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The New Legal Framework for Space Tourism in the UAE

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Abstract:

The commercialization of space tourism has become an essential shift in space exploration, where private entities are creating interest along with government agencies. This transformation urged the development of a legal framework to maintain regulations and facilitate space tourism activities. The present research emphasizes the United Arab Emirates (UAE) as a prominent space tourism hub given its strategic location and increasing government interest in space activities. The study explored space law concerning space tourism from three main perspectives: the distinction between airspace and outer space, regulatory requirements related to space companies and space tourism, and the deployment of space tourism-related contractual agreements to ensure a safe and enjoyable experience for space tourists. The research emphasized that the contractual agreements must include risk disclosures, pricing, safety measures, liability, force majeure clauses, and more. The study acknowledges the limitations of available

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literature on space tourism, especially concerning the UAE. However, it serves as a foundational effort to address the legal details of evolving industry. The research will benefit policymakers in the UAE alongside investors and potential space tourists as it will provide important insights into developing a legal framework that can foster a responsible, safe, and prosperous space tourism industry.

Keywords: space tourism, space travel, air space, outer space, legal framework, legislation, space agreements.

1. Introduction

Space exploration is no longer a job for government agencies as privatization has accelerated. The journey of Dennis Tito in 2001 to space was a landmark in this regard as he laid the foundation of space tourism. Entrepreneurs are developing rocket engines, satellites, rocket boosters, asteroid probes, and lunar cargo. NASA's Perseverance Rover 2021 is another milestone in discovering and traveling in space. The flight of NASA's Ingenuity Mars Helicopter showed it is possible to have a controlled flight on Mars by charting 18 flights, which is an impressive progress (Danov, 2020). Furthermore, business investments in space tourism are increasing the momentum of space travel by enabling regular commercial flights to space. William Shatner was sent to space on the New Shepard Spacecraft powered by Blue Origin and owned by Jeff Bezos, Amazon's founder, and CEO. Richard Branson's Virgin Galactic announced the inauguration of its first commercial flight in 2022. SpaceX, owned by Elon Musk, is working on a spacecraft that can take humans to Mars and back, and it is called Starship. Hence a new paradigm is developing by commercializing space tourism in the private sector. It anticipates more and more people would like to travel in space shortly; therefore, anchoring favorable laws is necessary. The legal framework for space tourism must consider different aspects such as the safety of passengers, liabilities of wrong happening, limitations of the agencies sponsoring space tourism, the condition of space crafts, and the environment of space hotels and space stations(Chang, 2022).

In 2021, the market size of global space tourism was recorded as $598 million, and the market expects to grow at a rate of 37.1% per year until 2030 by crossing the figure of $8.67 billion (Grand View Research, 2022). The United Arab Emirates can be a significant space tourism hub

due to its ideal geography. It is situated almost in the middle of the earth, attracting Western, African, and Asian passengers. Moreover, the UAE has a blessed climate, suits space flights, and its luxurious hospitality industry is a competitive advantage. In addition, it has listed itself among the major space powers with its successful Mars Hope Probe 2019 (Almatroushi et al., 2021). The government is also investing generously in satellite technologies while its astronaut program is ongoing, and the country has planned a flyby to Venus. The Ministry of Economy has announced a partnership with Blue Origin to accelerate the country's process of space tourism (Nasir, 2020). The use of space is changing at large, but progress is not reflected through the law in the territory.

This research aims to discuss the importance of the legal framework of space tourism in the UAE and its requirements from three different perspectives. Firstly, it seeks to prepare legislation focusing on the place of tourism, i.e., outer space or air space. The second is the means of transport, and the third is to provide such services that the client can enjoy their travel to the maximum. The research can explore the laws of space territory concerning space tourism to mark the difference between outer space and air space. It discusses the importance of a legal framework for space companies, spacecraft, and their travelers. Also, it defines the terms and conditions that must be part of contractual agreements between companies and passengers. The United Arab Emirates is a novice in space tourism and lacks legislation. Hence, this research is expected to be a landmark in understanding and developing the need for a legal framework. Nevertheless, the study can also help investors and potential customers of space tourism with essential principles that must not be overlooked.

2. Laws of Airspace and Outer Space

Airspace is considered part of the Earth's atmosphere; hence, a sovereign country has the authority to administer it. Usually, airspace is regarded as 60,000 feet above sea level (Niang, 2023) specifically under the War on Terrorism (WoT, as individuals can see above their cities and towns. National and international aviation authorities are administering the airspace. On the other hand, the vast expanse beyond the Earth's atmosphere is called outer Space. Outer s is more like a vacuum as the air is absent. Therefore, Outer Space has no atmosphere and cannot protect humans or material items from harmful radiation produced by the sun. A boundary 62 miles above sea level divides the air space from outer Space known as the "Karman line" (Freeland, 2020) within the foreseeable future, space will no longer be the sole domain of professionally trained astronauts or the exceptionally wealthy. However, the prospects for both suborbital and orbital private human access to space give rise to some challenging legal and ethical questions and call into question the adequacy of existing international law instruments that are directed towards the regulation of the use and exploration of outer space. It is clear that the existing international legal regimes covering air and space activities are not well suited to large-scale commercial access to space, largely because they were developed at a time when such activities were not a principal consideration in the mind of the drafters. The lack of legal clarity must be addressed as soon as possible, to provide for appropriate standards that will further encourage such activities. This article examines some of the more pressing legal issues associated with the regulation of space transportation of passengers on a commercial basis, and offers some suggestions as to those areas where important principles need to be developed.",”container-title”:”Melbourne

Journal of International Law",”DOI”:”10.3316/informit.283706601991374”,”issue”:”1”,”note”:”publisher: University of Melbourne - Law School”,”page”:”90-118”,”source”:”search.informit.org (Atypon. This boundary is believed to be Space's edge and is unsuitable for flying aircraft (Hobe, 2010). Here, the curvature of the Earth becomes clearer.

Since airspace is considered a part of the Earth and each country has sovereign rights to administer airspace directly above its land and sea territory, almost every country has developed laws to control it. However, there are no clearly defined rules for administering Outer Space. Recently, numerous countries have expressed interest.

1.2 Difference Between Airspace and Outer Space Laws

As discussed above, airspace and Outer Space differ in numerous ways, as do their laws governing these distinct jurisdictions. Airspace is administered as jurisdiction under individual states. On the other hand, outer Space is not considered national appropriation but a global common. From here, it is clear that sovereign countries are free to administer airspace directly above their land and sea territory (Hearsey, 2008). To conduct outer space activities, they must consult international outer space law.

Despite this, international and local treaties exist to govern Outer Space. The framework to manage both is different, and the Chicago Conventions is the leading international treaty to administer airspace (Al Dhahouri & Allam, 2024). National laws of various countries detail much about airspace but less about Outer Space. Airspace is more concerned with civil aviation activities and operations related to the military, as considered essential for national security (Stamm et al., 2006). On the other hand, various activities are being conducted in outer Space, such as commercial space ventures,

earth observations, telecommunications, and scientific research. Outer Space laws are more complicated to develop, while airspace laws are less complicated. For instance, the temperature of Outer Space poses threats to people and equipment. Both jurisdictions have different liability issues because airspace liabilities are treated through local laws. In contrast, liabilities in Outer Space are more related to damage from space objects, and the Liability Convention prepares the liability regime to handle such issues.

3. National Space Policy of the UAE

The people of the United Arab Emirates have an affection for outer space in their genes because astronomy education was practiced in the region during navigation through the seas. The founder of the UAE, Sheikh Zayed bin Sultan Al Nahyan, received the first NASA delegation in 1976. The UAE's strong economy and its government's passion enable it to be the regional leader in space exploration activities. It owns the GCC countries' most significant space sector and invests in diversifying it further (The UAE Government, 2023). The UAE's space sector comprises numerous institutions, centers, and companies, such as Mohammed Bin Rashid Space Centre (MBRSC), Al Yah Satellite Communications Company, and Thuraya Telecommunication Company.

In 2021, the UAE launched 12 satellites into space, and these are.

- DubaiSat-1 in 2009 to provide services on remote sensing and imaging
- DubaiSat-2 in 2013 to provide services on remote sensing and imaging

- Nayif-1 in 2017 for educational purposes
- KhalifaSat in 2018 to provide services on remote sensing and imaging
- Al Yah 3 in 2018 to promote telecommunication services.
- MeznaSat in 2020 to monitor the environment
- Hoe Mars Mission in 2020 to Study Planet's Atmosphere
- Falcon Eye 2 in 2021 for military surveillance
- TUBSAT -2C in 2021 for technology demonstration
- DMSat 1 in 2021 to provide services on remote sensing and imaging
- Soyuz MS–18 in 2021 to reach the International Space station
- The second Mars Mission in 2021, popularly known as Hope Probe 2, is to study the Martian atmosphere.

To control activities concerning space, the UAE developed its space policy.

"To build a strong and sustainable space sector for the country to protect national interests and to diversify its economy, to develop UAE competencies in this sector, build scientific and technological capabilities, to set the innovation culture, to make the nationals feel pride, as well as to strengthen the status of the UAE at the regional and global level (The UAE Government, 2023).

3.1 Federal Law Numbers 46 and 47 of 2023 Space Law of the UAE

The UAE National Space Law has come into effect, regulating space-related activities in the country and enabling private space companies to operate after obtaining a permit (UAE Federal Law No. 46 of 2023, UAE Federal Law No. 47 of 2023) .The law covers ownership of space objects, sending astronauts to space, and operating space tourism flights. Offenders who participate in space activities or own space objects without a permit can face a jail term of up to two years and a fine between Dh 100,000 and Dh 10 million (Nasir, 2020). Operators who fail to provide proof of proper training and fitness for a space flight may face a fine of up to Dh 500,000 and no less than a year of jail. The law is expected to apply to upcoming space tourism flights operators, such as Virgin Galactic, in the UAE. The UAE Space Agency has been working with the United Nations Office for Outer Space Affairs to ensure it meets international policies as the country grows its space sector, including sending the first Emirati astronaut to space last year and the upcoming launch of the Hope to orbit Mars (Alshihi & Halilou, 2024).

Federal Law Number 46 of 2023 has been developed to regulate space activities in the country . The law comprises nine chapters: general provisions, organizing the agency, space activities and space debris, numerous activities related to the space sector, registration of space objects, legislations on concerned matters, managing risk and crisis, administrative sanctions, and final provision. The law, however, does not discuss anything related to space tourism. However, it regulates disposing of space objects from orbit to enter and re-enter orbit, administers satellite communication activities and operates space objects, manages space data activities, and collects or trades meteorites that fall in the UAE.

3.2 Space Tourism in the UAE

Space tourism is a potential industry that can expand the UAE's tourism sector to meet future trends and offer various recreational and leisure services. The UAE's space tourism law is not very dynamic, but it must include safety and security to protect travelers from risks (Becerra, 2014). The UAE must incorporate safety standards while developing a framework for space tourism. Safety standards must determine the nature of space vehicles, equipment details, training, and qualification of operating staff. Space tourism law framework also requires the inclusion of the perspective of insurance and liability, such as the rules and requirements of having insurance, limits of liabilities, and details of insurance coverage. Furthermore, space tourism law is incomplete or ineffective without a clause to protect the space environment by deploying regulations for space users and ensuring that space tourism will not harm the environment. The UAE must also seek international cooperation because space tourism is a global industry, and international cooperation can facilitate the activities.

4. Implementation of the Legal Framework Regarding Space Tourism

The accelerated emergence of space tourism in the 21st century introduced the industry to numerous challenges and opportunities. Because individuals and enterprises are venturing to go beyond planet Earth to experience the cosmos, a comprehensive and well-defined legal framework is becoming increasingly essential. International complexities, the inherent nature of risk, and technological complexities add to the sensitive nature of space tourism. However, few countries have invested in developing such a legal framework. Since the industry is novice, this section compares

the inclusions and limitations of a legal framework to determine a more comprehensive law for the United Arab Emirates.

4.1 USA Framework for Space Tourism

The United States has one of the most comprehensive laws for space tourism, comprehensively describing the enclosures and restrictions concerning commercial space activities. Federal Aviation Administration (FAA) is the authority that regulates commercial licenses for space launches (Updegrove & Jafer, 2017). The Commercial Space Launch Amendment Act outlines the licensing requirements for conducting space tourism activities. The regulatory framework supervised by the Office of Commercial Space Transportation - AST by the FAA provides legal dimensions for commercial space operations, including the safety of passengers, crew members, and other stakeholders. The AST office is further divided into five sections: safety authorization division, safety analysis division, safety assurance division, business operations division, and policy and innovation division.

As per the 2004 amendments, AST categorizes rockets as Amateur and Licensed with clear distinctions. Amateur rockets have a limit of altitude and threshold, further dividing them into three classes based on their complexity. Class 1 Amateur rockets must need safety protocols to be launched but do not require approval. Class 2 rockets can enter National Airspace but must provide complete information about launching and rocket engineering. Class 3 rockets must go through detailed scrutiny to get approval for launch.

The other category of rockets is licensed, and they require experimental permits, definitions, the ability to operate within a designated area, and limitations of the missile. The AST office is also responsible for permitting

launch sites for operation, given that they follow the regulations mentioned in Regulatory Framework Part 420. Adherence to these regulations ensures the environmental, operational, and safety standards by fostering responsible and secure commercial space activities in the United States. The legal framework covers certain other critical factors for space tourism, such as licensing, authorization, safety standards, insurance requirements, liability provisions, health and medical standards, environmental considerations, aspects of emergency preparedness, ethical and social considerations, operational procedures, technology and vehicle review, and international coordination.

The Office of Commercial Space Transportation permits licenses to conduct space tourism activities in the United States. The country's space laws primarily focus on passenger protection, the safety of crew members, and the public. The space law also covers the insurance aspect to some extent. However, further adequacy is required to make it comprehensive. In addition, liability provisions are detailed in case of accidents and unforeseen situations. Though not complete, health and medical standards are discussed in present space law but cover immediate needs. The US space law also regulates and incorporates environmental considerations to minimize the impact of space transportation on the environment.

4.2 Russian Framework for Space Tourism

Russia has a rich history of space exploration, and its legal framework is wide-ranging to accommodate the increasing field of space tourism. Its century-old experiences established regulations and mechanisms to facilitate safe and responsible commercial space ventures. Russian Federal Space Agency – Roscosmos regulates all aspects of space-related activities and is crucial in issuing guidelines and developing policies and

regulations (Boazman et al., 2022). The federal authority needs to ensure that commercial space endeavors follow established standards. Roscosmos also actively encourages cooperation between government and private organizations. Essential aspects of the Russian legal framework are the following.

Licensing and authorization: As per the Russian legal framework for space tourism, commercial operators must obtain licenses and permission from Roscosmos to perform space-related activities. Licensing ensures the safety and operational standards for conducting commercial space activities.

Safety Standards: The legal framework ensures strict safety standards for space tourism so that the well-being of passengers, crew members, and other stakeholders can be guaranteed. Operators are required to proceed with strict safety guidelines to maintain safety standards.

Insurance Requirements: as per legal standards, space tourism operators must abide by the insurance requirements of space vehicles, crew, and passengers. Insurance covers must mention the liabilities arising from unforeseen incidents and accidents during space flights. The insurance coverage must be sufficient enough to protect both parties, that is, operators and participants.

Liability provisions: This is the legal framework for space tourism, summarizing liability provisions to address spaceflight participants' responsibilities and potential legal recourse in case of accidents and incidents. These provisions protect participants in space flights and balance their rights.

Health and Medical Standards: The Russian space flight regulations also demonstrate participants› health and medical requirements. These regulations set standards for travelers› physical and mental health challenges. Travelers must undergo a mandatory medical examination to determine their ability and suitability to travel.

Environmental Considerations: Russia›s legal framework lacks environmental considerations concerning space tourism. However, it is focusing on taking activities to minimize the environmental impact of space tourism. In this regard, operators must be held responsible for assessing and mitigating the potential environmental effects of their launches.

4.3 European Legal Framework for Space Tourism

European legal framework for space tourism is comprised of collaboration between numerous institutions, such as the European Space Agency (ESA), an intergovernmental organization coordinating between European Union member states (Peldszus & Faucher, 2022). This framework is essential for harmonizing space policies and facilitating international cooperation regarding space exploration. It also helps promote research and other space-related activities. All members of the European Union have their national aviation authority, which aims to supervise and regulate aerospace activities in relevant jurisdictions. (Tanja M-Z, 2010) These authorities are responsible for issuing licenses and granting approvals for space tourism operators by analysing their compliance with operational and safety standards. Some other authorities that developed to regulate space tourism include the European Aviation Safety Agency, the European Conference on Space Debris, National Space Agencies, and the European Space Policy Institute. In short, the European legal framework for space tourism is quite comprehensive in comparison to other developed countries, including the

US and Russia, because it covers safety aspects, passenger and crew well-being and clearly defines responsibilities. The European legal framework for space tourism is a growing landscape designed by national and EU regulations, with some participant states like France and Germany creating their peculiar space laws to administer actions related to space travel in arrangement with international space treaties. The ESA performs a key position in forming this structure, identifying the perspective of suborbital travel and cooperating with state establishment to establish suitable legal configurations. Furthermore, the EU's broad space program aims to augment its starring role in the universal space sector by recommending an integrated governing structure that directs care, long-term sustainability, and traffic control in space. The European Union Aviation Safety Agency (EASA) may also be engaged in standardizing space tourism by operating aviation safety guidelines to suborbital flights, guaranteeing high safety practices among the participants. Additionally, ESA urges collaborations with private firms connected to this tourism to influence skills in astronaut training and safety measures.

Licensing and Authorization: space tourism operators must have licenses from respective national and regional authorities before performing. Moreover, they must adopt environmental, safety, and operational standards before executing commercial space activities.Under the French Space Operations Act (FSOA), space tourism operators must obtain licenses from CNES and comply with safety and environmental standards (Article 5, FSOA) (Lazare, 2013).

Safety Standards: According to the European Union legal framework, space tourism operators must validate their safety guidelines, including operational protocols, launching procedures, and even vehicles. Under EU

Space Surveillance and Tracking (SST) Framework and national regulations (Peldszus & Faucher, 2019).

Insurance Requirements: it is inevitable to have insurance coverage to launch space tours and the insurance must cover potential liabilities from accidents and incidents. This provision is important to protect the interest of travellers and operators. French Space Operations Act (FSOA) and other national laws mandated them to protect the interests of travelers and operators (Lazare, 2013).

Liability Provision: the regulations require liability provision to maintain responsibilities and legal resources for space participants especially for unforeseen accidents and incidents. As outlined in the French Space Operations Act (FSOA) and similar national frameworks, ensuring legal protection and balance of rights for participants (Lazare, 2013). These provisions are essential to maintain a balance between the rights of participants through legal protection.

Health and medical standards: health and medical standards regarding mental and physical fitness are essential considerations in European Union space regulations.

Environmental considerations: The US and Russian legal frameworks do not consider ecological concerns for space tourism activities; however, European space tourism laws are paying particular attention to the environmental impact of space tourism activities.

4.4 UAE Framework for Space Tourism

To promote the space tourism industry in the United Arab Emirates, the government has taken several steps, such as developing the National

Space Policy in 2016 and a strategy for policy implementation in 2017 (Lyall, 2021). The plan aims to implement high-priority initiatives for all non-military space activities, including commercial, governmental, and scientific entities. In addition, it will supervise the participation of the UAE in international space activities and collaboration. The strategy's main objective is to implement the policy into practice and focus on initiatives and programs across various sectors. Moreover, it also emphasizes national space industry development, promotion of collaboration, technological advancement, and strategic international engagement.

In December 2019, the UAE enacted its first space law under Federal Law No. 12 of 2019. The rule clarifies the complications related to the space law treaty framework by ensuring space compliance. The UAE is a signatory to four international treaties, five of which are related to space-governing activities. It is a Signatory of the Outer Space Treaty of 1967, a foundational treaty to maintain peace and cooperation in outer space. Rescue Agreement 1968 obliges states to rescue suffering astronauts and provide them with a safe return. This agreement also ensures countries for their collaboration in recovering space objects. Space Liability Convention 1972 is an expansion of the Outer Space treaty used to launch states responsible for damage caused by its space objects to aircraft and the Earth's surface. The convention details the number of settlements and damage claims. Registration Convention of 1975 is responsible for identifying and categorizing details of space objects, including orbit information, with the United Nations (Mehran et al., 2023).

The UAE developed specific rules, such as fines for space tourism offenders. As per space law, private space tourism company Virgin Galactic can launch flights from Al Ain Airport after obtaining and maintaining

relevant permits. The UAE's space law also considers environmental protection. Damage caused by negligence can lead the owner of the space object to pay hefty fines starting from AED 100,000 to 10 million (El Tahir, 2022).

4.4.1 Need for a Comprehensive Legal Framework in the UAE

International space treaties have shortcomings, but to promote the space tourism industry at the national level, a high-level investment is required in the research and development sector, and a more elaborated regulatory framework is compulsory as the UAE has the most significant space sector in terms of investment (Pekkanen, 2019).

A robust legal framework at the national level for space tourism can enhance the general public's and passengers' safety, covering the design of vehicles, crew training, and operational procedures (Al-Hosni & Allam, 2024). The defined legal framework can minimize the risks associated with space travel by clearly mentioning the clause related to accidents, injuries, and damages, which will help determine compensation and liabilities of passengers and other stakeholders; a detailed and transparent legal framework adds to the protection of consumers of space tourism by preventing companies from misleading advertisements, enforcing fair contract terms and transparent pricing, and enhancing consumers' trust in the emerging industry.

Moreover, a well-defined legal framework will identify property rights and resource utilization issues concerning space tourism. These details will further pave the way for ethical practices by preventing conflicts over space assets. A comprehensive legal framework harmonizes with regulations between different nations concerning data sharing, facilitation of smooth

operations, and cross-border dispute resolution. Legal provisions are direct practices related to pollution prevention, activities leading toward space debris, and other harmful interferences concerning space activities.

Additionally, a well-defined legal framework will allure investors of space tourism in the UAE as investors support ventures in a stable legal environment that protects their interests and outlines the rules and regulations. An all-inclusive legal framework will determine the UAE's commitment to responsible space activities in adherence with international norms, contributing to building the country's reputation as a forward-thinking state and responsibly participating in developing a robust global space community.

4.4.2 Challenges and Limitations in Developing a Legal Framework for Space Tourism in the UAE

The United Arab Emirates is a significant player in the space tourism industry worldwide, especially after developing the Mohammed bin Rashid Space Centre, a prominent landmark in space exploration and its commercialization. However, the country lacks a comprehensive legal framework concerning space tourism and faces challenges and limitations in its development.

The absence of a steadfast legal framework can disrupt space tourism in the country because this industry can be viewed as uncertain. Space tourism activities require regular coordination and collaboration with other countries due to the crossing of national boundaries and space trajectories, airspace rules, and even related to launching sites (Boazman et al., 2022). Therefore, harmonious regulation with other countries adds to security and safety and lowers the problems related to time consumption. Passengers' safety is most

significant in space tourism as it is a sensitive journey; therefore, a legal framework establishes clear safety standards and requirements for space tourism operators to lower risks associated with commercial space flights. Insurance coverage determines liability if accidents or injuries happen during a space journey. Hence, the legal framework required to mention the clause concerning compensation mechanism and insurance coverage and must need to determine the responsibility of different parties. One of the most significant disadvantages of space tourism is its hefty environmental impacts, resulting in large-scale production of carbon emissions during rocket launches and due to the potential generation of space debris. The legal framework will address these challenges by establishing sustainable space tourism practices and guidelines.

However, developing a comprehensive legal framework for space tourism in the UAE is facing certain limitations. For example, the space tourism industry of the United Arab Emirates is at its initial stages but is expected to evolve rapidly especially due to frequent changes in business models and technological advancements. Therefore, the future legal framework for space tourism may become complicated especially when it comes to alignment with regulations and standards of international treaties.

Moreover, the legal framework for space tourism within the UAE must cover cultural and ethical aspects alongside persevering the unique cultural values of the region by justifying its potential impact on future societies. It must cover clauses related to emergency preparedness, for instance, unforeseen incidents before, during, or after the execution of spaceflights. Additionally, the age of the cyber world has its own demands such as data safety and privacy protection which must be addressed to develop passenger's confidence.

5. Challenges in Developing a New Legal Framework for Space Tourism

In modern times, space tourism is leading the way for technology and business innovation. It is offering exciting opportunities to explore the universe and to boost the economy. Despite its importance, the development of a legal framework for space tourism is not an easy task but it requires careful consideration of different interconnected factors and their various aspects. This chapter highlights the complications related to regulatory jurisdiction, safety standards, and liability, and ethical considerations.

5.1 Regulatory Jurisdictions

The first and foremost challenge in developing a legal space tourism framework is to determine the appropriate regulatory jurisdiction. The point to consider is that activities of space tourism surpass national boundaries and they are not like traditional air travel which is regulated by the national aviation of the relevant country. Rather, it becomes more complicated in the presence of international treaties and agreements. The Outer Space Treaty (1968), however, can serve as a foundation for developing a legal framework for the space exploration of the commercial nature because it pays more attention to principles of freedom of exploration and undermines the national appropriation of celestial bodies. Nevertheless, it does not cover the aspects of regulation of commercial space activities.

Various countries have worked on developing or defining regulatory authority over space tourism in the past few decades and determined their jurisdiction boundaries (Berkman, 2018). For example, the regulatory framework of the USA supervised by the Federal Aviation Administration (FAA) Office of Commercial Space Transportation (AST). This office has

the right to control licensing issues and to regularize activities related to commercial space launch and reentry. Some other countries that developed their space-activity regulatory mechanism significantly include Europe, Russia, and China. Nevertheless, the main challenge in this regard is to harmonize the disparate regulatory regimes to determine consistency and clarity for space tourism operators and participants. International collaboration and dialogues hold the utmost importance in addressing jurisdictional conflicts and developing common standards for facilitating the growth of the space tourism industry. In addition to maintaining the principles of safety, security, and environmental sustainability cannot be overlooked.

5.2 Safety Standards

Safety perspective is very critical in the space tourism industry because space travel has inherent risks that demand strict safety standards and protocols. Activities of space tourism exposed to extreme conditions in comparison to conventional aviation, for instance, the concept of microgravity, cosmic radiation, and the vacuum of space. These extraordinary conditions can threaten human health and safety, therefore, to develop a safe and reliable space tourism must require international collaboration, technical expertise, consultation from industry stakeholders, and support from government regulators. Such collaboration can create comprehensive safety standards and certification processes. For instance, the AST office of the FAA implemented various licensing requirements strictly for commercial space launch and reentry operations (Danov, 2020). The requirements are related to the design of vehicles, crew training, and risk assessment, and operational procedures.

Nevertheless, it is very important to develop emergency response protocols and to advance contingency plans to lower associated risks with space travel. Also, space tourism operators must demonstrate the ability to respond effectively to in-flight emergencies, medical incidents, and other unforeseen events to improve the safety and well-being of passengers and crew. A regular evaluation of deployed technologies requires the adaptation of safety standards to keep pace with technological advancements and emerging risks, especially those related to suborbital spaceplanes and orbital habitats. Therefore, a continuous collaboration between regulators and industry stakeholders is essential to maintain safety management in the rapidly evolving landscape of space tourism.

5.3 Liability

Liability is another important aspect of a legal framework especially when it comes to space tourism. Because in case an accident happens, injuries occur, or property gets damaged during space travel activity, then liability allocation to responsible authority is inevitable, for instance, insurance coverage and compensation mechanism. This framework gets further complicated in the scenario of space tourism due to its unique nature compared to the traditional liability framework which needs innovative approaches to address liability concerns while developing industry growth and innovation (AJjaberi & Monajjed, 2024). International treaties are covering the aspect of liability in space tourism such as the Registration Convention and the Liability Convention. These principles serve as fundamental liability guidelines to perform space activities demanding focus on the responsibility of launching states in case of damage by their space objects. However, these principles are inadequate for commercial space tourism due to the inclusion of private companies, third parties,

crew, and passengers. Space tourism companies need to develop various contracts including safety agreements and insurance plans to handle risks properly. On the other hand, government regulators are very important in developing liability requirements and supervising mechanisms to maintain adequate insurance coverage and financial resources to cover potential liabilities (Chang, 2022).

There is a need to balance the interests of commercial operators, passengers, and the broader public but the emergence of new legal concepts including informed consent and waiver of liability poses ethical and legal challenges. For example, informed consent can facilitate operators from specific legal claims, and they can raise concerns about the enforceability of waivers when it comes to gross negligence or willful misconduct. In short, it is important to address liability issues in space tourism by developing a collaboration between government agencies, insurance companies, industry stakeholders, and legal experts. Moreover, there is a need to develop innovative risk management strategies for adequate protection for all involved parties.

6. International Collaboration for Diplomatic and Legal Harmonization

International collaboration is essential for the development of space tourism industry because it can catalyze innovation, exploration, and growth beyond national boundaries. Since space tourism goes beyond geopolitical borders, developing a diplomatic and legal framework is critical to maintaining cooperation. Collaboration is also important for sustainable development and resolving disputes in transforming the industry. Hence, this section aims to discuss various aspects of international collaboration in

space tourism to explore critical challenges, opportunities, and strategies to navigate diplomatic and legal harmonization on the global stage.

6.1 Multilateral Diplomacy and Governance

The governance of space activities is based on international treaties and agreements, defined but related frameworks, and responsibilities of spacefaring countries (Alshihi & Halilou, 2024). COPOUS which is the United Nations Committee on the Peaceful Uses of Outer Space is oversighting this governance structure. Because it is more like a multilateral diplomacy forum to develop collaboration in space exploration and utilization. It has membership from 95 countries and it facilitates negotiations and dialogues on a range of space-related issues including space tourism.

Nevertheless, it also faces challenges primarily due to diverse interests and priorities of member countries. These differences cannot lead to the development of meaningful consensus on space tourism regulations within COPUOS. For example, developing countries like the UAE may prioritize equal access to space-related resources along with technology transfer. However, developed countries may emphasize on commercialization and economic growth. Diplomatic negotiations can help bridge such gaps along with commitment to find mutually beneficial solutions to promote the common good (Sheer & Li, 2019).

Recently, COPUOS started addressing regulatory challenges more aggressively and urging operators to adopt guidelines to maintain long-term sustainability for outer space activities. The guidelines comprise safety framework for space operations and space debris mitigation. It is to promote responsible behavior in space and to minimize the risk of collision,

accumulation of debris, and other associated hazards.

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6.3 Bilateral and Multilateral Agreements

Bilateral and plurilateral agreements are important to facilitate international collaboration and cooperation in the space tourism industry in addition to multilateral diplomacy. Bilateral agreements between spacefaring nations can be used to exchange technical expertise and for data sharing. Moreover, collaborative research initiatives can be arranged to accelerate the development of space tourism technologies and capabilities.

For example, the United States developed bilateral agreements with countries having advanced space tourism capabilities including Canada, Japan, and Russia. Such agreements improve collaboration in the context of space exploration and utilization of projects including commercial space transportation and the International Space Station (ISS). Moreover, these agreements serve as a legal framework to develop cooperation because they outline the rights of each involved party along with their responsibilities. Therefore, they provide a mechanism for dispute resolution and technology transfer.

On the other hand, agreements governing the activities of states on the moon and other celestial bodies which are known as the Moon Agreement and the Artemis Accords is a form of multilateral agreement. It helps in developing common principles and norms for space exploration and can be used among participating countries. The Artemis Accords were developed by the US and signed by various member countries. It focuses on sustainable lunar exploration including protecting heritage sites and artifacts, transparency, interoperability, and using space. Nevertheless, the dissemination of bilateral and multilateral agreements without a comprehensive international treaty on space tourism may raise questions about its legal coherence. Moreover, benefits yielded by it, responsibilities, and jurisdictional conflicts among member nations can arise. Therefore, achieving legal harmonization and developing consensus on space tourism regulations requires sustained dialogues and negotiations.

6.4 Regulatory Convergence and Standardization

To harmonize the national regulatory framework and technical standards, the operations of space tourism must be performed in smooth manners even across international borders. The alignment of national laws with licensing

requirements is essential for regulatory convergence. This will help in developing consistency, interoperability and mutual recognition of approval and certificates. Therefore, the role of the International Organization for Standardization (ISO) cannot be undermined especially when it comes to the development of technical standards and guidelines for space activities and space tourism. ISO standards can cover space tourism from various aspects including safety requirements, crew training, spacecraft design, and environmental management. These efforts develop a common reference point for regulators worldwide and for industry stakeholders (Jiang & Zhao, 2021).

However, it is not very easy to achieve regulatory convergence in the industry of space tourism primarily due to the diverse regulatory approaches and priorities of different countries. For example, some countries may prioritize environmental protection and passenger safety, while others may emphasize commercialization and competitiveness of industry. Therefore, transparent communication must be arranged to create a balance of diverse interests, and relevant authorities must try to find common grounds on critical issues along with regulatory flexibility.

In this regard, the role of industry associations including the International Associate for the Advancement of Space Safety (IAASS) and the Commercial Spaceflight Federation (CSF) are important to promote standardization and regulatory convergence (Lawrence et al., 2022). These organizations can facilitate dialogues and share best practices to share knowledge among industry stakeholders and policymakers to bridge regulatory gaps and develop a culture of safety and responsibility in the space tourism industry.

7. Environmental Considerations to Balance Commercial Interests and Planetary Preservation

The environmental impact of human activities beyond the atmosphere of Earth amid humanity's venture into space exploration and commercialization must be evaluated. Activities of space tourism can create unique challenges related to commercial interests with the imperative of planetary preservation. Therefore, this section can discuss the environmental considerations related to space tourism, orbital debris, and the potential impact on celestial bodies along with responsible stewardship of outer space and sustainable practices.

7.1 Planetary Protection and Ethics of Exploration

The term planetary protection is referred to treat planets and other space bodies as important scientific sites and possible homes for life which is important for responsible space exploration. These include planets such as Mars, asteroids, Moon, and the stars. Though their exploration holds scientific opportunities, but it also poses ethical dilemmas related to preserving a pristine environment by avoiding biological contamination. There are international agreements aiming to develop principles and guidelines for the protection of planets such as the Outer Space Treaty and the COSPAR Planetary Protection Policy. These agreements urge spacefaring nations to lower the risk of forward and backward contamination during space missions (Kminek et al., 2022). Operators of space tourism are suggested to strictly adhere to these guidelines so that their activities cannot harm the scientific integrity and environmental stability of celestial bodies being visited by tourists.

In addition, there are ethical dimensions of space exploration which go beyond scientific considerations and cover aspects of preservation of

cultural heritage. For example, the recognition of space as a shared heritage of humanity and indigenous rights. It emphasizes that operators of space tourism must respect the cultural and historical significance of celestial bodies and their associated artifacts. These measures must be implemented to lower the risk of damage or disturbance during tourism visits.

7.2 Orbital Debris and Space Sustainability

The human invasion of space causes the issue of orbital debris which is causing significant threats to the long-term sustainability of space activities including space tourism (Al Dhahouri & Allam, 2024). Orbital debris or space junk includes old satellites, fragments from collisions, and parts of used rockets. This junk is dangerous for spacecraft and astronauts as it can cause more debris, ultimately, the risk of collisions will increase. This chain reaction is called the Kessler Syndrome. Therefore, operators of space tourism must need to find ways to avoid or lower orbital debris by creating responsible spacecraft design. They also need to deploy end-of-life disposal strategies and operational practices. For instance, adopting the debris mitigation guidelines developed by the Inter-Agency Space Debris Coordination Committee (IADC). It suggests measures including spacecraft deorbiting, post-mission disposal, and maneuvers to avoid collisions.

Moreover, operators of space tourism must contribute to the sustainability of space by developing space vehicles that can be reused. These vehicles must be designed with on-orbit servicing capabilities and space debris removal technologies. Space tourism can become a catalyst for the transition toward a more sustainable and resilient space environment by lowering the generation of new debris and actively removing existing debris from pathways of orbits (Ryzhenko, 2020).

7.3 Earth's Environment and Carbon Footprints

Although space tourism opens new opportunities to discover the Earth and the Cosmos, it has certain implications for Earth's environment and carbon footprints. Launching of space operations including rocket propulsion, fuel combustion, and atmospheric emissions contribute to water pollution and accelerate the process of depletion of the ozone layer. Moreover, greenhouse gas emissions are reduced significantly. Therefore, operators of space tourism must assess and strive to mitigate the environmental impacts of their launch operations. These measures include the reduction of emissions and minimization of ecological disruptions including resource conservation. Methane-based engines, electric propulsion and other alternative technologies can be used to lower environmental impact than traditional chemical rockets. In the end, operators of space tourism must offset their carbon footprints by reforestation projects including renewable energy investment and carbon capture initiatives. The activities of space tourism can contribute to global efforts to lower climate change and to protect biodiversity by investing in environmental conservation and restoration efforts. Nevertheless, these efforts should align with commercial interests and planetary preservation goals.

Conclusion

In conclusion, the emerging industry of space tourism holds unique but exciting opportunities for the United Arab Emirates. By investing in developing a legal framework for space tourism, the country can develop itself as a marvelous player in the global space tourism industry. Nevertheless, the journey into space tourism is not without challenges and hindrances. These challenges and hindrances must be sorted out for the

growth and development of industry. The present research highlights the importance of developing a new legal framework for space tourism in the UAE by evaluating its various aspects. These aspects include a focus on highlighting differences between airspace and outer space, requirements for space-related legal regulations, and critical components of space tourism contractual agreements. The findings show that understanding the difference between airspace and outer space is important to develop a sound and effective legal framework. For instance, this understanding will help define boundaries and to regulate covering each domain to avoid ambiguity for proper governance.

The research focuses on the significance of space law as it is unavoidable to govern activities beyond the atmosphere of the Earth. As per findings, there is a need to combine various legal disciplines including environmental, technical, technological, and ethical to maintain the health and safety of space exploration. Therefore, it is necessary to develop a space tourism specific legal framework to maintain compliance with international standards and treaties.

Moreover, the research discusses the legal framework for space tourism deployed by several spacefaring nations including the US, Europe, Russia, and China. Those frameworks can serve as valuable reference for the UAE in developing its own regulatory context. The research findings show that the UAE has made noteworthy the developments in space tourism. For example, it invested heavily in development of its national space policy and deployed laws addressing licensing, liability, safety, and environmental protection. These efforts can define it as a prominent player in the space tourism industry.

Nevertheless, the research demands deploying a comprehensive legal framework related to space tourism including regulations to cover passenger safety, rights of property, ethical considerations, and international cooperation. Finally, the research suggests that developing a contractual agreement to define the rights and responsibilities of space tourists and operators is critical. It underlines that such contracts must hold elements related to regulatory compliance, insurance coverage, liability provision, pricing, and risk disclosure. These efforts can ensure involved parties about transparent and secure space tourism experience.

In short, a new legal framework for space tourism in the UAE is critical and needed for the growing industry as it can harness the interest of stakeholders. The UAE is dedicated to creating strong space laws and agreements, which are helping space tourism grow. These steps will make travel safer for passengers. Still, they will add to the protection of the overall journey and position the country as a responsible and reliable member of the global space community. Therefore, the present research serves as a landmark in future endeavors to shape the legal framework for space tourism in the UAE to contribute to realizing its centennial vision for 2071 and facilitating the growth of the space tourism sector on the global landscape.

Future Research Implications

The following are research implications for future research in the context of the new legal framework for space tourism in the UAE.

Future researchers must explore the comparative analysis of international space laws and regulations to evaluate their applicability and effectiveness in the context of space tourism. This will help understand the complexities

of space law by identifying the best practices that the UAE can adopt. Commercial space flights open numerous ethical and cultural challenges, such as cultural heritage, indigenous communities and their impact, and space exploration ethics. Therefore, exploring these dimensions of the UAE space tourism must be considered.

Increased environmental sustainability demands future research that explores comprehensive environmental impact assessment. Therefore, evaluating the ecological consequences of space launches and space stations must be considered necessary.

Space tourism's relatively easy accessibility raises concerns about human rights and protection. These areas could be explored and evaluated to develop a more comprehensive framework.

Technological advancements in space tourism open opportunities but also pose challenges. Therefore, future research is suggested to explore the impact of emerging technologies on space tourism.

Furthermore, future research can explore the dimensions of regulatory compliance, consumer behavior, legal education and training, and long-term economic impact.

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الإطار القانوني الجديد للسياحة الفضائية في دولة الإمارات العربية المتحدة

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ملخص البحث:

لقد أصبح تسويق السياحة الفضائية تحولا أساسيا في مشهد استكشاف الفضاء؛ إذ تخلق الكيانات الخاصة مزيدا من الاهتمام إلى جانب الوكالات الحكومية. وقد أسهم هذا التحول في تطوير إطار قانوني قوي للحفاظ على اللوائح وتسهيل أنشطة السياحة الفضائية. يركز البحث الحالي على دولة الإمارات العربية المتحدة باعتبارها مركزًا بارزًا للسياحة الفضائية، ويرجع ذلك إلى موقعها الإستراتيجي وزيادة الاهتمام الحكومي بالأنشطة الفضائية. واستكشفت الدراسة قانون الفضاء المعقد فيما يتعلق بالسياحة الفضائية من ثلاثة جوانب رئيسة: التمييز بين الفضاء الجوي والفضاء الخارجي، والمتطلبات التنظيمية المتعلقة بشركات الفضاء والسياحة الفضائية، ونشر الاتفاقيات التعاقدية الشاملة المتعلقة بالسياحة الفضائية لضمان تجربة آمنة وممتعة للسياح الفضاء. وشدد البحث على أن الاتفاقيات التعاقدية يجب أن تتضمن الإفصاح عن المخاطر، والتسعير، وإجراءات السلامة، والمسؤولية، وبنود القوة القاهرة، والمزيد. تشير الدراسة بمحدودية الأدبيات المتوفرة حول السياحة الفضائية، خاصة فيما يتعلق بدولة الإمارات العربية المتحدة. ومع ذلك، فهو بمثابة جهد تأسيسي لمعالجة التفاصيل القانونية لهذه الصناعة المتطورة. وسيستفيد من هذا البحث صناع السياسات في دولة الإمارات العربية المتحدة إلى جانب المستثمرين وسائحي الفضاء المحتملين؛ إذ سيوفر رؤى مهمة حول تطوير إطار قانوني يمكن أن يعزز صناعة سياحة فضائية مسؤولة وآمنة ومزدهرة

الكلمات الدالة: السياحة الفضائية، السفر الفضائي، الفضاء الجوي، الفضاء الخارجي، الإطار القانوني، التشريعات، اتفاقيات الفضاء

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