

The Regulation of Commercial Space Tourism Under International Space Law: Challenges, Gaps, and the Need for a Comprehensive International Legal Framework

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Abstract- Commercial space tourism has evolved from a futuristic concept into an emerging global industry driven by private aerospace companies such as Blue Origin, Virgin Galactic, and SpaceX. Successful suborbital flights have demonstrated that commercial human spaceflight is no longer limited to government astronauts but is increasingly accessible to paying private individuals, creating significant opportunities for technological innovation, economic growth, and international cooperation. This transition, however, has also exposed deficiencies in the international legal framework governing outer space. The five principal United Nations space treaties were negotiated between 1967 and 1979, at a time when states were the exclusive actors in space exploration, and they contain little guidance on private commercial spaceflight, passenger status, insurance, or environmental protection. This article examines the adequacy of that framework in regulating commercial space tourism, evaluating the legal status of spaceflight participants, the allocation of liability among states and private operators, passenger safety standards, insurance requirements, environmental sustainability, and consumer protection. Through comparative analysis of national regulatory approaches in the United States, the United Kingdom, the United Arab Emirates, Japan, and Nigeria, the article demonstrates that domestic law alone cannot effectively govern an inherently transnational industry, and that the resulting fragmentation creates legal uncertainty for operators, insurers, and passengers alike. The article argues that the rapid commercialization of outer space has outpaced the development of international legal norms, and that without a harmonized regulatory framework, uncertainties surrounding liability, jurisdiction, passenger rights, and environmental protection will continue to constrain the industry's sustainable growth. It concludes by recommending the negotiation of a dedicated international convention on commercial human spaceflight under the auspices of the United Nations Committee on the Peaceful Uses of Outer Space (COPUOS), supported by harmonized safety,

licensing, liability, and environmental standards, and considers the particular position of developing spacefaring nations such as Nigeria within this emerging regulatory landscape.

Keywords: commercial space tourism, international space law, Outer Space Treaty, Liability Convention, private spaceflight, COPUOS, national space legislation.

I. INTRODUCTION

For more than five decades after the launch of Sputnik 1 in 1957, human spaceflight remained almost exclusively the domain of sovereign states, conducted by professionally trained astronauts sponsored by national governments. Governments invested enormous financial, scientific, and technological resources in national security, scientific research, and international prestige, and access to outer space was limited to a small number of individuals selected through rigorous government programmes.

In recent years, this state-centric model has undergone a profound transformation. Advances in aerospace engineering, increased private investment, reusable launch technology, and supportive government policy have enabled commercial entities to transport private individuals into outer space. Companies such as SpaceX, Blue Origin, and Virgin Galactic have introduced commercial human spaceflight services aimed at tourists, researchers, and private customers willing to pay substantial sums for access to space[1].

Commercial space tourism is now among the fastest-growing sectors of the global space economy. Unlike traditional government missions, it is driven primarily by market demand, private investment, and entrepreneurial competition, and industry analysts predict that declining launch costs will gradually make the experience accessible to broader segments of society. The commercialization of human spaceflight has stimulated investment across aerospace manufacturing, satellite technology, artificial intelligence, telecommunications, and tourism, and governments increasingly treat commercial space activity as a strategic sector for economic diversification and technological competitiveness.

Despite these developments, the rapid growth of commercial space tourism presents legal challenges that the existing framework of international space law struggles to address. The foundational treaties governing outer space were negotiated during the Cold War, when only states possessed the capability to conduct space missions, and their drafters focused on intergovernmental activity rather than private commercial enterprise. Although these instruments establish important principles concerning state responsibility, international cooperation, and liability for damage caused by space objects, they provide little guidance on the regulation of commercial passengers, private operators, consumer protection, or insurance.

The Outer Space Treaty[2] and the Rescue Agreement[3] refer to “astronauts” as “envoys of mankind,” requiring states to render assistance in cases of accident or distress, but neither treaty defines whether paying commercial passengers qualify as astronauts or whether they are entitled to equivalent legal protection. Liability presents a further difficulty: under the Liability Convention[4], launching states bear international responsibility for damage caused by their space objects, yet modern commercial missions typically involve multiple private operators, multinational investors, and cross-border contractual relationships, which makes it difficult to determine responsibility among governments, manufacturers, insurers, and passengers when accidents occur.

Passenger safety has likewise become a critical legal concern. Unlike commercial aviation, where comprehensive international safety standards exist under the Convention on International Civil Aviation[5], no comparable international safety regime governs commercial human spaceflight, and individual states set their own licensing requirements, training standards, and operational procedures. Environmental sustainability adds further complexity, since increasing commercial launches contribute to atmospheric pollution and to the proliferation of space debris, a threat the existing treaties address only through broad, non-binding principles.

National regulatory responses illustrate the resulting fragmentation. The United States has enacted the Commercial Space Launch Act to facilitate private spaceflight, the United Kingdom has established a licensing regime under the Space Industry Act 2018, and the United Arab Emirates and Japan have introduced comparable national legislation. These domestic frameworks provide regulatory certainty within their own jurisdictions but differ significantly in licensing requirements, safety standards, and liability allocation, producing a legal fragmentation that sits uneasily with the inherently transnational character of commercial space activity.

For developing countries such as Nigeria, commercial space tourism presents both opportunity and a policy gap. Nigeria’s expanding space programme, coordinated through the National Space Research and Development Agency (NASRDA)[6], has so far focused on satellite development, remote sensing, and capacity building rather than human spaceflight. Understanding the evolving international legal framework is nonetheless essential for developing national policy that aligns with international obligations while positioning the country to benefit from the industry’s eventual expansion.

This article examines whether the existing framework of international space law adequately regulates commercial space tourism. It analyzes the principal treaties and emerging national approaches, identifies the resulting legal and institutional gaps, and proposes reforms capable of supporting the safe,

sustainable, and equitable growth of commercial human spaceflight. The analysis adopts a doctrinal and comparative methodology, drawing on international treaties, national legislation, and scholarly literature to evaluate the effectiveness of current regulatory mechanisms.

The remainder of this article proceeds in six parts. Section 2 sets out the conceptual and theoretical framework within which commercial space tourism should be understood, including its evolution, principal categories, and the theoretical lenses that help explain the pressures it places on existing legal doctrine. Section 3 examines the five principal United Nations space treaties in detail, assessing each instrument's relevance and limitations for private commercial spaceflight. Section 4 undertakes a comparative analysis of national regulatory approaches in the United States, the United Kingdom, the United Arab Emirates, Japan, and Nigeria. Section 5 draws together the specific legal challenges that emerge from this analysis, spanning passenger status, liability, safety, jurisdiction, environmental protection, insurance, cybersecurity, and ethics. Section 6 proposes a set of reforms and a model international regulatory framework, with particular attention to the position of developing spacefaring states, before Section 7 concludes.

II. CONCEPTUAL AND THEORETICAL FRAMEWORK

2.1 Concept of Commercial Space Tourism

Commercial space tourism refers to the provision of spaceflight services by private companies to individuals who travel into outer space primarily for recreational, educational, or scientific purposes in exchange for payment. Unlike traditional government-sponsored missions, it is market-driven and operated by private entities under the authorization and supervision of national governments. The concept emerged from the broader commercialization of outer space that gained momentum after the Cold War, as advances in reusable launch systems and private investment significantly reduced the cost of accessing space.

Commercial space tourism today encompasses several distinct activities:

- Suborbital flights, in which passengers briefly cross the recognized boundary of space before returning to Earth;
- Orbital tourism, involving travel around the Earth over several days;
- Lunar tourism, comprising proposed commercial missions around or to the Moon;
- Commercial space stations, where tourists may spend extended periods in orbit; and
- Prospective space hotels, designed to provide accommodation and recreational experiences in microgravity.

2.2 Evolution of Commercial Space Tourism

The commercialization of human spaceflight evolved through distinct phases: an initial period of complete governmental control dominated by the Soviet Union and the United States, a second phase of growing cooperation between governments and aerospace contractors, and a third phase marked by the emergence of private commercial operators. A historic milestone occurred in 2001, when businessman Dennis Tito became the first paying space tourist, travelling aboard a Russian spacecraft to the International Space Station and demonstrating that private individuals could safely participate in human spaceflight. Tito's flight was arranged commercially through the company Space Adventures in cooperation with the Russian space agency Roscosmos, and it was followed by a small number of further paying visitors to the International Space Station over the following decade, establishing orbital tourism as a workable, if extremely expensive, commercial proposition.

The subsequent development of reusable launch systems by SpaceX, Blue Origin, and Virgin Galactic accelerated commercial innovation and lowered the cost of access to suborbital flight in particular. Virgin Galactic and Blue Origin each began carrying paying passengers on short suborbital flights in 2021, marking the first time that commercial space tourism became available to individuals outside the narrow channel of a government-brokered seat aboard a Soyuz spacecraft. The industry is today no longer regarded as a futuristic aspiration but as a rapidly

emerging sector of the global space economy, with several additional companies actively developing orbital and cislunar tourism capabilities.

2.3 Categories of Commercial Space Tourism

A. Suborbital Space Tourism

Suborbital tourism involves flights that cross the boundary of outer space without completing a full orbit, generally lasting ten to twenty minutes and offering passengers several minutes of weightlessness. It is presently the most commercially viable category, requiring less fuel, lower operating costs, and shorter preparation than orbital alternatives.

B. Orbital Space Tourism

Orbital tourism places passengers into Earth orbit for periods ranging from several days to several weeks and requires substantially greater technical capability, larger launch vehicles, and more extensive astronaut training than suborbital flight. Passengers may visit commercial space stations, or the International Space Station where international agreements permit.

C. Lunar Tourism

Several private companies have announced plans for commercial missions around the Moon. Lunar tourism remains largely experimental given its financial cost and technological complexity, though continuing advances in spacecraft design suggest that commercial lunar travel may become feasible within the next decade.

D. Space Hotel Tourism

Private companies are developing concepts for commercial space stations and orbital hotels where tourists could spend extended periods experiencing life in microgravity. Although these projects remain under development, they represent the next frontier of commercial tourism beyond Earth.

2.4 Characteristics of Commercial Space Tourism

Commercial space tourism is privately financed, with private corporations rather than public treasuries assuming the financial and technological risk of development. It is profit-oriented, in contrast to governmental scientific missions whose objectives centre on research and national interest rather than

paying customers. It involves substantial international cooperation, since spacecraft components are frequently manufactured across multiple countries and launches often depend on multinational partnerships and supply chains. It remains, at the same time, an inherently high-risk activity, requiring sophisticated engineering, extensive passenger training, and comprehensive insurance arrangements that most other consumer industries do not need. Finally, it is technology-intensive, relying on continuing innovation in aerospace engineering, artificial intelligence, satellite communications, and reusable rocket systems.

2.5 International Space Law: Meaning and Scope

International space law consists of the body of treaties, customary international law, and national legislation governing activities conducted in outer space, with the principal objective of ensuring that outer space is explored and used peacefully for the benefit of all humanity. It regulates matters including the exploration of outer space, the use of celestial bodies, the registration of space objects, liability for damage, the rescue of astronauts, and environmental protection. The foundation of the field rests primarily on the five United Nations space treaties adopted between 1967 and 1979, supplemented by an increasingly significant body of non-binding General Assembly resolutions, COPUOS guidelines, and national legislation that fills gaps the treaties themselves leave open. Understanding the scope of this body of law is a necessary precondition for evaluating whether it adequately addresses commercial space tourism, which is the task undertaken in the sections that follow.

2.6 Theoretical Framework

A. The Common Heritage of Humankind Theory

This theory holds that certain areas beyond national jurisdiction belong collectively to humanity and should be managed for the benefit of present and future generations. Although the Outer Space Treaty describes outer space as “the province of all mankind” rather than using the phrase “common heritage of mankind,” both concepts emphasize equitable access and peaceful utilization, and commercial space tourism raises the question of

whether private commercialization could undermine those collective principles.

B. Functionalism Theory

Functionalism suggests that international cooperation develops incrementally, as states recognize mutual benefit in addressing common technical and administrative problems rather than through grand ideological settlement. Commercial space tourism illustrates this dynamic well: licensing standards, liability rules, rescue coordination, insurance markets, and space traffic management are all technical questions that no single nation can resolve on its own.

C. Sustainable Development Theory

Sustainable development requires balancing economic growth with environmental protection and social responsibility, a framework first articulated in terrestrial environmental law but increasingly applied to outer space as launch cadence increases. Commercial space tourism offers substantial economic opportunity but also contributes to atmospheric emissions, orbital congestion, and the accumulation of space debris, so future regulation should ensure that commercial expansion does not compromise the long-term sustainability of outer space.

2.7 Research Gap

Existing scholarship tends to examine individual aspects of commercial space tourism, such as liability or environmental protection, in isolation[7], and most of it concentrates on developed spacefaring nations, particularly the United States and Europe, with limited attention to developing countries such as Nigeria. This article addresses that gap by providing a holistic analysis of the international legal regime governing commercial space tourism that also incorporates the perspective of an emerging African space nation.

III. INTERNATIONAL LEGAL FRAMEWORK GOVERNING COMMERCIAL SPACE TOURISM

3.1 Introduction

International space law is derived primarily from the five United Nations space treaties negotiated between 1967 and 1979 under the auspices of the United Nations Committee on the Peaceful Uses of Outer Space (COPUOS). These treaties were drafted at a time when governments alone possessed the capability to conduct space activities and therefore focus predominantly on state responsibility, peaceful exploration, and liability for damage caused by space objects, with very few provisions addressing private commercial spaceflight or the rights and obligations of space tourists.

3.2 The Outer Space Treaty of 1967

The Outer Space Treaty[2] entered into force in 1967 and remains the constitutional foundation of international space law. Article I guarantees freedom of exploration and use “for the benefit and in the interests of all countries,” irrespective of their level of economic or scientific development. For commercial space tourism, this provision legitimizes private human spaceflight provided that it remains consistent with international law and is carried out under state authorization, though critics argue that exclusive access by a small class of paying tourists sits uneasily with the egalitarian philosophy underlying Article I, while supporters respond that the technological innovation generated by commercial investment ultimately benefits humanity more broadly.

Article II prohibits national appropriation of outer space, the Moon, or other celestial bodies by claim of sovereignty, occupation, or any other means. This principle raises significant questions for future commercial tourism involving lunar hotels or private space stations: companies may own their spacecraft and equipment, but they cannot acquire sovereignty over any portion of outer space.

Article VI is arguably the most consequential provision for commercial space tourism. It provides that states bear international responsibility for national activities in outer space, including activities carried out by private entities, and requires governments to authorize and continuously supervise private operators. Consequently, a government

cannot avoid international responsibility for a commercial spaceflight accident by arguing that it resulted solely from the conduct of a private company incorporated within its jurisdiction. Article VII establishes that launching states are internationally liable for damage caused by their space objects, but where commercial tourism involves multinational launches, more than one state may simultaneously qualify as a launching state, creating overlapping layers of potential liability. Article VIII provides that the state on whose registry a space object is carried retains jurisdiction and control over that object and its personnel, a provision increasingly complicated by commercial spacecraft carrying passengers of multiple nationalities and by privately owned orbital stations. Article IX requires states to conduct space activities with due regard for the interests of other states and to avoid harmful contamination of outer space, yet commercial tourism increases launch frequency and, with it, orbital congestion, atmospheric emissions, and space debris generation, matters the Treaty addresses only through broad principles rather than enforceable standards.

3.3 The Rescue Agreement of 1968

The Rescue Agreement[3] supplements the Outer Space Treaty by requiring states to assist astronauts who suffer accidents, distress, or emergency landings. The Agreement, however, consistently refers to “astronauts” without defining the term and without addressing the status of space tourists, civilian researchers, or private crew, leaving genuine uncertainty as to whether commercial passengers are entitled to identical protection. Most scholars argue that humanitarian considerations require states to rescue any person in distress in outer space regardless of legal status[8], but explicit treaty clarification would eliminate the ambiguity.

3.4 The Liability Convention of 1972

The Liability Convention[4] establishes detailed rules governing compensation for damage caused by space objects, distinguishing between absolute liability for damage caused on Earth or to aircraft in flight, which requires no proof of negligence, and fault-based liability for damage occurring in outer space. The fault standard is problematic for commercial tourism because determining negligence in a highly technical

aerospace accident may require complex scientific evidence, and multiple actors, including manufacturers, launch providers, insurers, and software developers, may all have contributed to the failure. More fundamentally, the Convention addresses liability between states rather than between private companies and individual passengers, so tourists injured during a commercial flight generally must rely on domestic contract law rather than international law, which represents one of the Convention’s most significant limitations.

3.5 Registration Convention of 1975

The Registration Convention[9] requires launching states to register space objects, which promotes transparency, jurisdictional certainty, and accident investigation. Commercial tourism is increasing the number of spacecraft entering orbit, making accurate registration more important than ever, yet the Convention establishes no operational safety standards for commercial passenger transport.

3.6 The Moon Agreement of 1979

The Moon Agreement[10] declares lunar resources to be the common heritage of mankind and contemplates an international regime governing their exploitation. The Agreement has attracted very limited ratification among major spacefaring states, however, which leaves it with little practical influence on the commercial lunar tourism ventures that several companies have begun to plan.

3.7 United Nations Principles and Soft Law

Alongside the binding treaties, several non-binding instruments increasingly shape national practice, including the Space Debris Mitigation Guidelines[11] and the Guidelines for the Long-Term Sustainability of Outer Space Activities[12]. Soft law has become especially important in this field because treaty negotiation proceeds slowly while commercial technology advances rapidly.

3.8 The Role of COPUOS

COPUOS is the principal international forum for developing space law, promoting peaceful uses of outer space, encouraging capacity building, and developing sustainability guidelines through its Scientific and Technical Subcommittee and Legal

Subcommittee. Its work proceeds by consensus among member states, which gives its output broad legitimacy but also means that treaty negotiation moves slowly relative to the pace of commercial technological change. Commercial space tourism has become an increasingly prominent topic within COPUOS discussions, but no dedicated treaty currently regulates commercial human spaceflight, and many experts advocate negotiations toward a comprehensive convention under the Committee's auspices.

3.9 Evaluation of the Existing Legal Framework

The existing framework has genuine strengths: it establishes widely accepted principles of state responsibility, promotes peaceful exploration and international cooperation, provides a mechanism for international liability, and prohibits national appropriation of outer space. Its shortcomings for commercial space tourism are nonetheless substantial. The treaties were drafted before private commercial spaceflight existed, and they contain no definition of commercial space tourism or space tourists, no international passenger safety standard, no mandatory insurance requirement, only limited environmental regulation, and no licensing standard for private operators. National legislation has therefore developed independently, producing the fragmented regulatory landscape examined in the following section.

IV. NATIONAL REGULATORY APPROACHES TO COMMERCIAL SPACE TOURISM: A COMPARATIVE ANALYSIS

4.1 Introduction

International space law leaves considerable discretion to individual states in regulating the private space activities conducted under their jurisdiction, which is particularly evident in commercial space tourism, where national governments authorize, license, and supervise the private companies involved in human spaceflight. In the absence of a comprehensive international treaty, several spacefaring nations have enacted domestic legislation governing private launches, passenger safety, liability, and insurance. This section examines the regulatory frameworks of

the United States, the United Kingdom, the United Arab Emirates, Japan, and Nigeria.

4.2 The United States

The United States is widely regarded as the global leader in commercial space tourism, home to SpaceX, Blue Origin, and Virgin Galactic. Commercial space activity is governed by the Commercial Space Launch Act[13], first enacted in 1984 and amended repeatedly, which authorizes the Federal Aviation Administration, through its Office of Commercial Space Transportation, to license and regulate commercial launch and re-entry activities. Private companies must obtain launch and re-entry licenses, demonstrate financial responsibility and insurance coverage, and undergo mandatory safety assessment before launch authorization is granted. A distinctive feature of the American model is the doctrine of informed consent, under which spaceflight participants must be informed of the risks of space travel and voluntarily accept them before boarding. This approach balances innovation with consumer protection by allowing the industry to develop without the heavier regulatory burden that a mandatory safety code would impose, though critics argue that reliance on informed consent under-protects passengers relative to commercial aviation and that environmental impacts of frequent launches receive comparatively little regulatory attention.

4.3 The United Kingdom

The United Kingdom has positioned itself as an emerging participant in commercial spaceflight through the Space Industry Act 2018[14], which established a comprehensive licensing regime covering launch operations, spaceports, operator licensing, passenger safety, environmental protection, and insurance. Unlike earlier legislation focused primarily on satellite operations, the Act specifically anticipates commercial human spaceflight, and licensing responsibilities are shared among government agencies to ensure that safety, security, and environmental standards are satisfied before commercial operations begin. Practical implementation nonetheless remains dependent on continued investment in launch infrastructure and international partnerships.

4.4 The United Arab Emirates

The UAE has rapidly emerged as a significant space actor through substantial government investment and strategic international cooperation. Its National Space Law[15] regulates the licensing of private operators, registration of space objects, insurance obligations, and environmental protection, reflecting a deliberate strategy to attract international investment while maintaining oversight consistent with the country's international obligations. The UAE demonstrates how a state with limited historical involvement in human spaceflight can nonetheless establish a modern legal framework capable of attracting international investment.

4.5 Japan

Japan has developed a sophisticated aerospace industry through collaboration between government agencies and private companies, formalized in the Space Activities Act 2016[16], which requires government authorization for launches, mandatory insurance, and continuous supervision of private operators. The regulatory model emphasizes high technical standards, strong governmental oversight, and close integration with Japan's international treaty obligations.

4.6 Nigeria

Nigeria is one of Africa's leading space nations. Since the establishment of NASRDA in 1999[6], the country has invested in satellite technology for telecommunications, environmental monitoring, disaster management, and national security, though it has not yet entered the commercial human spaceflight market. Nigeria's space activities are governed by the NASRDA Act and its National Space Policy, both focused on satellite development and scientific research rather than commercial human spaceflight. Nigeria currently has no commercial space tourism legislation, no human spaceflight licensing procedure, and no insurance or consumer protection requirements specific to space tourism. As Africa's space sector expands, Nigeria is well placed to become a regional leader by developing legislation governing commercial space activities before the industry matures domestically.

4.7 Comparative Analysis

The comparison reveals significant differences among national regulatory systems, summarized in Table 1.

Table 1. Comparative overview of national regulatory approaches.

Country	Commercial Legislation	Human Spaceflight
United States	Comprehensive	Yes
United Kingdom	Comprehensive	Yes
UAE	Comprehensive	Emerging
Japan	Comprehensive	Limited
Nigeria	Limited	No

No single national model provides a complete solution to the legal challenges of commercial space tourism, but several principles recur across jurisdictions: commercial operators should be subject to government authorization and continuous supervision, passenger safety must remain the highest regulatory priority, adequate insurance should be mandatory, environmental protection should be integrated into licensing, and national legislation should complement, rather than replace, international treaty obligations.

4.8 Conclusion

The experiences of the United States, the United Kingdom, the UAE, Japan, and Nigeria demonstrate that domestic legislation plays a critical role in regulating commercial space tourism, but the significant variation among national legal systems creates uncertainty for operators, investors, insurers, and passengers engaged in cross-border commercial space activity. While advanced spacefaring nations have built comprehensive regulatory frameworks, developing countries such as Nigeria remain in the early stages of adapting their legal systems to the realities of commercial human spaceflight,

underscoring the need for a harmonized international framework capable of promoting innovation while ensuring safety and legal certainty.

V. LEGAL CHALLENGES IN THE REGULATION OF COMMERCIAL SPACE TOURISM

5.1 Introduction

The five United Nations space treaties continue to provide the legal foundation governing outer space, but they were negotiated during the Cold War, when only governments conducted human spaceflight, and their provisions therefore focus on interstate relations rather than the complex legal relationships involving private corporations, investors, insurers, and commercial passengers that now characterize the industry. Building on the treaty-by-treaty analysis in Section 3 and the comparative national survey in Section 4, this section synthesizes the specific legal challenges that recur across jurisdictions and that any future international framework will need to address directly.

5.2 The Legal Status of Space Tourists

The Outer Space Treaty[2] and the Rescue Agreement[3] consistently refer to “astronauts” as “envoys of mankind” without defining the term, and because commercial space tourism did not exist when these instruments were negotiated, their drafters never considered whether paying passengers should enjoy the same legal protection as professional astronauts. Some scholars argue that commercial tourists should be treated as astronauts because they travel beyond Earth’s atmosphere and face comparable physical risk, while others contend that astronauts are properly understood as individuals selected for governmental scientific missions. The absence of a settled definition has direct consequences for rescue obligations and emergency response.

5.3 Liability for Accidents

Liability is one of the most complex legal issues in commercial space tourism. The Liability Convention[4] establishes that launching states bear international responsibility for damage caused by their space objects, but it regulates liability primarily

between states rather than between operators and individual passengers. A commercial mission may involve spacecraft manufacturers, launch service providers, insurers, software developers, and multiple governments, so that a catastrophic failure caused by defective software developed in one country, a launch vehicle manufactured in another, and a launch conducted from a third can make legal responsibility extremely difficult to establish. Commercial passengers typically also enter contractual liability waivers and informed consent provisions that limit private liability under domestic law but cannot displace the international responsibility that the Outer Space Treaty and Liability Convention impose on the launching state.

5.4 Passenger Safety and Human Rights

Unlike international civil aviation, where detailed technical standards are established under the International Civil Aviation Organization[5], no equivalent international safety code exists for commercial space tourism, and individual states instead set their own licensing requirements and operational standards. Basic questions remain unanswered: what minimum medical standards should passengers satisfy, how much training should they receive, and what rights should a passenger have if an operator fails to meet its safety obligations. From a human rights perspective, commercial space tourists retain fundamental rights to life, dignity, health, and personal security, and states accordingly have a positive obligation to build regulatory systems capable of protecting those rights while still permitting technological innovation.

5.5 Jurisdiction and Applicable Law

Under Article VIII of the Outer Space Treaty[2], the state that registers a spacecraft retains jurisdiction over it, but future commercial missions may involve passengers of multiple nationalities, spacecraft registered in one state and launched from another, and privately owned orbital stations operated by multinational corporations. A tourist travelling aboard a spacecraft registered in one country, launched from another, and docking at a privately owned station raises difficult questions of criminal jurisdiction, civil liability, consumer protection, and

taxation for which current international treaties provide only limited guidance.

5.6 Environmental Protection and Space Debris

Rocket launches release carbon dioxide, water vapour, soot particles, and nitrogen oxides into the upper atmosphere, and increasing commercial activity is expected to produce measurable environmental impact. Beyond the atmosphere, space debris has become one of the most serious threats to commercial space tourism: defunct satellites, abandoned rocket stages, and collision fragments travel at speeds exceeding 27,000 kilometres per hour, and even very small objects carry enough kinetic energy to destroy a spacecraft or endanger human life[11]. Existing treaties require states to avoid harmful contamination but establish no binding limits on launch emissions or orbital debris, and the United Nations Space Debris Mitigation Guidelines remain non-binding, leading many scholars to advocate mandatory debris removal obligations and active space traffic management.

5.7 Insurance and Consumer Protection

Operators require insurance against launch failure, passenger injury, third-party damage, and environmental liability, but commercial human spaceflight remains a relatively new industry with limited actuarial history, so insurers face considerable uncertainty when pricing risk and premiums remain correspondingly high. International space law, meanwhile, contains virtually no consumer protection provisions addressing misleading advertising, ticket cancellation, refunds, or disclosure of medical risk, leaving these matters almost entirely to domestic contract law.

5.8 Cybersecurity

Modern spacecraft depend extensively on digital technology for navigation, communication, propulsion, and life support, and a cyberattack targeting a commercial spacecraft could have catastrophic consequences. Because the existing space treaties were drafted decades before cybersecurity became a global concern, they contain no obligations relating to cyber resilience or digital security, leaving this an area of significant and growing regulatory gap.

5.9 Ethical Considerations and Regulatory Fragmentation

Commercial space tourism also raises genuine ethical questions. Critics argue that the resources devoted to recreational space travel could instead address poverty, healthcare, or climate change, while supporters contend that commercial investment stimulates technological innovation whose benefits extend well beyond the space sector. Underlying all of these issues is the absence of internationally harmonized regulation: different countries maintain different rules on licensing, insurance, passenger training, and accident investigation, and this fragmentation increases legal uncertainty for multinational operators and passengers alike.

5.10 Conclusion

Commercial space tourism represents one of the most significant developments in the modern space industry, but its rapid growth has outpaced the evolution of international space law. The uncertain legal status of space tourists, inadequate liability mechanisms, fragmented safety standards, jurisdictional conflict, environmental and debris risk, and the absence of consumer protection and cybersecurity obligations together demonstrate that the current legal regime is no longer sufficient to govern a rapidly expanding commercial industry.

VI. RECOMMENDATIONS AND A PROPOSED INTERNATIONAL REGULATORY FRAMEWORK

6.1 Introduction

Commercial space tourism has progressed from an experimental concept to a rapidly expanding industry, and the existing legal framework, designed primarily for state-led activity, is no longer sufficient to regulate it. This section proposes reforms capable of strengthening the international governance of commercial space tourism while preserving the foundational principles of peaceful exploration and international cooperation.

6.2 An International Convention on Commercial Space Tourism

The most important recommendation is the negotiation of a new multilateral treaty specifically

regulating commercial human spaceflight. The existing UN space treaties were drafted for an era when governments alone conducted space activity and were never designed to regulate private commercial tourism. A dedicated convention should clearly define commercial space tourism, commercial spaceflight operators, space tourists, and commercial orbital or lunar tourism facilities, and should establish uniform international rules on licensing, liability, passenger protection, insurance, and dispute resolution.

6.3 Uniform International Safety Standards

Passenger safety should remain the highest priority in commercial human spaceflight. An international regulatory body operating under COPUOS, in cooperation with the International Civil Aviation Organization[5], should develop globally accepted standards covering spacecraft design, passenger medical examination, crew qualification, emergency procedures, and life-support systems.

6.4 Clarifying the Legal Status of Space Tourists

Future international legislation should expressly recognize commercial passengers as spaceflight participants, a category distinct from government astronauts but entitled to fundamental humanitarian protection. The new framework should clarify rescue obligations, emergency evacuation procedures, and the obligations operators owe to their passengers.

6.5 Reforming the International Liability Regime

The present liability system was designed to regulate disputes between states and needs to be extended to address relationships among governments, private companies, passengers, insurers, and manufacturers. A revised regime should establish mandatory insurance requirements, define operator liability more clearly, regulate contractual liability waivers, and, following the model used in civil aviation, establish a compensation fund for catastrophic accidents.

6.6 Harmonizing National Licensing Systems

Commercial operators currently face different licensing requirements in every jurisdiction in which they operate. International harmonization should establish minimum licensing criteria covering financial capability, technical competence,

operational safety, environmental compliance, cybersecurity, and insurance coverage, while allowing individual governments to retain sovereignty over the licensing decision itself.

6.7 Strengthening Environmental and Debris Governance

Future regulation should require mandatory environmental impact assessment, launch emission monitoring, and sustainable rocket fuel research. A comprehensive debris management framework should likewise require mandatory mitigation plans, compulsory end-of-life disposal, active debris removal obligations, and international tracking systems, with meaningful legal consequences for non-compliance.

6.8 Consumer Protection and Cybersecurity

Commercial space tourists should enjoy protections comparable to those available to consumers in other transportation industries. International rules should require operators to provide transparent pricing, accurate risk disclosure, and clear refund and compensation policies, and should require secure communication systems, encryption protocols, and incident reporting.

6.9 Capacity Building for Developing Countries

Commercial space tourism should not become an industry that benefits only technologically advanced nations. International organizations should support developing countries through technical cooperation, legal training, and research partnerships, so that greater participation by developing countries can promote more equitable access to the benefits of commercial space activity. Although Nigeria has not yet entered the commercial space tourism industry, early legal preparation would position the country to benefit from its future development. Nigeria should, in particular:

- Enact comprehensive national legislation governing commercial human spaceflight, and amend the NASRDA Act to address private commercial space activity;
- Establish licensing regulations for commercial launch operators, together with passenger safety standards and mandatory insurance requirements;

- Promote public-private partnerships in aerospace technology and invest in research on reusable launch systems and satellite technology; and
- Strengthen international cooperation through COPUOS, the African Union, and university programmes specializing in space law and commercial space regulation.

6.10 A Proposed Model for International Regulation

A future international regulatory framework should rest on eight pillars: international licensing standards, uniform passenger safety requirements, comprehensive liability rules, mandatory insurance, environmental sustainability, space debris management, consumer protection, and international dispute resolution. Together, these principles would create a balanced legal regime that promotes innovation while safeguarding the public interest.

6.11 Conclusion

The future of commercial space tourism depends not only on continued technological innovation but also on the development of a legal framework capable of responding to genuinely new commercial realities. A new international convention, supported by harmonized national legislation and stronger international cooperation, would provide greater legal certainty, improve passenger safety, protect the space environment, and support the sustainable growth of the commercial space tourism industry.

VII. CONCLUSION

The commercialization of outer space represents one of the most remarkable developments in the history of space exploration. Once reserved for government-sponsored astronauts, outer space is now becoming increasingly accessible to private individuals through commercial space tourism, driven by technological innovation, declining launch costs, and the growing participation of commercial aerospace companies. This transformation has exposed significant shortcomings within the existing framework of international space law, negotiated during the Cold War, when only sovereign states possessed the capability to undertake space activity.

This article has found that the Outer Space Treaty of 1967[2] remains the cornerstone of international space law and continues to provide principles of enduring relevance to commercial space tourism, including the peaceful use of outer space, non-appropriation of celestial bodies, and state responsibility. None of the five United Nations space treaties, however, specifically regulates commercial space tourism, private human spaceflight, or privately operated orbital facilities, leaving the legal status of commercial space tourists uncertain, the international liability regime only partially suited to disputes involving private companies and individual passengers, and internationally harmonized safety, environmental, consumer protection, and cybersecurity standards largely absent. The comparative analysis of national legislation further shows that while the United States, the United Kingdom, the UAE, and Japan have developed relatively comprehensive regulatory frameworks, Nigeria has not yet developed legislation specific to commercial human spaceflight, presenting both a challenge and an opportunity for reform.

This study contributes to the growing scholarship on commercial space tourism by examining the interaction between international treaties, national legislation, and private commercial activity as a whole, rather than treating liability, safety, or environmental protection as isolated questions, and by incorporating the perspective of an emerging African space nation into a literature that has concentrated overwhelmingly on established spacefaring states.

Commercial space tourism is no longer a futuristic aspiration but an emerging commercial reality, and continued technological advancement will likely bring routine suborbital transportation, commercial orbital stations, and eventually lunar tourism within reach over the coming decades. Rather than replacing the current treaties, the international community should build upon their foundational principles through a modern legal framework specifically regulating commercial space tourism, one that establishes internationally harmonized standards for licensing, passenger safety, liability, insurance, environmental protection, cybersecurity, consumer

rights, and space traffic management. For Nigeria, proactive legal reform is particularly important: by strengthening its domestic space legislation, investing in institutional capacity, and participating actively in international space governance through COPUOS and the African Union, Nigeria can position itself to benefit from the opportunities presented by the rapidly expanding global space economy. Ultimately, the success of commercial space tourism will depend as much on the development of a coherent and internationally accepted legal framework as on the technology that makes it possible.

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