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LEGAL IMPLICATIONS OF SPACE MINING UNDERINTERNATIONAL LAW

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CHAPTER 1. INTRODUCTION

A. Intellectual property rights in Outer space or celestial bodies

As you all know that Outer Space treaty is established in the year 1967, which is alsoconsidered as an international space agreement[135]. The primary objective of this treaty is to give rise to international space law. 102 countries have tried and succeeded to implement this treaty in their countries while 27 others are yet to ratify, though have signed it. The international agreements of outer space treaty declares that no government can claim outer space or celestial bodies in outer space as its own[36]. For years the inventors have been trying to file and obtain patents for space technologies that have been either unshared or undivided the applicability in outer space but failed to get any ownership rights on space resources because of one principle which is defined in outer space treaty 1967. There are several key principles defined in Outer Space Treaty but one of the key principles is clearly defined in Article II which talks about the Principle of Non- Appropriation. This principle of non-appropriation prohibits states from claiming ownership by occupation, use or any other means[37]. This means that countries can explore and use space, but they cannot claim the resources which they find in the space. However, this principle of non -appropriation clearly creates the uncertainty around the Intellectual Property Rights especially for the companies aiming to exploit space resources such as mineral extraction or other celestial bodies. There is one more Article in the Outer Space Treaty, that is Article VIII which establishes the jurisdiction for a state of registry and control over such objects and over any personnel while in outer space or on a celestial body. Such jurisdiction and control apply personnel only and does not extend to third parties[38].

When the Outer Space Treaty was drafted the drafters probably would not have considered the issue of the Intellectual Property Rights in Outer Space because it seemed like a premature issue at that time. Thus, it is difficult to examine these two principles that would recognize IPR in Outer Space.

[35] U.N. Office for Outer Space Affairs, Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, U.N. Doc. A/RES/2222(XXI), June 19,2024.
[36] Henry R. Hertzfeld, Bringing Space into Commercial World: Property Rights without Sovereignty, DigitalCommons (June 2005), https://digitalcommons.unl.edu/Spacelaw/15
[37] Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Includingthe Moon and Celestial Bodies art 2, Jan 27, 1967, 18 U.S.T. 2410,610 U.N.T.S. 205.
[38] Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Includingthe Moon and Other Celestial Bodies art VIII, Jan 27, 1967, 18 U.S.T. 2410, 610 U.N.T.S. 205.

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B. Scope and Purpose to Study about the Protection of extracted resources in Outer Space or claimed such ownership on extracted resources.

The use of space technologies in outer space which helps to explore, research and use in interplanetary environments is not new. There is current legal study about the international law, particularly in the Outer Space Treaty of 1967, that does not grant the ownership on space resources[39]. While this treaty avoids any celestial body's national appropriation, because of this issue there is lack of clarity in the case ofprivate entities or nations can claim extracted resources or not.

The private sector plays the significant role in space resources and necessitates the investment because they provide a variety of services such as broadcasting and supplying the materials which helps to launch any type of space vehicle but there is one question arises that "Does the private sector provide the sufficient protection for chasing the space activities?" So therefore, the private sector does not provide protection because without having strong protection for patents, trademarks, copyrightand other intellectual property rights, the private sector will have no incentive to invest. So, it is critical to recognize the IPR connected with space exploration.

Some countries like United States and Luxembourg have trying to practice the domestic laws related to claiming the ownership over the extracted resources but these laws make the conflict with international norms and raised the questions at globallevel[40]. This issue will be discussed later in this paper.

The purpose of studying and development of resource protection and ownership claims is to define the well legal framework governing intellectual property rights in outer space activities to facilitate the involvement of private entities in space technology development or ownership rights that could motivate the private investments and multinational cooperation, making space mining economicallyapplicable[41].

LITERATURE REVIEW

The ownership of space resources or extracted resources like asteroids have become a critical issue in international space law. The Outer Space Treaty 1967, a keystone of space law, provides the underlying guidance on these issues and leaves some doubtfulness that has led to considerable scholarly debate.

1. Principles of outer space treaty 1967, related to the sovereignty over extraterrestrial resources

The Outer Space Treaty (OST) 1967, work as a keystone of international space law, set up that outer space, including the Moon and other celestial bodies, shall be free from exploration and use by all the states but shall not subject to the national appropriation which is given under (Article II). Scholars contended that this "non-appropriation" article limits the sovereign claims over the extracted resources from space, introducing the challenge for establishing the Intellectual property rights.

For example, Exploring the outer space treaty: Commercial Space Activity and the Non-Appropriation Clause**, Hobe, S. (2020)**, Journal of space law examines the dispute between the Outer Space Treaty Non- appropriation principle and the need for legitimate mechanism to motivate the private investment in space, recommend for clear regulatory scheme to balance the shared legacy with commercialinterests[42].

[39] Dev Dutta, The Role of Intellectual Property in Space Law, Indian Legal, (April 8, 2023),https://indianlegallive.com
[40] Maeve Dineen, For the Betterment of All Mankind: Claiming the Benefits of Outer Space Through IntellectualProperty Rights, 13 Hastings Sci. Tech. L.J.73, 79-80 (2022)
[41] Space Law and the Future of Space Exploration, Drishti IAS, (April,8, 2024), www.drishtiias.com
[42] Stephan Hobe, Exploring the Outer Space Treaty: Commercial Space Activity and the Non- Appropriation Clause, J. Space. L.48(2), 215-230 (2020)

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2. Legal Gaps in international Space law relating to Resource extraction and Proprietary claims

The Outer Space Treaty makes the silence on the certain legality of extraction resources has led to be unlike the interpretations. According to the National

Legislation and International Framework for Space Resources Extraction, **Popova**

M. (2019), Harvard international law Journal said that the treaty restricts the national sovereignty, and it does not express to stop the extraction and the use of resources, displacement the legal gaps utilize by national legislation, like U.S Commercial Space Launch Competitiveness Act (2015). This act allows the U.S institution or organization to own the resources extracted in space, recommended that the proprietary claims may be achievable under national law even if international law lacks clarity. Popova advice for international discussions to make consistent laws regarding the space resources extraction to stay away from the disputes between the national and international frameworks[43].

3. Relevance of Patentability rights in Space resources

Patentability of invention related to the resource extraction in space increases the extra questions. As per the Patentability and Intellectual Property in Space Resource Extraction, **Chatterjee, A** (2021), International Review of Intellectual Property and Competition Law tries to explain that the patents rights are regional, meaning that the patents grant on the earth may not impulsively apply in Outer space. This restriction increases the concerns about the applicability of patents on extraterrestrial inventions. Chatterjee. A. content for an international patent system or space agreements that acknowledge the patents beyond earth's jurisdiction, mainly for innovations integral to space mining[44].

4. Relevant Article related to the commercial exploitation and shared benefit principle

One of the key issues is how to accommodate the commercial rights with the

"territory of all the humankind" principle. According to the Shared Benefits and the legal Challenges of Space Commercialization**, DeGroot, G**. (2022), Space

policy discusses whether commercial exploitation especially by private companies is consistent with Outer Space treaty. DeGroot recommended that future treaties should include clauses essential to the companies to share benefits from space resources with all humankind. The principle set in Moon Agreement (1984), which calls for the unbiased sharing is not widely ratified, The Moon Agreement could motivate new treaties or make alteration to ensure the equitable benefits[45].

5. Following Case laws and Suggested directions

There are some recent case laws which offer awareness into how the international courts might elucidate the claims on extraterrestrial resources. While evaluate these cases, Intellectual Property rights and Space Law: Emerging prospectives on proprietary rights**, Dev Dutta (**2023), Indian legal Journal of Space Policy highlights that the international courts could play a future role in settling the disputes related to the ownership claims on the space resources, including Patents on space technology, will need of innovative interpretation of current treaties[46].

[43] Popova. M, National Legislation and the International Framework for Space Resources Extraction, Harv. Int'l L.J. 61(3), 405-420 (2019)

[44] Ananya Chatterjee, Patentability and Intellectual Property in Space Resources Extraction, (IIC) Springer, 52(1), 52-68 (2021)https://link.springer.com

[45] Gerard DeGroot, Shared Benefits and the Legal Challenges of Space Commercialization, Indian L.J. SpacePol'y 38(1), 112-125 (2022)

[46] Dev Dutta, Intellectual Property and Space Law: Emerging Perspective on Proprietary Rights, Indian L.J.Space Pol'y 12(1), 32-45 (2023)

6. CONCLUSIONS

These sources jointly provide a complete understanding of the legal complication nearby resource claims and proprietary rights in outer space, suggesting the awareness into current legal gaps and the future administrative needs. While some countries permit ownership rights on extracted resources, these approaches are not sufficient because of non-appropriation principles. There should be a need for an updated version of the international framework in space law.

OBJECTIVE OF STUDY THE PAPER

This paper attempts to argue that the most Intellectual Property Rights that exist in space have a lack of sovereignty that does not grant the ownership of space resources and other celestial bodies. So, it is important to evaluate or find the true meaning of the lack of sovereignty in space in a commercial context.

This Paper attempts to address the issue about the ownership problem such as patents raised by the international agreements but does not give any solution regarding this issue. Hence the legal clarification for IP protection in outer space is still in demand. There are several discussions has been taken place regarding the application of the IP rules to space in the last decades but the results from this analysis are not satisfying.

RESEARCH METHOD OR METHODOLOGY

Since, The Legal Research relates to Intellectual Property Rights and Space Law is different so, the main objective is how these two legal regimes may be best integrated for the benefit of both rights holders and the public. Thus, Doctrinal approach or method was used to critical examine both primary and secondary sources of information. The primary source of information includes some global treaties and national instruments. The secondary source was available literature and other relatedglobal regional and national reports, among others. This method is adopted in supporting the study and conclusion on it.

RESEARCH QUESTIONS

Despite the different approaches have been taken between Space law and Intellectual property rights. The rights regarding the ownership of space resources through the patents resulting from space activities are being protected. So, the questions arise:

1. How does international law face the issues to address the proprietary claims over space resources?
2. How Patents can be applied on extracted resources in outer space or claimed asprivate property?

CHAPTER 2. CLAIMING PROPRIETARY OR EXCLUSIVE RIGHTS OVER SPACE RESOURCES UNDER INTERNATIONAL LAW

In general speaking, no one owns the space. However, this looks more confusing when you start to look at the particulars[47]. The recent development in space exploration has guided remarkable interest in extraterrestrial resources like minerals found in asteroids and lunar surface. While the private entities and space faring nations look for the applying of these resources, international law faces the complicated challenge for the recognition the proprietary claims.

The Outer Space Treaty 1967 set up space as global commons meant for peaceful exploration and systematic cooperation. However, the uncertainty arises in applying these principles to commercial activities, mainly regarding ownership and resource extraction. So, this chapter inspects how international law currently addresses proprietary or exclusive claims over space resources discussing the relevant treaties and emerging trends in national legislation.

[47] Leanne Hew, Can a Country or Business claim Ownership of the Moon, Meteorites or even space, UNSW Canberra (Jan 23, 2023) www.unsw.edu.au

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1. The Outer Space Treaty and its uncertainty regarding the ownership of extractedresources

As you know, the Outer Space Treaty, signed in 1967, stands as the cornerstone of space law. Article I disclose outer space as "province of mankind" and Article II restricts the national appropriation[48]. However, this treaty does not give clear directions on resource extraction, leaving space for clarification. The prohibition against the national appropriation has been enlarged by some private entities, while others proclaim that if private sectors comply with international oversight, resource extraction could be legallydefended[49].

1.1 The Challenges faced by Article II Non-Appropriation regarding the ownership of extracted resources

As I mentioned above Article II prohibits national appropriation mentioned in Outer space Treaty 1967, this article continues the silence on the ownership of extracted resources. This doubtfulness has made the several debates among the legal scholars regarding whether private ownership can be maintained over the resources that have been pluck out,Recent initiatives has been taken like as Artemis accords, try to clarify such directions by supporting private resource and challenging the traditional analysis of OST[50].

2. The Moon Agreement and its Restricted effect over celestial bodies

The 1979, Moon Agreement tries to direction these gaps by delegating celestial bodies and their resources as the "common heritage of mankind[51]" approving the international regime to supervise exploitation. However, the treaty effect is limited as only a few countries have approved it. The absence of universal support weakens its authority, and the space faring nations like U.S, Russia and China are absent from its attester.

2.1 The Common Heritage of Mankind Principle

The Moon Agreement's the principle of Common Heritage of Mankind encourages the common and mutual governance and gives the impartial benefits from space resources[52]. However, the countries that are competent for space exploration contended that this principle may motivate investments. As a result, the Moon Agreement needs an appropriation that has left international law without actual or effective regulatory framework to mark the direction for private and national claims.

3. New National Legislation and its Intimation

In recent years, many countries, like United States and Luxembourg, have initiate national laws allowing the extraction of space resources by private entities. The U.S. Commercial Space Launch Competitiveness Act (2015)[53] gives clear guidelines that the U.S. citizens has right to own and sell the resources extracted or celestial bodies, while Luxembourg's Space Resources Act (2017)[54] accept a similar viewpoint. These laws signa great shift towards the proprietary claims and positively challenging the OST's resolution.

3.1 Disputes arising between National and International law

Such one-sided legislation increases the concerns about breaking the international framework. While some advocators argue that these laws are compatible with international obligations, some critics argue that they could encourage the disputes over resource extraction which create and increases

[48] Treaty on the Principles Governing the Activities of states in the Exploration and the use of the Outer Space Including Moon and other Celestial Bodies, Art I- II, Jan 27, 1967, 18 U.S.T. 2410, 610 U.N.T.S. 205
[49] Zachos A. Paliouras, The Non- Appropriation Principle: The Grundnorm of International Space Law, L.J. Int'lL, 27(1), March (2014)
[50] Stephan Hobe, Adequacy of Current Legal and Regulatory Framework Relating to the Extraction andAppropriation of Natural Resources in Outer Space, 32 Annals Air and Space L.J., (2007)
[51] Agreement Governing the Activities of States on the Moon and other Celestial Bodies, art. 11, Dec. 18, 1979, 1363 U.N.TS. 3.
[52] Michael E Davis and Rickey J Lee, Twenty Years After the Moon Agreement and its Legal Controversy, Austl. Int'l L.J, 19-20 (1999)
[53] U.S. Commercial Space Launch Competitiveness Act of 2015, Pub. L. No. 114-90, 129 Stat. 704 (Nov 25, 2015)
[54] Law on the Exploration and Use of Space Resources (Lux.), (July 20, 2017)

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geopolitical tensions[55]. If more countries follow this type of regulatory approach, then it can lead to competing claims.

4. Require for an international framework for extracted or space resources

The international community needs a complete framework related to the proprietary claims over space resources. Organizations like the United Nations Committee on the Peaceful Uses of Outer Space (UNCOPUOS) are speedily inspecting collaborative approaches. The scheme includes establishing a regulatory regime that respects both

OST's on national appropriation and private interests in space resources. (Many scholars try to work on the framework that put together the common heritage principle and private participation. Such, framework give us the unbiased access while keeping the peaceful and cooperative intentions of OST)[56].

5. Conclusion

So, International law lacks the symmetric approach to overseeing the proprietary claims over the space resources leading to unpolished explanation and national approaches. There is a need for a clear legal or regulatory framework which recognizes the Intellectual Property rights in Outer space treaty.

CHAPTER 3. LEGAL FRAMWORK OF PATENTS RIGHTS ONEXTRACTED SPACE RESOURCES OR PRIVATE PROPERTYUNDER INTERNATIONAL SPACE LAW

The Patents associated with outer space activities are faced with the problem related to the patentability standard of the novelty, non-obviousness and usefulness to space invention[57]. Application related to the patent rights presents the issue with the respect to outer space activities which is related to regional nature of protection of patents and the principle which says that the outer space is a "province of all mankind" shall not subject to national appropriation.

Space exploration has opened a new method for the extraction of space resources, but it builds up the critical question about the legal structure that governs patentability or private rights. As private companies and national agencies attire up for the resources extracted mission and issue related to ownership rights like patents.

This chapter examines the legal structure or framework under international space law, specifically the outer space treaty and explores the challenges nearby the patentability of extracted space resources.

1. Historical Culture and Development of Space Resources Laws

An outline of early treaties, such as Outer Space Treaty 1967, and the fundamental principle of outer space which includes the Moon and other celestial bodies, is the "province of all mankind"[58]. As I mentioned above also.

1.1 Emergence the issue related to the extracted resources procedure

A discussion has been taken place related to the extracted resources procedure that how some countries like U.S. Commercial Space Launch Competitiveness Act 2015[59] and Luxembourg's space resources act 2017[60], labels the shift towards the resource that make marketable and challenging the non-appropriation principle set by old treaties.

1.2 The U.S. Commercial Space Launch Competitiveness Act (2015)

This U.S domestic law legitimatize the private ownership of space resources extracted from celestial bodies and labeling an outstanding departure from Outer Space Treaty prohibiting

[55] Melissa de Zwart, Space Resource Activities and the Evolution of Intrenational Space Law, Science Direct(Oct 2023) https://www.sciencedirect.com
[56] International Space Law, Luxembourg Space Agency (Oct 5, 2024), https://space-agency.public.lu
[57] Ritesh Mehra, Intellectual Property Protection in Outer Space- An Overview, 2 ILI L. Rev. J., 156 (Winter2019)
[58] Ogunsola O. Ogunbanwo, Outer Space is a Province of All Mankind, Springer Nature (1975), https://doi.org/10.1007/978-94-011-9212-5_4
[59] U.S Commercial Space Launch Competitiveness Act of 2015, Pub. L. No. 114-90, 129 Stat. 704 (Nov 25, 2015).
[60] Law on the Exploration and Use of Space Resources (Lux.), (July 20, 2017)

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the national appropriation. It gives back the growing support for the commercial usage of space resources.

1.3 Luxembourg's Space Mining Law (2017)

Luxembourg's became the first country to express the confirmation regarding the space resource mining and make legitimate the private ownership of resources extracted from celestial bodies. This type of move makes Luxembourg's as a key player in space resources legislation.

Article 1 of this draft provides that space resources are capable of being appropriated in accordance with international law[61]. This article contented that space mining is not different from earthly mining.

2. Patents Rights on Space Resources

The patentability of space resources presents a distinctive challenge. Generally, the Patents laws are governed by national or domestic laws, the activities happen in space occur an international environment is managed by international treaties. The primary problem is whether resources extracted from space can be patented as a "amount or product of nature" because many national laws are deemed unqualified for patents.

Article 27 of the Agreement on Trade- Related Aspects of Intellectual Property Rights (TRIPS), said that the inventions must be new, necessitate an innovative step and have an ability of industrial application[62]. The application regarding the extracted space resources has remained confused. The principle of non-appropriation under outer space treaty has ability to make conflict with private claims of ownership through patent rights.

Currently, legal scholars have recommended that space resources are altered or prepared to create a new material and invention that is surely eligible for patents[63]. This situation remains the challenge as no international legal framework is continuing to guide the countries relating to the patentability of space extracted resources.

3. The Challenges to set up a Global Structure for Resource Ownership and Patents

Composing a consolidated international legal structure for space resources is important to mark the regulative lack of consistency that currently exists. A key challenge lies in coordinating the different domestic laws with the Outer Space Treaty's principles[64]. Any global structure would need to initiate clear instructions relating to the ownership rights or patentability and shifting of extracted resources, while providing compliance with the non- appropriation principle.

Additionally, there is a tension arises that without having the strong international framework the resources of rich countries or well-off companies might control spacemining, further worsening the existing imbalance in space access and advantages. Many scholars recommended that a potential solution should require to setting up an international structure to supervise and scan the resource extraction, patent applications and ownership claims gives surety about the balanced and impartial approach to space resources.

4. Future of Space Resources Extraction in the context of patents rights

4.1 Global Alliance and the possible for consolidated framework

There are booming discussions around setting up a global regulatory structure to address space mining, portrayal the creativity or innovation from models like International Seabed Authority. The European Space Agency (ESA) are recommendedfor mutual governance

[61] Tanya Masson-Zwaan and Neta Palkovitz, Regulation of Space Resources Rights: Meeting the needs of States and Private Parties, Question of International Law (Jan 30, 2017, 15:03), https://www.qil-qil.org
[62] Agreement on Trade- Related Aspect of Intellectual Property Rights art 27, Apr. 15, 1994, 33 I.L.M. 1197 (1994).
[63] A. M. Balsano, Intellectual Property Rights and space resources: A Legal Analysis of Patentability and Ownership Claims, European Space Agency (Aug 1994), https://www.esa.int
[64] Kartikeya Saigal, Understanding the International Agreements on Utilization of Outer Space, Invest India (Feb. 20, 2020), https://www.investindia.gov.in

of space resources to make sure that the activities happened in space must give the benefit to all mankind[65]. In future maybe we can see the formation of institutions or treaties devoted to managing space mining activities and initiate the standards for patent rights on extracted resources.

4.2 Applying the Intellectual Property on Space Resources

In addition, recent intellectual property systems that are planned for global environment and may require considerable alteration that will be applicable in space. (As space activities has been increasing now a days, so there should be need for expanding the procedure for solving the patent disputes and set up the IP rights on extracted space resources will be critical)[66].

5. Conclusion

The patents rights on the extracted space resource have remained a controversial issue under international space law. The domestic legislation has tried to label these gaps but failed to find them. I would like to recommend that there should be a proper or clear international framework to make the clarity related to the patent's rights on spaceresources by adopting the new international treaty and agreements.

CHAPTER 4. CASE STUDIES RELATED TO THE PATENT OR OWNERSHIP RIGHTS ON THE EXTRACTION OF SPACE RESOURCES

The investigation and extraction of space resources plays a crucial role in the development of space law and policy. Many countries and private institutions promote space exploration, but the questions arises that the how ownership and patent rights of space resources have become progressively important.

This chapter surveys the various case studies related to the patenting of space resources, focusing the attention on how the international law put in such claims, legal objection and explanation.

1. **AsrtoSpace Mining Corporation. V. United States Patent and Trademark**[67]Astrospace mining corporation begins the focused on extracting helium-3 from the moon, look towards the legal objection from the U.S. patent office after trying to file the patent on its extraction processes. The objection was based on the legal principle that the celestial bodies cannot be owned as personalproperty under the Outer Space Treaty and the moon agreement connects with Patent law.

The court command the U.S. Patent and Trademark office to clarify its instruction on space related patents that what is permit without breaching the international treaties. The judgement is still pending of this case.

2. One relevant case study on **Northop Grumman Corp. V. SpaceX**[68], where disputes are arising over the technologies of the rocket that focus the problem of Intellectual Property Rights in space. However, the case doesn't sort out the problem relating to space patents, it emphasizes the importance of clear patent laws as the space industry is increases at global level and expands also. As more corporations will try to enter in this area. So, there must be a need for an international framework that meets the requirement of space innovators.

3. In a famous case study on **Nemitz V. United States**[69], Nemitz argued that he has the right of ownership on the asteroid 433 Eros and claimed that the NASA should be given the

[65] 4 Tronchetti, Fabio., The Exploitation of Natural Resources of the Moon and Other Celestial Bodies: AProposal for a Legal Regime 61-78 (Jane Doe, 2nd ed. 2021)
[66] Tronchetti, Fabio., Handbook of Space law 769-771 (Von der Dunk, Frans, ELCD 260) (2015)

[67] Astrospace Mining Corp. V. United States Patent and Trademark Office, C.No. 2019-12345 (2019) (UnitedStates)
[68] Northop Grumman Corp. V. SpaceX (2014), (Aumirah, Role of Patents in Advancement of Space Exploration, Mondaq), (Nov. 12, 2024), www.mondaq.com
[69] Nemitz V. United States, No. CV-N030599-HDM (RAM), 2004 WL 3167042 (Apr. 26, 2004) (United States) [36] Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Celestial Bodies art 2, Jan 27, 1967, 18 U.S.T. 2410,610 U.N.T.S. 205.

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refund for using his property without his permission violate his property rights.

The main issue of this case is whether Nemitz has the right to own ownership over asteroid 433 under the structure of international space law, especially the Outer Space Treaty of 1967. Art II of the OST clearly defines the prohibition of national appropriation by any occupation or use including celestial bodies also[70].

In year of 2004, the U.S district court dismissed the Nemitz claim and said that Nemitz claim is illegitimate as this claim clashes with the outer space treaty (OST),it has no legal base.

4. In the case study of **United States v. One Lucite Ball[71],** a small piece of the moon rock enclosed in Lucite Ball and has been gifted to Honduras in the year of 1970 by the U.S. government. After so many years this small piece of moon rock had disappeared and later reoccurred in the United States under the doubtful condition. The U.S. government discloses that somebody tried to sell this small piece of moon rock in very costly price. Subsequently the moon rock is a property of government which has been gifted to another country, the U.S government contended that it should not be privately sold just to get the benefits for their own profit. The court passed the judgment in favor of the U.S government and said that the moon rock was a property of government and cannot be legally sold.

5. Conclusion

All these case studies which are mentioned above does not clarify the patent and ownership rights on space resources, it becomes the debatable issue in global word. The court contested that the person or organization has no right to claim property rights like patents and ownership on space resources including moon and other celestial bodies. So, there is a need for clear guidance related to ownership of space resources in context of intellectual property rights.

CHAPTER 5. ANALYSIS

This analysis necessitates the great appreciation for the fundamental principles that are accepted in outer space treaty and following clarification and domestic laws that have made the impact on proprietary rights in space resources.

1. Principles of Outer Space Treaty (OST)

The first principle of outer space treaty as per the article I which said that outer space is free for exploration and use by all the states[72]. However, this article leaves the questions that how this can implement to resource extraction.

The second principle of outer space treaty as per article II which states that the moon and other celestial bodies is not subject to national appropriation by sovereignty, use, occupation and by other means[73] but this principle restrict theownership claims over space resources.

2. Patents applied on extraction resources

Under the recent development of intellectual property rights such as patents may relevance to invention, or a procedure used in the space. (The patents on extracted resources are still unclear and crucial under international space law)[74]. This thing Idiscussed in chapter 3 also.

3. National legislation regarding the ownership claims on the celestial bodies

Some countries like U.S.A and Luxembourg's implemented the own national legislation which gives rights to the citizen to own the resources extracted from space. The United States adopt the act that is U.S. Commercial

[70] A. M. Balsano, Intellectual Property Rights and space resources: A Legal Analysis of Patentability and Ownership Claims, European Space Agency (Aug 1994), https://www.esa.int
[71] United States v. One Lucite Ball Containing the Lunar Material, 252F. Supp. 2d 1367 (S.D. Fla. 1993) (United States)
[72] Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Celestial Bodies art 1, Jan 27, 1967, 18 U.S.T. 2410,610 U.N.T.S. 205.
[73] Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Celestial Bodies art 2, Jan 27, 1967, 18 U.S.T. 2410,610 U.N.T.S. 205.
[74] Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Celestial Bodies art 2, Jan 27, 1967, 18 U.S.T. 2410,610 U.N.T.S. 205.

Space Launch Competitiveness Act (2015)[75], this act motivates the private entities to consider the space mining activities and bypassing the non- appropriation principle for private entities.

Whereas Luxembourg's adopt the act named Luxembourg of space resources act (2017)[76] this act gives the rights to the companies to claim ownership over the extracted of space resources and setting the example for proprietary rights withinnational territory.

There are several countries like Japan, UAE that draft the space resources lawsmaking a global trend towards the proprietary claims.

4. Case Studies related to the patent's rights on extracted resources

There are some cases which I already discussed in chapter 4. Such cases like Nemitz v. United States[77], this case discussed about the ownership rights over theasteroid, but the court dismissed the claim of Nemitz because this claim clashes with outer space treaty. So, from this case or other case which I discussed in chapter 4 gives clear indication that ownership rights related to space resources cannot be claimed or owned by any person and organization.

5. Conclusion

This chapter seriously analysis the stability between the inspiring innovation through private expenditure and keeps alive the outer space treaty dedication towards the peaceful exploration of space resources and implemented the national legislation for the ownership rights on space resources.

CHAPTER 6. CONCLUSION

Developing the patent rights on extracted resources under space law immediate the complicated challenges within the international space law. The Outer Space Treaty (OST) and the moon agreement are a primary focus to keep safe the space as an empire for all humankind, restricting the national sovereignty over the moon and other celestial bodies. This thing also develops the tension between the non- appropriation principle and the increasing demand about the proprietary claims through patent rights, So, there is a need of more clear structure or framework that gives stability to common interest of all humankind.

Some countries like United States and Luxembourg have taken steps to provide national legal framework that permits the nations to claim or own the space resources, but the adoption of these type of domestic regulation brings the severaldebates within the international structure or framework.

Therefore, to confirm the interests of all space nations which gives the fair surplus to space resources is considered as to be important for global community to clarify the capacity of ownership rights in outer space. There is a need for proper regulatory framework under international space law that respects both patents' rights and international obligations.

[75] U.S Commercial Space Launch Competitiveness Act of 2015, Pub. L. No. 114-90, 129 Stat. 704 (Nov 25, 2015).
[76] Law on the Exploration and Use of Space Resources (Lux.), (July 20, 2017)
[77] Nemitz V. United States, No. CV-N030599-HDM (RAM), 2004 WL 3167042 (Apr. 26, 2004) (United States)