

“Managing commercial space activities: Legal and regulatory challenges in the UAE’s space sector”

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MANAGING COMMERCIAL SPACE ACTIVITIES: LEGAL AND REGULATORY CHALLENGES IN THE UAE'S SPACE SECTOR

Abstract

As commercial space activities continue to expand, establishing a comprehensive regulatory framework is crucial for ensuring sustainable growth, fostering private sector investment, and maintaining alignment with international legal standards. This study aims to examine the managerial and regulatory aspects of the UAE Space Regulation Law No. 12 of 2019, analyzing its impact on private sector participation and the broader commercial space industry. The paper specifically evaluates the role of the UAE Space Agency in facilitating investment, managing risks, and ensuring compliance with international treaties such as the 1967 Outer Space Treaty and the 1979 Moon Agreement.

The study uses a doctrinal legal research methodology to assess the legal mechanisms governing liability, space resource ownership, and private sector engagement. Findings indicate that while the UAE has developed a progressive framework for space commercialization, key regulatory gaps remain, particularly in space resource management and liability distribution. These challenges present barriers to investment and require strategic adjustments to enhance legal clarity and operational efficiency.

The study recommends a managerial approach to regulatory development, emphasizing risk mitigation strategies for private operators, stronger policy incentives for new market entrants, and enhanced international collaboration to create a globally harmonized framework for commercial space activities. Addressing these issues will strengthen the UAE's position as a competitive player in the space industry while ensuring legal certainty for businesses and investors.

Keywords

space law, regulation, liability, governance, investment, commercialization, UAE, treaties, policy

JEL Classification

K23, K33, L51, O33, Q56, L93

INTRODUCTION

The commercialization of outer space represents a transformative shift in global economic and technological advancement, offering nations new opportunities for innovation, investment, and strategic growth. As industries such as satellite communications, astronautics, space tourism, and space mining expand, regulatory frameworks play a critical role in balancing economic incentives with legal and governance challenges. Effective regulation ensures that private sector engagement aligns with international legal principles, mitigates risks, and fosters sustainable commercial space development. While international treaties such as the 1967 Outer Space Treaty and the 1979 Moon Agreement establish foundational principles, they do not fully address the complexities of modern space commercialization, particularly concerning liability, investment security, and resource ownership (Mazur et al., 2025; Salmeri, 2022; Shi et al., 2023).

In response to these challenges, the UAE has emerged as a key player in the commercial space sector through the enactment of Federal Law No. 12 of 2019, which regulates space activities and establishes the



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UAE Space Agency as the primary governing body. This legislation seeks to create a competitive investment climate, facilitate private sector participation, and position the UAE as a leader in the global space economy. However, despite its progressive framework, legal ambiguities remain, particularly regarding liability management and extraterrestrial resource ownership, which could impact investor confidence and regulatory stability (Aldabousi, 2024; Khan, 2021).

1. LITERATURE REVIEW AND HYPOTHESES

The commercialization of outer space represents a strategic shift in economic and technological growth, requiring nations to develop legal and regulatory frameworks that balance investment potential with governance challenges (Uwaoma et al., 2023). Viewing space activities as a high-value industry, governments increasingly prioritize space commercialization as a driver of national economic competitiveness (Siva Amruta, 2025). Key sectors such as satellite communications, astronautics, space tourism, space mining, and remote sensing provide lucrative opportunities for both economic expansion and technological leadership. By fostering space commercialization, nations enhance their technological capabilities, strengthen their positions in the global market, and create long-term economic stability through innovation-driven industries (Guzman & Meyer, 2011; Korzh, 2025; Yolusever, 2025).

Despite the significant economic potential, legal and regulatory barriers remain central to managing commercial space activities. The foundation of space governance is established through international treaties, particularly the 1967 Outer Space Treaty and the 1979 Moon Convention, which define principles for peaceful use and equitable resource management (Guzman & Meyer, 2011). These treaties set broad legal frameworks for state and private actors, emphasizing collective responsibility in space exploration and preventing resource monopolization. However, they do not provide specific regulations addressing modern commercial challenges, such as private-sector liability, investment security, and space resource ownership, necessitating more detailed national-level policies to ensure sustainable industry growth (Yuzbashyan, 2024).

In response, the UAE has positioned itself as a leader in commercial space regulation, intro-

ducing Federal Law No. 12 of 2019 to establish a structured governance framework that fosters private-sector investment in space exploration. This legislation grants oversight authority to the UAE Space Agency, a regulatory body with financial and administrative independence to manage commercial space operations (Adams, 2019; Extance, 2014). The agency plays a critical role in creating an investment-friendly business environment, ensuring legal clarity for commercial operators, and integrating space-related activities into the UAE's broader economic diversification strategy. By aligning space governance with national economic objectives, the UAE aims to solidify its role as a competitive player in the space economy while attracting private capital, fostering innovation, and mitigating legal risks for commercial space ventures (United Arab Emirates, 2019).

The establishment of the UAE Space Agency plays a strategic managerial role in ensuring that space commercialization aligns with national economic objectives and remains competitive. By structuring a clear legal and regulatory framework, the UAE government enables the private sector to engage in space ventures with legal certainty, minimizing jurisdictional conflicts between regulatory bodies and private enterprises (United Arab Emirates, 2019). This governance model fosters an environment conducive to investment, technological advancement, and innovation, positioning the UAE as a regional hub for commercial space activities while maintaining compliance with international space treaties. The UAE's approach to regulatory oversight provides legal stability for private investors, encouraging capital inflows into satellite communications, asteroid mining, and space tourism, which are rapidly emerging as commercially viable industries (Al Sharji et al., 2021).

However, one of the most pressing legal and managerial challenges concerns the definition of outer space. A lack of global consensus on the altitude at which airspace ends and outer space begins

has created regulatory uncertainties in commercial operations (Lits et al., 2017). While some legal scholars argue that aerospace activities should be subject to air law, others maintain that space law should apply irrespective of altitude (Hobe, 2007). The UAE's Federal Law No. 12 of 2019 has proactively addressed this ambiguity by defining outer space as beginning at 80 km above sea level, providing a clear legal boundary for commercial operations and regulatory compliance (Kobzar & Danylenko, 2019). This legal certainty benefits commercial operators, enabling companies to plan business strategies, investments, and risk assessments with greater confidence while ensuring compliance with the UAE's space governance framework (Harris & Linares, 2024; Dailey et al., 2024).

Another critical challenge affecting space commercialization is the legal status of space resources. International space treaties, such as the 1967 Outer Space Treaty, classify celestial bodies and their resources as the 'common heritage of humankind', prohibiting national sovereignty claims over space resources (Hofmann & Bergamasco, 2020; Aggarwal, 2024). However, as private-sector involvement in space mining expands, a growing legal contradiction emerges between theoretical international legal principles and commercial practices. While no country may claim ownership of celestial bodies, private enterprises can potentially extract and profit from space resources under national legal frameworks. This legal ambiguity creates managerial and regulatory challenges for companies seeking to develop long-term business models based on space resource extraction. The UAE's legal framework, while aligned with global treaties, still requires further clarity on property rights, investment protections, and international cooperation mechanisms to fully support sustainable space commercialization. This highlights the necessity for both national regulatory refinement and stronger international coordination to bridge legal gaps and encourage private sector investment in space industries.

Another critical aspect of space law concerns the principle of the inadmissibility of national ownership of outer space. As per the Outer Space Treaty, no state may claim sovereignty over outer space or celestial bodies. This principle is vital to ensuring

that space remains accessible to all countries and prevents the monopolization of space resources by powerful nations (De Man, 2016). However, some scholars argue that this principle is outdated and, rather than simply allowing private entities to own parts of outer space, should create mechanisms for the regulated ownership of space resources by national governments or private companies (White, 1998). While this view challenges existing space law, it suggests that legal reforms may be necessary to accommodate the rapidly evolving commercial space sector. International cooperation remains a cornerstone of space law. As space exploration grows more commercialized, countries must work together to ensure that the benefits of space activities are shared equitably. States are required to follow international law when conducting business in space, ensuring that commercial activities are conducted in a manner that does not negatively impact other countries or the environment. The increasing involvement of private companies in space exploration presents both opportunities and challenges for international cooperation (Pierre-Marie, 1992). As more nations and private actors engage in space activities, it becomes increasingly important to establish a cohesive legal framework that ensures responsible resource management, equitable distribution of benefits, and the peaceful use of space for all. The United States, through its Commercial Space Launch Act of 1998, has established a legal framework for regulating commercial space activities. The Act requires private companies to obtain licenses for space operations and ensures that they are financially responsible for any damages during space missions. This law sets specific liability limits and requires insurance to cover potential losses, making space activities more predictable and less risky for investors (Sur, 2024). By establishing liability guidelines, the US encourages private sector involvement while ensuring that the government is not held liable for damages caused by commercial space operations.

Similarly, the UAE has implemented its own legal system to regulate commercial activities in space, particularly with regard to the liability of space operators. According to Federal Law No. 12 of 2019, the UAE Space Agency oversees the granting of licenses for commercial space activities, ensuring that operators meet certain legal requirements. The law also defines the liability of space opera-

tors, particularly in cases where damage occurs to third parties, either in space or on the Earth's surface. In most cases, the UAE government is not responsible for compensating damages caused by space activities, reinforcing the principle that private operators bear responsibility for their actions (Moronese, 2019). The regulations set forth in the UAE's Space Law are designed to balance the growing commercial interest in space with the need for clear, enforceable rules. The law also addresses the liability of unauthorized space operators, emphasizing that they are fully responsible for damages without any limitations on compensation (Masson-Zwaan & Hofmann, 2022). These legal provisions ensure that space activities in the UAE are conducted with due diligence and in compliance with both national and international laws. Given the rapid expansion of the commercial space sector, the need for an international regulatory framework becomes increasingly urgent. While effective in many respects, the current international space law regime requires further refinement to accommodate the evolving landscape of space exploration and commercial activities (Su, 2017). One potential solution is the establishment of an international system governing the commercial exploitation of space resources under the auspices of the United Nations. This system would provide guidelines for managing space activities, ensuring that all nations have access to the benefits of space exploration and that the rights of private companies are protected while promoting sustainable development (Lee, 2012). Such a framework could facilitate peaceful, equitable, and responsible use of space resources, promoting international cooperation and reducing the risks of conflict. However, this system would need to address the challenges posed by the competing interests of developed and developing nations, as well as the private sector's growing influence in space activities. As space exploration and resource extraction become more feasible, establishing a clear and universally accepted legal framework will be essential to ensuring the long-term sustainability of outer space activities (Kuźniar, 2023; Nahtigal, 2022; Cheney, 2019).

The commercial exploitation of outer space presents significant opportunities for economic growth but also raises complex legal and regulatory challenges. The UAE's efforts to develop a le-

gal framework for space activities reflect a broader global trend toward regulating space commercialization. However, further international cooperation and the development of a unified legal system will be required to ensure that space resources are exploited responsibly and equitably. The establishment of an international regime for the commercial exploitation of space resources could provide a balanced approach that addresses the legal and practical complexities of space commercialization, benefiting both nations and private sector actors (Al-Hajj, 2020).

This study aims to examine the managerial and regulatory aspects of the UAE Space Regulation Law No. 12 of 2019, analyzing its impact on private sector participation and the broader commercial space industry. Based on the literature review, the following hypotheses are formulated:

- H1: *The UAE's legal framework effectively supports the commercial exploitation of space by private entities, facilitating investment and development.*
- H2: *There are significant gaps in the UAE's space legislation that hinder the growth of the commercial space sector, particularly in terms of liability and investor protection.*
- H3: *International cooperation and the establishment of a global regulatory system are essential for improving the legal framework and promoting the sustainable development of space commercialization.*

2. METHODOLOGY

This study adopts a doctrinal legal research methodology, focusing on examining, analyzing, and interpreting the legal texts and principles that govern the commercial exploitation of outer space. Given that this study is non-applied and theoretical, it does not rely on empirical data or case studies but builds its arguments through a legal analysis of existing legal frameworks, international treaties, and national laws related to space activities. The paper primarily involves scrutinizing and interpreting legal documents related to space law, with a partic-

ular emphasis on analyzing the laws governing the commercial exploitation of space in the United Arab Emirates.

The study is based on an extensive analysis of foundational international treaties such as the 1967 Outer Space Treaty and the 1979 Moon Agreement, where the key principles regulating outer space activities, especially in commercial contexts, are explored. These treaties lay the groundwork for the regulation of space law, and the study examines how these legal texts apply to modern commercial ventures, especially concerning the peaceful use of space, the concept of outer space as “the common heritage of humankind,” and the prohibition of appropriation of space. The analysis also explores how these principles apply to the commercial use of space, including the involvement of private entities in space exploration. Moreover, it compares the provisions of these treaties with the legal framework of the United Arab Emirates, particularly the UAE Space Regulation Law No. 12 of 2019, to understand how the UAE law aligns with international space law principles governing commercial activities in space.

The paper also analyzes national legislation, specifically the UAE Space Regulation Law, to examine how the law in the UAE addresses issues such as liability and commercial engagement in space. Through a comparative analysis, the study compares the UAE’s legal framework with those of other spacefaring nations, particularly the United States, which has established comprehensive regulatory systems for commercial space activities, including the Commercial Space Launch Act of 1984. This comparison identifies similarities and differences between legal systems and highlights best practices that could enhance the legal environment in the UAE.

Additionally, the study conducts a doctrinal analysis of the core legal principles that govern space activities. These principles include:

- Freedom of Exploration and Use of Outer Space, which grants states the right to explore and use outer space, including the freedom to land space objects on celestial bodies, place equipment in orbit, and establish space stations;

- Non-Appropriation of Outer Space, which ensures that no state or private entity can claim sovereignty over outer space or celestial bodies;
- The Common Heritage of Humankind, which states that space resources must benefit all of humanity, regardless of a country’s space capabilities; and
- Liability and Responsibility, which addresses the legal framework for damages resulting from space activities, including the responsibility of spacefaring states and private operators.

The analysis relies on secondary legal sources, including scholarly articles, books, legal commentaries, and official reports from international organizations such as the United Nations Office for Outer Space Affairs (UNOOSA) and the International Telecommunication Union (ITU). These sources offer additional context and insight into how space law is evolving and how international cooperation in the commercial exploitation of space is addressed. In addition, legal databases such as Westlaw, LexisNexis, and HeinOnline are used to access relevant case law, legal opinions, and academic papers on space law and commercial activities in outer space.

Furthermore, the document includes a jurisprudential analysis of the legal debates surrounding the regulation of outer space. This involves examining various scholarly perspectives on ownership, liability, and the role of private entities in space exploration. By examining the opinions of legal experts, practitioners, and scholars, the study addresses the legal challenges posed by the commercialization of space and offers solutions for how legal systems can better accommodate the increasing involvement of private sector players in space activities.

The goal is to provide a comprehensive evaluation of the adequacy of current legal frameworks governing commercial space exploitation, focusing on the role of the UAE Space Agency and the broader implications for international space law. The study also identifies potential legal reforms that could improve the regulatory environment for commer-

cial space activities in the UAE. Finally, the study explores the need for international cooperation to improve global space law frameworks and support the sustainable development of commercial space exploitation.

3. RESULTS AND DISCUSSION

The study evaluates the UAE Space Regulation Law No. 12 of 2019 in light of international space law, examining its managerial implications for commercial space activities and its effectiveness in supporting private sector participation. The results confirm that the UAE has made substantial progress in creating a structured regulatory framework for space commercialization. However, challenges remain, particularly in the areas of liability allocation, space resource ownership, and international alignment. These aspects have direct implications for investment attractiveness, regulatory stability, and the sustainability of space ventures.

A significant achievement of the UAE’s legal approach is the establishment of the UAE Space Agency, which serves as the central regulatory body for commercial space activities. This aligns with international best practices, as seen in NASA’s regulatory role in the U.S. and ESA’s governance in Europe. By consolidating regulatory oversight, the UAE has lowered entry barriers for private investors, ensuring that companies can engage in space exploration, telecommunications, and space tourism within a clear legal framework (Adams, 2019).

However, when compared with the U.S. model, where NASA collaborates with SpaceX and Blue Origin through public-private partnerships, the

UAE’s framework still lacks incentive mechanisms such as government-backed investment grants or subsidies (Freeland, 2010). The absence of direct financial incentives for commercial entities may impact the competitiveness of UAE-based space enterprises, particularly startups and small firms.

Table 1 highlights key comparative aspects of space regulatory approaches, emphasizing how different nations manage private sector participation.

One of the UAE’s most defining aspects of the law is its strict liability approach, which shields the government from financial risks by placing full responsibility for damages on private operators. This mirrors the U.S. model, where the Commercial Space Launch Act mandates private operators to carry liability insurance (51 U.S. Code § 50907).

While this reduces financial exposure for the UAE government, it creates a potential investment deterrent for small and medium-sized enterprises that cannot afford high insurance premiums.

This finding aligns with prior research suggesting that strict liability laws can act as financial barriers, as seen in European Union aviation laws, where higher insurance requirements reduce the number of new airline operators (Lits et al., 2017). If the UAE wishes to attract more private investment, it may need to introduce liability caps or state-backed insurance schemes to support emerging commercial space companies.

The most significant legal gap in the UAE’s framework pertains to space resource ownership. The 1967 Outer Space Treaty and 1979 Moon Agreement prohibit national appropriation of celestial bodies but do not explic-

Table 1. Comparative analysis of national space regulatory frameworks

Legal Provision	The UAE (Law No. 12 of 2019)	The USA (Commercial Space Launch Act)	Europe (ESA Regulations)
Central Authority	UAE Space Agency	NASA, FAA, and private sector partnerships	ESA governing board with national contributions
Private Sector Participation	Legal framework for private companies but no investment incentives	Extensive public-private partnerships with government funding	State-led programs with limited private sector access
Liability Framework	Full liability on private operators	Private operators must obtain liability insurance	Hybrid liability shared with state-backed indemnification
Resource Ownership	Unclear stance, no specific laws on mining rights	The USA recognizes commercial mining rights under national law	Subject to EU agreements on shared space resources

Table 2. Legal position on space resource ownership in major space-faring nations

Country	Legal Stance on Space Resource Ownership	Impact on Private Investment
The UAE	No clear legal framework	Investors face uncertainty, deterring long-term commitments
The USA	Recognizes private ownership rights (2015 Act)	Encourages investment in asteroid mining and resource extraction
EU (ESA Nations)	No unified policy; follows the Moon Agreement	Companies operate under EU-wide discussions, creating legal delays

itly address commercial resource extraction (Hofmann & Bergamasco, 2020). The UAE law does not clarify whether private entities can claim ownership of extracted resources, creating legal uncertainty for potential space mining ventures.

This lack of regulatory clarity contrasts sharply with the 2015 U.S. Commercial Space Launch Competitiveness Act, which explicitly grants American companies the right to extract and own resources obtained from asteroids and the Moon (Freeland, 2010). As Table 2 illustrates, the UAE's lack of a defined policy could place it at a disadvantage in attracting space mining investments.

Given the transnational nature of space activities, international legal cooperation is crucial. The UAE's space regulation aligns with global treaties, ensuring compliance with non-appropriation and peaceful use principles. However, legal uncertainties regarding ownership and investment protection remain unresolved.

Prior studies emphasize that international agreements play a key role in fostering commercial space stability. For example, research on China's commercial space sector shows that government-backed cooperation with international organizations has accelerated investment in space technologies (Guzman & Meyer, 2011). Similarly, Japan's regulatory framework integrates legal certainty through multilateral agreements, ensuring long-term investor confidence.

The UAE could benefit from deeper participation in international regulatory discussions, particularly in defining space resource ownership standards and liability-sharing agreements. The absence of global consensus on commercial space law means that unilateral national laws may not be sufficient to ensure investor security.

The UAE's legal framework effectively integrates private sector involvement, creating a business environment that aligns with international models, particularly that of the United States. However, strict liability laws may act as a barrier to the participation of small and medium enterprises, necessitating potential regulatory adjustments such as liability caps or government-backed insurance mechanisms. Additionally, the absence of explicit provisions on space mining and resource ownership generates uncertainty for commercial investors, placing the UAE at a competitive disadvantage compared to countries with more defined policies, such as the United States. Strengthening collaboration with global regulatory bodies is essential to enhancing investment stability and aligning policies with the broader space economy.

Despite its progress in space commercialization, the UAE faces two major challenges. First, the lack of clear ownership laws deters investment in space resource extraction. Second, strict liability regulations may limit the entry of SMEs into the industry due to high insurance costs. To address these issues, the UAE could adopt a more defined legal stance on space resource ownership, similar to the U.S. model, explicitly permitting private entities to extract and profit from space resources while adhering to international treaties. Adjusting liability regulations to implement a capped liability system would ensure that startups and smaller enterprises can compete without excessive financial burdens. Additionally, expanding international legal cooperation through multilateral agreements would help harmonize space commercialization policies with global standards.

By implementing these regulatory improvements, the UAE can strengthen its position as a global leader in space commercialization, attract foreign investment, foster innovation, and enhance its competitive advantage within the space industry.

CONCLUSION

This study aimed to examine the managerial and regulatory aspects of the UAE Space Regulation Law No. 12 of 2019, analyzing its impact on private sector participation and the broader commercial space industry. It was found that the UAE has made significant progress in fostering a legal environment that supports private sector involvement in space activities. The establishment of the UAE Space Agency provides a centralized regulatory authority that ensures compliance with international norms and promotes investment in space commercialization. The law's liability provisions, which place financial responsibility on private operators, align with global practices and help protect government resources while encouraging corporate accountability.

However, the study also identifies critical legal ambiguities, particularly regarding space resource ownership. The UAE Space Regulation Law does not explicitly address the ownership and exploitation of extraterrestrial resources, a key concern for private investors. The principle of the common heritage of humanity, embedded in international treaties, further complicates this issue by restricting individual or national claims to space resources. The absence of clear ownership regulations may discourage private companies from investing in space mining and resource extraction. Future amendments to the UAE's legal framework should provide greater clarity on this matter to enhance investor confidence and competitiveness in the space sector.

Additionally, the study emphasizes the necessity of international cooperation in space governance. As commercial space activities expand, isolated national regulations may prove insufficient. A globally coordinated framework is essential to regulate liability, resource utilization, and private sector engagement. While the UAE's proactive approach to space law is commendable, further integration with international legal frameworks will strengthen its position in the global space economy.

AUTHOR CONTRIBUTIONS

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Formal analysis: Ahmed Moustafa Aldabousi.
Funding acquisition: Ahmed Moustafa Aldabousi.
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REFERENCES

1. Adams, B. (2019). Cooperation in space: An international comparison for the benefit of emerging space agencies. *Acta Astronautica*, 162, 409-416. <https://doi.org/10.1016/j.actaastro.2019.06.011>
2. Aggarwal, J. (2024). Space policy imperative: The urgency for a new international space governance system. *Astropolitics*, 22(1/2), 102-113. <https://doi.org/10.1080/14777622.2024.2379089>
3. Al Sharji, F., Al Hosani, H., & Al Rashedi, N. (2021). Empowering the UAE space sector through an attractive regulatory framework. *Air and Space Law*, 46(3), 329-350. <https://doi.org/10.54648/aila2021019>
4. Aldabousi, A. M. (2024). Legal framework to regulate the commercial exploitation of space in compliance with the provisions of the UAE Space Regulations law. *Journal of Southwest Jiaotong University*. <https://>

- doi.org/10.35741/issn.0258-2724.59.2.24
5. Al-Hajj, M. A. (2020). The possibility of commercial investment in outer space in the light of the principles of the common heritage of humanity and sovereignty. *Journal of Law, College of Law – University of Bahrain*, 11(2). <https://doi.org/10.12785/LAW/110203>
 6. Cheney, T. (2019). There's no rush: Developing a legal framework for space resource activities. *Journal of Space Law*, 43, 106-150. Retrieved from <https://www.semanticscholar.org/paper/There's-No-Rush%3A-Developing-a-Legal-Framework-for-Cheney/3bba2537e72a1b59d105c02a872f446cfd1bf085>
 7. Dailey, N., Engel, R., Groesbeck, T., Lee, K., Sundby, E., Malekos Smith, Z., & Stilwell, R. (2024). Behavioral economics in space: Steering the future of space governance for security and sustainability. *37th IAA Symposium on Space Policy, Regulations and Economics* (pp. 340-356). <https://doi.org/10.52202/078380-0035>
 8. De Man, P. (2016). Space law, scope and status. In *Exclusive Use in an Inclusive Environment* (pp. 73-136). Cham: Springer. https://doi.org/10.1007/978-3-319-38752-9_2
 9. Extance, A. (2014). UAE fires up space agency with Mars mission. *Physics World*, 27, 11-11. <https://doi.org/10.1088/2058-7058/27/11/19>
 10. Freeland, S. (2010). Fly me to the moon: How will international law cope with commercial space tourism? *Melbourne Journal of International Law*, 11(1), 99-118. Retrieved from <https://search.informit.org/doi/10.3316/informit.283706601991374>
 11. Guzman, A. T., & Meyer, T. (2011). International soft law. *The Journal of Legal Analysis*, 2(1), 171-225. <https://doi.org/10.2139/ssrn.1353444>
 12. Harris, M., & Linares, R. (2024). Developing adaptive space governance based on terrestrial examples. *37th IAA Symposium on Space Policy, Regulations and Economics* (pp. 385-395). <https://doi.org/10.52202/078380-0039>
 13. Hobe, S. (2007). Legal aspects of space tourism. *Nebraska Law Review*, 86(2), Article 6. Retrieved from <https://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1089&context=nlr>
 14. Hofmann, M., & Bergamasco, F. (2020). Space resources activities from the perspective of sustainability: Legal aspects. *Global Sustainability*, 3, Article E4. <https://doi.org/10.1017/sus.2019.27>
 15. Khan, M.A. (2021). An analysis of the space tourism market in the United Arab Emirates and the Kingdom of Saudi Arabia and its potential for development of zero-gravity and suborbital commercial spaceflights. *New Space*, 10(4). <https://doi.org/10.1089/space.2021.0007>
 16. Kobzar, O., & Danylenko, A. (2019). International and national provisions of space law regulating the use of outer space. *Advanced Space Law*, 3, Article 4. <https://doi.org/10.29202/asl/2019/3/4>
 17. Korzh, P.V. (2025). The role of the UN in shaping the international legal regime for outer space. *Analytical and Comparative Jurisprudence*, (1). <https://doi.org/10.24144/2788-6018.2025.01.146>
 18. Kuźniar, D. (2023). The concept of long-term sustainability of outer space activities and the international responsibility of states for space activities. *Studia Iuridica*, 97. <https://doi.org/10.31338/2544-3135.si.2023-97.7>
 19. Lee, R. J. (2012). *Law and regulation of commercial mining of minerals in outer space*. Springer. <https://doi.org/10.1007/978-94-007-2039-8>
 20. Lits, M., Stepanov, S., & Tikhomirova, A. (2017). International space law. *BRICS Law Journal*, 4(2), 135-155.
 21. Masson-Zwaan, T., & Hofmann, M. (2022). *Introduction to space law* (5th ed.). Kluwer Law International. Retrieved from <https://law-store.wolterskluwer.com/s/product/introduction-to-space-law-fifth-edition/01tPg000005wFwflAE>
 22. Mazur, O., Trokhymets, O., & Koreniuk, P. (2025). Sutnist i znachennia natsionalnoi ekonomichnoi bezpeky v umovakh hlobalizatsii [The essence and significance of national economic security in globalization]. *State and Regions. Series: Economics and Business*, (1). (In Ukrainian). <https://doi.org/10.32782/1814-1161/2025-1-4>
 23. Moronese, V. (2019). The commercial exploitation of space: Legal issues. *FUTURI*, 11. Retrieved from https://www.academia.edu/43184793/The_commercial_exploitation_of_space_legal_issues
 24. Nahtigal, M. (2022). Outer space treaty reform and the long-term sustainability of space exploration. *Teorija in Praksa*, 59(1), 42-59. <https://doi.org/10.51936/tip.59.1.42-59>
 25. Pierre-Marie, M. (1992). *Droit des activités spatiales [Space activities law]*. Paris: Masson. (In French). Retrieved from https://openlibrary.org/books/OL1192091M/Droit_des_activite%CC%81s_spatiales
 26. Salmeri, A. (2022). The multi-level system of space mining: Regulatory aspects and enforcement options. *International Institute of Space Law*. <https://doi.org/10.5553/iisl/2022065007005>
 27. Shi, Z., Liu, B., Yue, Y., Arramel, A., & Li, N. (2023). *Unveiling the regulatory factors for phase transitions in zeolitic imidazolate frameworks: A high-throughput calculations and data mining*. Semantic Scholar. Retrieved from <https://www.semanticscholar.org/paper/Unveiling-the-Regulatory-Factors-for-Phase-in-A-and-Shi-Liu/8fa28d686480ed6d374290202fce9c0b04771ecc>
 28. Siva Amruta, G.K. (2025). The role of private entities in outer space activities. *International Journal for Multidisciplinary Research*, 7(2). <https://doi.org/10.36948/ijfmr.2025.v07i02.41334>

29. Su, J. (2017). Legality of unilateral exploitation of space resources under international law. *International & Comparative Law Quarterly*, 66(4), 991-1008. <https://doi.org/10.1017/S0020589317000367>
30. Sur, R. (2024, September 19). *Space resource regulation: From national approaches to the need for a general framework*. Space Generation Advisory Council. Retrieved from <https://spacegeneration.org/space-resource-regulation-from-national-approaches-to-the-need-for-a-general-framework>
31. United Arab Emirates. (2019, December 19). *Federal Law No. (12) of 2019 on the regulation of the space sector*. Retrieved from <https://www.moj.gov.ae/assets/2020/Federal%20Law%20No%2012%20of%202019%20on%20THE%20REGULATION%20OF%20THE%20SPACE%20SECTOR.pdf.aspx>
32. Uwaoma, P.U., Eboigbe, E.O., Eyo-Udo, N.L., Daraojimba, D.O., & Kaggwa, S. (2023). Space commerce and its economic implications for the U.S.: A review: Delving into the commercialization of space, its prospects, challenges, and potential impact on the U.S. economy. *World Journal of Advanced Research and Reviews*, 20(03), 952-965. <https://doi.org/10.30574/wjarr.2023.20.3.2494>
33. White, Jr N. (1998). Real Property Rights in Outer Space. *40th Colloquium on the Law of Space of the American Institute of Aeronautics and Astronautics*. Retrieved from http://www.space-settlement-institute.org/Articles/research_library/WayneWhite98-2.pdf
34. Yolusever, A. (2025). The space economy: A new frontier for economic growth and innovation. *İzmir Sosyal Bilimler Dergisi*, 7(1), 15-31. <https://doi.org/10.47899/ijss.1654411>
35. Yuzbashyan, M. (2024). Topical trends in outer space cooperation/competition and perspectives on space law. *Journal of Law and Administration*. <https://doi.org/10.24833/2073-8420-2024-1-70-103-119>