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Bridging Outer Space Treaties and Transnational Construction Contracts: Practical Tools for Risk Allocation and Dispute Resolution

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International space law and international construction contract law (FIDIC) intersect in building the ISS, Starlink and prospective off-Earth mining sites. The chapter first maps the normative trajectory from the 1967 Outer Space Treaty through the 2015 U.S. Commercial Space Launch Competitiveness Act and Luxembourg's statute, highlighting the legal vacuum on private resource appropriation. A second section foregrounds militarization pressure following New START's suspension and the establishment of U.S. Space Command. A third section analyses the "New Space" surge, exemplified by

Indian public-private synergy. The concluding part assesses FIDIC's standard forms for risk allocation, liability and resource rights in orbital and planetary construction. Findings indicate that extraterrestrial adaptation of FIDIC clauses is essential to balance state and corporate interests while safeguarding the principle of peaceful use.

International space law traditionally governs outer space activities – including the exploration and use of celestial resources – and seeks to prevent the militarization of outer space. In parallel, international construction contract law serves as part of international commercial law, providing the legal framework for major cross-border construction projects. Examples include the building of the International Space Station (ISS) and global satellite networks. With the emergence of new space initiatives (such as Elon Musk's Starlink program) and the ongoing expansion of the ISS, the need for legal coordination between these two fields is increasingly apparent.

The latter half of the twentieth century saw major achievements in space exploration, moving from theoretical research to practical implementation, and creating the international legal framework for space activities. During this period, states actively developed treaties establishing norms of behavior in space, laying the foundations of contemporary space law and institutions. A key instrument was the 1967 Outer Space Treaty, which enshrined the principle that outer space should be used exclusively for peaceful purposes, echoing the 1963 UN Declaration. However, the interpretation of "peaceful purposes" has been legally contested, particularly regarding the placement of weapons in orbit. Disagreements among states and experts led to prolonged debates on militarization as geopolitical tensions rose. The U.S. withdrawal from key arms control agreements in 2001 and 2019 (and Russia's response to these steps) highlighted the insufficiency of bilateral regimes and the need for more comprehensive international regulation of outer space.

Space law is one of the newest and most rapidly evolving branches of legal science, reflecting a continual increase in the number and complexity of challenges faced in space. A pivotal factor in this evolution is the growing importance of space technologies to the global economy and society. Around 2011, notions of a "Fourth Industrial Revolution" gave rise to the philosophy of "New Space". This phenomenon is marked by a significant expansion of

participants in space exploration and new forms of entrepreneurship based on creating space-based products and services, with most funding coming from private sources. Peter W. H. Peters explains that "New Space" is characterized by a surge in private companies and a shift to an ecosystem primarily financed by private investment and venture capital – in stark contrast to earlier phases dominated by state institutions. Given these changes, "New Space" is transforming the legal and economic foundations of space activities, altering regulatory approaches to space technology deployment internationally.

Today's humanity faces global challenges – climate change, population growth, the rise of a multipolar world, and resource depletion – which intensify political contradictions among leading states and compel the search for new energy sources and minerals beyond Earth. In this context, P. N. Lozhkovoy notes that space activity has become a key factor stabilizing the world economy and society under these modern pressures. The increasing importance of space is linked to its use in critical areas such as communications, navigation, weather forecasting, and global security, driving not only technological development but also expanding opportunities for financial, cultural, and scientific cooperation regionally and globally – a trend that demands further refinement of the international legal regulatory system.

Particular focus is placed on different approaches to developing "New Space" in various countries. India was selected for analysis due to its unique position; as Nagendra N. Prasad observes, India's space program is among the world's most dynamic, thanks to decades of investment, and unlike the programs of the U.S., Russia, or China, India pursues a harmonious development of both state and private sectors in space. This approach underscores the need for a more integrated legal framework that covers both governmental space projects and private enterprise activities, which is vital for addressing new challenges and opportunities in international construction contract law and space development.

The study employed a comprehensive doctrinal analysis of key international legal instruments governing outer space, focusing on their interaction with international construction contract law. Special attention was given to the

1967 Outer Space Treaty, which enshrines fundamental principles of peaceful use of space, still central to modern space regulation. We considered this treaty in the context of its application to contemporary challenges, including infrastructure development, resource management, and prevention of militarization. The research also analyzed standard construction contracts used in major international space-related projects such as the ISS and global satellite deployments.

The results show that the "New Space" transformation of the global economy requires a rethinking of space policy strategies at both the global and national levels, generating substantial demand for legal innovation and adaptation to new realities of space exploration. Our analysis identified key regulatory challenges and prospects in governing the interaction between governments and private actors under international construction contracts for space activities. As noted by A. A. Yanik, the pace of space transformation and its economic impact outstrips existing scholarly understanding, emphasizing the need to refine legal mechanisms for sustainable development in the sector.

One major area of innovation is the use and adaptation of standard-form contracts developed by the International Federation of Consulting Engineers (FIDIC). These contracts play a significant role in harmonizing legal approaches to large international construction projects, including space programs. They create a legal foundation that ensures stability, transparency, and balance of interests among all participants – a critical factor as space activities expand with both governmental and private involvement. In our study, we examined examples of such contracts in international projects (including building orbital infrastructure and launching satellite constellations), highlighting the continuing need to enhance regulatory mechanisms and adapt legal norms to the demands of modern space programs.

In a multipolar world where contradictions between major powers over space use are intensifying, international space law must be revisited. The recent extension of the U.S.–Russia New START treaty (Strategic Arms Reduction) until 2026 played a crucial role in global stability, but Russia's suspension of the treaty in 2023 amid rising geopolitical tensions showed the inadequacy of bilateral agreements. On one side, the U.S. legitimately points out that China's

absence from the treaty threatens its national interests – especially after China deployed new generation Beidou satellites – while on the other side, Russia recognizes that the U.S. might no longer honor New START under the growing Chinese challenge. This creates a situation where militarization of space and escalation of tensions become nearly inevitable without agreement among all key players on common norms and rules. Meanwhile, the need to unify international standards for building space infrastructure is overlooked. This concerns not only strategic systems (such as reconnaissance and communications satellites, debris removal systems) but also the creation of universal standards for constructing humanitarian-use assets (including rescue satellites). In this context, FIDIC, as an organization with expertise in developing standards for international construction contracts, could take the initiative to establish unified norms for constructing space infrastructure – considering its strategic and humanitarian importance. For example, agreeing on common construction norms for such objects would enhance their compatibility and efficiency, which is especially important in global crises.

Political initiatives – including the creation of the U.S. Space Command – have demonstrated intent to use space as a strategic military domain. This growth of militarization necessitates revisiting existing legal norms to prevent conflicts and to limit weapons placement in orbit. Existing international treaties (like the 1967 Treaty) proclaim peaceful use of space but contain vague formulations that allow different states to interpret them differently and exploit loopholes for strategic maneuvers. This underscores the need for new legal mechanisms aimed at guaranteeing peaceful space use and preventing threats to global security.

At the same time, contemporary space projects – such as building and maintaining the ISS or deploying satellite networks like Starlink – reveal the need for comprehensive legal regulation amid expanding space activities. These projects require not only technical coordination but also legal mechanisms to harmonize international space law with construction law norms. Among the key issues requiring regulation are liability for damage to space objects, the legal status of orbital infrastructure, and the use of space resources.

Since the UN General Assembly established in 1958 the Committee on the Peaceful Uses of Outer Space (COPUOS), the international community has actively pursued coordination and cooperation in this field. This is reflected in numerous UN resolutions aimed at maintaining peaceful cooperation in space and providing a legal foundation for space programs. These documents, including key legal principles in UNGA Resolution 1962 (XVIII) of 1963, emphasize the international commitment to comply with legal norms in space activities, urging states to consider the interests of all countries when using outer space, regardless of their technical capabilities. Special attention is given to equal access to space and its peaceful exploration. These principles have underpinned further development of international space law, creating mechanisms to prevent conflicts related to the military use of space.

Starting in 2015, several countries (including the U.S. and Luxembourg) adopted national laws regulating private companies' extraction of space resources. These acts provide a legal basis for developing and exploiting planetary and asteroid resources, recognizing private entities' rights to ownership of extracted materials. For example, the U.S. Commercial Space Launch Competitiveness Act of 2015 expanded opportunities for private companies to participate in space programs and established legal guarantees for commercial use of space resources. This created a precedent and sparked international debate on the legality of space resource utilization and the need for clearer international legal norms in this area.

Legislative initiatives in space economy create important precedents capable of influencing international space law. Our research results show that the surge in private company activity demands a review of existing international norms to ensure clearer regulation of their interaction with states. In this context, V. L. Tolstykh emphasizes the necessity of reforming space law in response to new challenges; his analysis shows that the current legal framework needs refinement to adequately reflect the growing influence of the private sector in space exploration. I. A. Khavanova examines the U.S. Commercial Space Act and underscores that such legislative measures effectively overcome the international prohibition on appropriation of space resources, creating conditions for economic-legal expansion. Her studies analyze national approaches that allow private entities to mine and

appropriate resources of celestial bodies, which raises active discussions about the legitimacy of such actions in international legal context.

The rise of commercial space activity involving resource extraction and private initiatives calls for a reconsideration of the international legal regime. Existing norms, while designed to ensure that space remains a demilitarized global commons, are becoming insufficient under modern challenges. The growing number of commercial projects underscores the need to adapt international legal norms, demanding a more detailed approach to regulating the use of space resources. For example, U.S. laws that allow private companies to develop minerals on celestial bodies, despite the Outer Space Treaty's ban on national appropriation, require further legal elaboration to prevent potential conflicts and to ensure fair resource distribution.

The complexity of constructing space infrastructure – such as lunar bases or Mars colonies – implies not only technical but also extensive legal preparation. The necessity of coordination between space law and construction law, particularly with regard to applying FIDIC standard contracts, becomes clear. Adapting these rules to the specific conditions of the space environment is an important step toward international cooperation and preventing militarization of space infrastructure. As Lozhkovoy notes, space resources play a significant role in building sustainable international cooperation and can contribute to global system development.

Simultaneously, states' active involvement in technological innovations for resource extraction creates long-term conditions for international security and cooperation. These aspects again underline the importance of global legal coordination and regulation. Debates on the legitimacy of appropriating space resources began in the late 1950s and were reflected in the 1967 space treaty. Eugene Brooks pointed out as early as 1966 that UN resolutions prohibit national appropriation but do not offer clear mechanisms for regulating the exploitation of specific parts of celestial bodies. Modern legal practice shows the necessity to refine existing approaches to adapt to new challenges, including private companies' access to resources. Brooks' analysis of "primary rights" to celestial territories parallels contemporary initiatives by some states allowing private actors to mine and use those resources, creating

a legal vacuum that requires revision of international norms to prevent monopolization and ensure fair distribution.

Shinkaretskaya in her research emphasizes that contemporary international space law – originally a public-law institution – does not correspond to current realities with private actors' participation. She observes that since the early 1980s, virtually no new universal treaties in this area have been adopted, resulting in regulatory gaps. Consequently, domestic laws and private regulatory mechanisms (through civil contracts between private entities) have begun to play a larger role, forming new norms that international law does not always cover. Shinkaretskaya concludes that this situation fosters the development of de facto unified norms through private-state agreements, but requires coordinated international efforts to address pressing issues such as delimiting airspace and outer space and the concept of the "launching state".

This study focuses on the dynamics of interaction between private and state actors in space activities, emphasizing the legal problems arising from increased commercial involvement. In contrast to Shinkaretskaya's analysis, our findings demonstrate the need to update existing international norms to adapt them to new realities caused by active private participation in space projects. In particular, we underscore the importance of developing legal mechanisms that ensure equitable resource distribution and reduce the likelihood of conflicts. The conclusions emphasize the necessity of updating international norms to prevent militarization of space infrastructure and to create a sustainable legal field that harmonizes international and national legislation aimed at space industry development.

Modern space law faces complex tasks, one of which is regulating the use of resources in outer space. A key document on this issue is the 1979 Moon Agreement. This international treaty imposes strict limitations on commercial exploitation of space resources, emphasizing that celestial bodies should be used exclusively for the common interest of humanity. In particular, the Agreement prohibits any economic activity related to mining and appropriation of resources on celestial bodies, banning their commercial use. This legal regime imposes significant constraints on potential economic initiatives in space, and its principles, as Gaggero and Ripoll note, are aimed

at restricting privatization of space resources and preserving them for the global good.

The main problem with the Moon Agreement is that the largest space powers – Russia, the U.S., and China – have not signed it. This leads to legal uncertainty regarding the future use of space resources, as the lack of consensus among leading states casts doubt on its efficacy and enforcement.

Examples of national legislative initiatives – such as Luxembourg's measures to regulate the commercial use of space resources – demonstrate a desire to bring order to this field. At the same time, rising competition among world powers (USA, Russia, China) increases the significance of the military component of space programs. In 2018, U.S. President Donald Trump signed an order establishing the United States Space Command, which manages U.S. military operations in space, underscoring the strategic importance of space to national interests. In this context, A. V. Iglin emphasizes the necessity of new legal mechanisms to control space militarization and maintain its peaceful status.

Russia is also actively developing its space forces, highlighting the importance of international cooperation in the space sphere. However, as Shinkaretskaya notes, the expansion of military space programs requires coordinated efforts by the international community to prevent the turning of outer space into a combat zone.

In conclusion, the research finds that integrating international space law with international construction contract law is essential to ensure sustainable and peaceful use of outer space amid growing commercialization and private-sector involvement. The analysis shows that existing international norms, such as the 1967 Outer Space Treaty, need adaptation for effectively regulating commercial exploitation of space resources and preventing militarization of space infrastructure. The use of FIDIC standard contracts has proven significant in unifying legal approaches to major international construction projects in the space domain.

The findings underscore the need to update international space law by creating detailed rules for commercial space resource use, which will

eliminate legal gaps and ensure fair resource allocation. Furthermore, it is necessary to integrate FIDIC construction standards into space infrastructure projects, ensuring legal consistency and preventing conflicts between state and private participants in space activities. Such measures will help harmonize international and national legislation aimed at space industry development, strengthen international cooperation, and prevent the militarization of space.

In a multipolar world where several countries play significant roles in space, national interests – including those of Russia – become key in shaping international legal norms. Russia, as one of the leading space powers, seeks to safeguard its strategic security and economic interests in outer space, requiring coordinated international efforts to refine legal norms and regulatory mechanisms. Given geopolitical changes and intensified global competition, developing agreed international rules will form the foundation for stable and secure space exploration by all nations. Achieving long-term stability and security in outer space thus requires concerted international action to improve legal norms and regulatory mechanisms. This will not only effectively address current legal challenges but also build a solid foundation for future space initiatives, promoting peace and prosperity for humanity in space.

Note on the publication of the main research results

Academic specialty: 5.1.5. International legal studies.

International space law. Legal regulation of applied types of space activities and of activities for the exploration, development and use of the resources of outer space and celestial bodies. Prevention of the militarization of outer space.

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