as a key player in the increasingly evolving global space governance. The gradual development of these regulations should be pursued while maintaining alignment with technological developments and international space law principles. To facilitate understanding of the Conceptual Framework for Space Resource Utilization, the following table is presented:

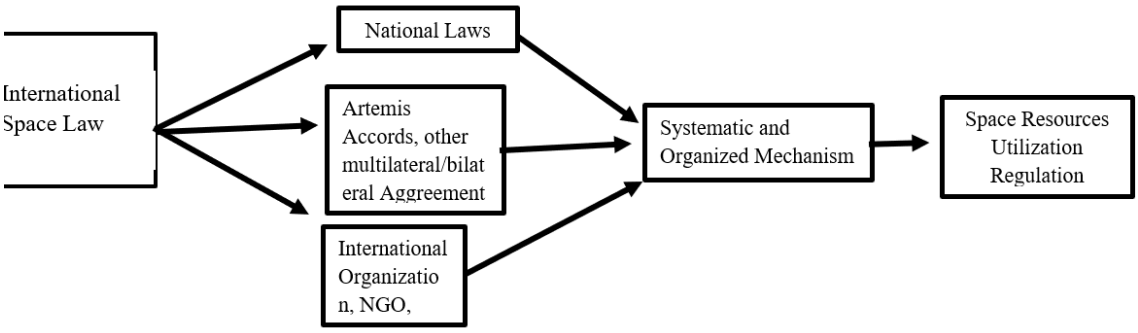

Table 1.1 Conceptual Framework for Space Resource Utilization

This scheme provides an overview beginning with the interpretation of the principles of freedom of exploration, use of outer space, and other celestial bodies in Article I of the OST, Article II on Non-National Appropriation, Article VI on national regulation under the OST, and related international laws. It then elaborates on the provisions of the Artemis Accords. The provisions in the Artemis Accords influence by National Regulations such as those of the United States in determining national space commercialization regulations. Next, the conceptual framework for space resource utilization is synchronized with Systematic and Organized mechanism, thereby creating a national space commercialization regulatory framework.

The Framework includes : First, the method of resource extraction is limited to resources taken in situ from the Asteroid, Moon, planets, and other celestial bodies(de Zwart et al., 2023). Second, the scope is focused for example on the Earth belt, i.e., the zone extending from Earth to Jupiter containing 1.9 million asteroids, or safety zones as defined in the Artemis Accords, or the Moon and ranges determined by the international space community such as UNCOPUOS (*United Nations Committee on the Peaceful Uses of Outer Space 56 Th Legal Subcommittee*, n.d.). Third, the scale of resource extraction must consider the amount of space debris and potential risks arising from it. Fourth, the distribution of benefits from resource extraction at the national level can be used to fund national government programs such as the RPJPN or RPJMN, while at the international level, it can support SDG's and considering to promote and share the extracted resources to other states (Bohacek et al., 2022). Benefit distribution can utilize mechanisms such as royalties or taxes (McKeown et al., 2025). Lastly, the coordination mechanism within the international landscape, such as through the Secretary general of the United Nations, must be addressed. To facilitate understanding of the implementation of Systematic and organized mechanism, the following table is presented below :

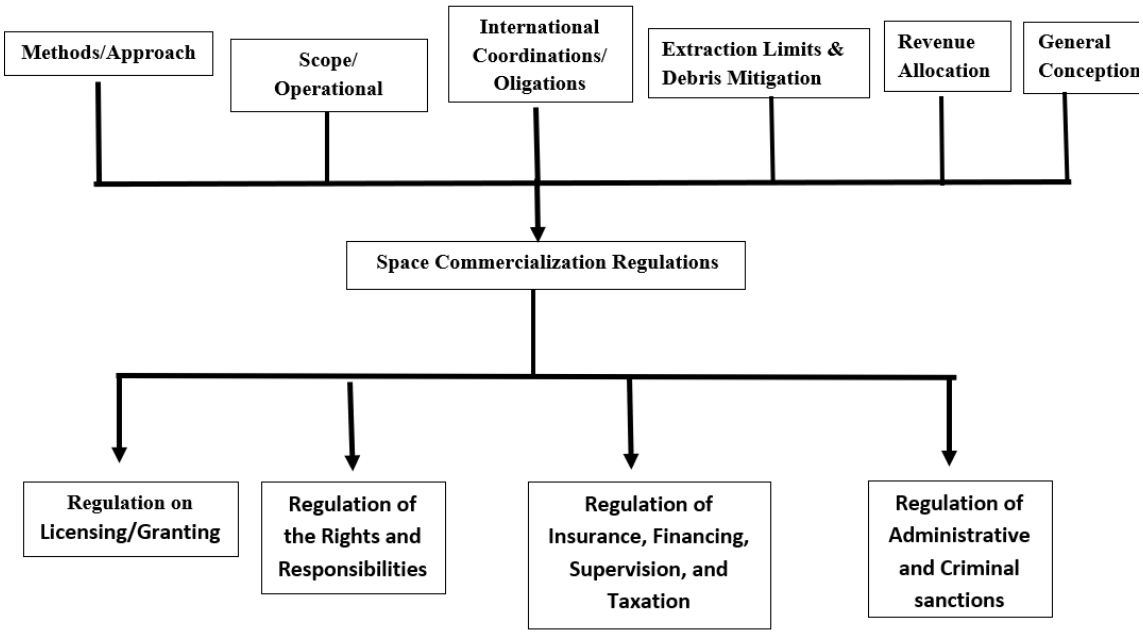

Table 1.2: The Systematic and Organized Regulatory Mechanism

In realizing all the considerations above, a legislative regulation is needed that contains the following framework:

1. First, the regulation of licensing/granting of licenses.

The granting of licenses must be carried out with strict requirements, such as financial schemes, technical aspects, legal procedures, agreements, a structured organization capable of facing future risks, and an organizational background that must be clean from any harmful or criminal activities.(Suryaatmadja et al., 2020)

2. Second, the regulation of the rights and responsibilities of private entities.

The regulation of rights as defined most of the 4 nations who own's domestic space resources regulation to the freedom of every individual, legal entity, and institution (indegnious or foreign) to own property derived from outer space resources, including the rights to possess, use, sell, transfer, and store outer space resources. On the other hand, obligations emphasize that every space actor must comply with and consider regulations, the environment, public interests, and nation's responsibilities under international law, as well as compensation if losses are incurred by third parties.

3. Third, insurance, financing, supervision, and taxation.

Insurance is required to ensure compensation payments to third parties in case of losses caused by the operator, given that this activity is very high-risk with the considering that nation would pay the compensation at the very first place (Suryaatmadja et al., 2020). Financing is provided by the government/foreign entities to promote the space industry in this field, such as Japan's Space Strategic Fund as an example. Supervision is a crucial aspect that must be regulated by the state through a space agency to ensure activities comply with regulations and safety. Following this is the tax instrument imposed to provide state revenue and contribute to international programs.

4. Fourth, administrative and criminal sanctions.

Sanctions, as in any legal system, must be applied to serve as both preventive and repressive measures for space activities. Sanctions can be administrative, such as fines, business suspension/termination, or criminal sanctions if violations of the law occur that could harm national or international communities.

This regulation takes into account the domestic laws on outer space resource ownership from the four previously discussed countries, with slight modifications and synchronization with the national legal framework. With this initial framework, it can be concluded that any space activity must consider procedural and juridical aspects to operate, aimed at ensuring peace, certainty, and security in the commercialization of space programs.

4. Conclusion

Current international space law, particularly the Outer Space Treaty, has not provided full clarity regarding ownership of space resource commercial exploitation. Countries such as the United States, Japan, Luxembourg, and the United Arab Emirates have taken proactive steps by establishing domestic regulations that enable private sector involvement in space resource exploitation, accompanied by clear licensing schemes, liability provisions, insurance requirements, and sanctions. This research proposes the implementation of a "Systematic and organized" mechanism as a regulatory model establishing framework for space resources utilization in Indonesia, which grants exploration and utilization freedoms with certain restrictions to safeguard international interests and humanity's collective benefit. This mechanism is harmonized By establishing comprehensive regulations encompassing concepts of space resources, licensing procedures, rights and responsibilities, financing mechanisms, oversight provisions, insurance requirements, and sanctions, Indonesia can not only create legal certainty but also advance its national space economy and strengthen its position in international space governance.

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