Arbitration of Space-Related Disputes

Case Trends and Analysis

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Abstract

Despite a consistent annual increase in the number of space-related disputes, the distinct role of arbitration in the resolution of these disputes remains understudied. To our knowledge, there exist no consolidated catalogues for publicly-reported space-related disputes that have been resolved through international arbitration. This research begins to fill that gap by cataloguing all publicly-reported space-related disputes that have been resolved through international arbitration to date. Results are categorized and analyzed according to: (i) type and subject matter of dispute submitted to international arbitration, as organized by industry and topic; (ii) kind of disputant currently employing international arbitration, as organized by type and size of actor; (iii) applicable law used in international arbitration; (iv) seat; and (v) arbitral institution administering the dispute. Results shed light on current industry practices and complement existing research on the use of arbitration clauses by companies providing space-related products and services. Scholars, policymakers, and legal practitioners may use the data to assess the strengths and weaknesses of the current dispute-resolution infrastructure and to inform future practices in the resolution of space-related disputes.

Keywords: arbitration, dispute resolution, space-related disputes, satellites

1. Introduction

Technological advancements over the last 40 years have allowed private, non-state actors to enter the space industry, previously the exclusive terrain

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of states. The rise in non-state actors is expected to lead to an increase in complex cross-border space-related disputes. As space law cannot necessarily be enforced by going to court and receiving a judgment against the party violating its rules, questions arise on the most suitable dispute resolution mechanism for resolving space-related disputes. Binding arbitration is already a leading dispute settlement mechanism for cross-border disputes, both for commercial and state actors. Thus, it is frequently hypothesized that international arbitration ought to be an attractive tool for the resolution of cross-border space-related disputes.[1] We attempt to test that hypothesis by measuring the actual use of arbitration to resolve space-related disputes.

This paper uses empirical research to establish a baseline of the use of arbitration in space-related disputes before drawing preliminary conclusions.[2] An inherent challenge of this project is the paucity of publicly available information on space-related disputes. Despite these limitations, we believe that this research provides an important empirical foundation for future longitudinal and comparative research into the use of international arbitration in the resolution of space-related disputes.

2. Resolution of Cross-Border Space-Related Disputes

Following the space race of the mid-twentieth century, five United Nations (UN) treaties on outer space were completed between 1967 and 1984. These treaties address issues such as the non-appropriation of outer space by any one country, arms control, the freedom of exploration, liability for damage caused by space objects, and the safety and rescue of spacecraft and astronauts. However, none of the major space law treaties provide a machinery for *binding* dispute settlement. This lacuna has been reported to be intentional.[3] Space activities of the day, although limited, were imaginably risky and still in the early stages of development. Moreover, until recently, states were generally reluctant to accept the compulsory jurisdiction of any international tribunal.[4] In the absence of direct guidance on binding methods of dispute settlement, existing methods of dispute resolution in public international law are incorporated into space law through general international law and the principles found in the UN Charter.[5] Consequently,

1 A. Kurlekar, *Space – The Final Frontier: Analysing Challenges of Dispute Resolution Relating to Outer Space*, 33(4) J. of Intl. Arb. 380.

2 Similar projects have been undertaken previously in the context of domestic case law in the United States. *See* Stephen Gorove, *Cases on Space Law: Texts, Comments and References* (1996).

3 T. Nelson, *Regulating the Void: In-Orbit Collisions and Space Debris*, 40(1-2) JSpaceL, n. 76.

4 VS Mani, *Development of Effective Mechanism(s) for Settlement of Disputes Arising in Relation to Space Commercialization*, 5 J Int'l & Comp L. 193.

5 Charter of the United Nations (UN), signed 26 June 1945, Arts. 2(3), 33.

states may avail themselves of, *inter alia*, adjudication and arbitration to resolve inter-state space-related disputes.

However, non-state actors lack the recourses offered by international law because they are not considered to be subjects of it. Domestic litigation of cross-border space-related disputes often proves unsatisfactory, due to loss of confidentiality, uncertainty in the recognition and enforcement of judgments across jurisdictions, and its susceptibility to political pressure and claims of sovereign immunity on the part of defendant states. With the growth in the space industry, there have been many renewed efforts to establish more effective binding methods of international dispute resolution for cross-border space-related disputes.[6]

One of the leading contenders in such efforts is international arbitration. This method of dispute resolution is frequently used to resolve disputes which have a cross-border component and disputes between parties who are situated in different jurisdictions. It is a final and binding method which is built on the consent of parties and the principle of party autonomy. Due to these features, international arbitration often escapes the many "one-size-fits-all" disadvantages presented by domestic litigation. For example, disputants control the selection of arbitrators, who are often chosen for their expertise and can operate on a confidential basis. This tailored approach leads to higher confidence in issued decisions (and thus improves the enforceability of the arbitral award). Indeed, the existing infrastructure of international arbitration has been appealing to both state and non-state actors alike.

Clauses mandating resolution by arbitration are frequently written into contracts and treaties before disputes arise, although parties may submit existing disputes to arbitration using submission agreements. With respect to pre-dispute arbitration agreements, various sources may give rise to arbitration. Arbitration may be invoked through arbitration clauses found in commercial contracts. Both state and non-state actors rely on such clauses. For example, the European Space Agency (ESA) has long used arbitration as its preferred method of dispute resolution in its model contracts with contractors.[7]

In addition, many of the thousands of bilateral investment treaties and free-trade agreements in existence permit arbitration for the resolution of investment disputes, which may equally apply to space-related disputes.[8]

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6 *See e.g.,* 2011 Permanent Court of Arbitration Optional Rules for Arbitration of Disputes Relating to Outer Space Activities.

7 European Space Agency, *General Clauses and Conditions for ESA Contracts*, July 2019, https://esamultimedia.esa.int/docs/LEX-L/Contracts/ESA-REG-002_rev3_EN.pdf (last accessed 1 January 2021).

8 *See e.g.*, Agreement between the Government of the Republic of Mauritius and the Government of the Republic of India for the Promotion and Protection of

Finally, arbitration is also found in very specific instruments for highly limited areas of space activities. For example, cooperation and project-based agreements often demonstrate the will to use arbitration to resolve disputes. Likewise, several institutional regimes and operating agreements also cite optional or compulsory arbitration provisions to settle disputes. The most notable of these is the 1998 International Space Station (ISS) Intergovernmental Agreement, which permits ISS partners to submit "issue[s] not resolved through consultations" to an "agreed form of dispute resolution such as conciliation, mediation, or arbitration."[9]

3. Goals and Objectives of Study

This research seeks to establish the current status of the use of international arbitration in the resolution of space-related disputes by cataloguing and analyzing all publicly-reported space-related disputes that to date have been resolved exclusively through international arbitration. This research builds on prior work undertaken under the *McGill University Institute of Air & Space Law Research Project on Space-Related Disputes*, which surveyed the use of arbitration by space companies offering space-related products and/or services, and provides a foundation for future work that will advance our understanding of how arbitration may contribute to the resolution of space-related disputes.[10]

4. Methodology

In order to produce a comprehensive and meaningful list of all publicly-reported space-related arbitrations, this study was executed in four distinct steps. *First*, we developed a corpus of useful search terms. *Second*, the corpus was searched on comprehensive international arbitration databases and

Investments, signed 4 September 1998, Art. 8 (Settlement of Disputes Between An Investor and A Contracting Party).

9 Agreement Among the Government of Canada, Governments of Member States of the European Space Agency, the Government of Japan, the Government of the Russian Federation, and the Government of the United States of America Concerning Cooperation on the Civil International Space Station, signed January 29, 1998, Art. 23(4). Other examples include the Constitution and Convention of the International Telecommunication Union, signed 22 December 1992; the Convention for the Establishment of a European Space Agency, signed 30 May 1975; the Agreement relating to the International Telecommunications Satellite Organization "INTELSAT," signed 20 August 1971; and the Operating Agreement of the Intersputnik International Organization of Space Communications (Intersputnik), signed 30 November 1996.

10 V. Dadwal & E. Tepper, *Arbitration in Space-related Disputes: A Survey of Industry Practices and Future Needs*, International Astronautical Congress, 21-25 October 2019.

industry websites. *Third*, initial search results were screened for relevance by a primary reviewer. *Lastly*, relevant research results analyzed and coded using developed categories of data. Each step is described in additional detail below.

5. Development of Corpus

A base list of words and search terms likely to elicit instances of publicly-known "space-related disputes" was developed after consultation of field literature, academics, and industry actors. This list was then further conceptualized based on potentially applicable legal instruments and space-related topics. The final corpus contained 152 words and terms related to the phrase "space-related disputes."

5.1. Database Search

Each corpus entry was searched on Westlaw and Jus Mundi, which are electronic, subscription-based databases that aggregate and present available primary sources of international arbitral awards and decisions.
Westlaw's International Arbitration Awards library compiles documents from major arbitral organizations, such as:

- China International Economic Trade & Arbitration Commission (CIETAC) (coverage from 1963 -1997);
- International Centre for Dispute Resolution (ICDR) (the international division of the American Arbitration Association) (coverage from November 2000 to present);
- International Centre for Settlement of Investment Disputes (ICSID) (coverage from May 1982 to present);
- International Chamber of Commerce (ICC) (coverage from 1975-2004);
- Iran-United States Claims Tribunal (IUSCT) (coverage from 1981-2005);
- London Court of International Arbitration (LCIA) (coverage from 2004 to present).

Jus Mundi covers over 16,000 international law and investor-state arbitration documents, including those from bilateral investment treaties and free trade agreements, multilateral agreements, and arbitration institutions such as the Arbitration Institute of the Stockholm Chamber of Commerce (SCC), CIETAC, ICC, ICDR, LCIA, and the Singapore International Arbitration Centre (SIAC).
Both databases also compile arbitral documents from domestic judgments, for example judgments concerning the use of interim measures, evidence gathering, and the enforcement and set aside of arbitral awards.

Supplementary searches were conducted to bolster results yielded by the primary search. Since basic details of space-related disputes often come to light through press releases and regulatory filings, a subset of the corpus was searched on the industry-news websites Global Arbitration Review, Investment Arbitration Reporter, and SpaceNews. Academic articles and gray literature were also consulted for this purpose.

5.2. Screening Relevant Results

The legal definition of what constitutes "space" is subject to debate, and therefore it remains difficult to precisely define what constitutes a "space-related dispute." For the purpose of this study, guidance was taken from the 2010 Permanent Court of Arbitration (PCA) Optional Rules for Arbitration of Disputes Relating to Outer Space Activities, which reflect the "particular characteristics of disputes having an *outer space component* involving the use of outer space by States, international organizations and private entities."[11] This working definition broadly includes disputes either occurring in outer-space, having effects in outer-space, or having effects on Earth, especially with regards to Earth-facing applications and the operations of man-made space objects. In so doing, it was necessary to distinguish between space operations and uses and space applications (*e.g.,* the launch of a GPS satellite that will transmit signals to receivers as compared to a global position system (GPS) receiver in a car).

Initial results were screened using the above working definition. A few examples of topics that were excluded from the survey results are disputes relating to airspace, telecommunications, and the provision of multimedia and television services. The scope of this study also excludes disputes resolved through domestic arbitration.

5.3. Coding Relevant Results

All arbitral awards and decisions identified as being relevant were coded according to eight data categories. Arbitrations are often confidential and thus information publicly unavailable; missing data points were noted in the dataset. The following categories were used:

Type and subject matter of space-related dispute, organized by industry and topic: Analyzing the type and subject matter of a dispute may provide information about which types of disputes are most likely to be resolved through arbitration and about the underlying source of the arbitration agreement.

Disputants currently employing international arbitration, as organized by type of actor: Analyzing the disputants currently employing international

11 2010 Permanent Court of Arbitration Optional Rules for Arbitration of Disputes Relating to Outer Space Activities, Introduction (emphasis added).

arbitration may provide information about the types of users who are more likely to prefer arbitration over other dispute resolution methods, for example as a result of their formal or informal dispute resolution policies and preferences. Building on a previously-developed a schematic for categorizing space disputes, disputants were organized according to whether they were states, commercial entities, or intergovernmental organizations.[12] The study originally sought to assess the "size" of disputing parties to test whether larger, better-resourced parties employ arbitration more frequently. However, this data category was subsequently eliminated due to the difficulties in assessing such a variable, and the influence of third-party funding on parties' resources.

Applicable substantive law: Where available, recording the substantive law used in international arbitration may provide insights into parties' preferences as to the ideal law that parties wish to govern substantive claims under dispute (*e.g.*, due to a legal jurisdiction's well-developed jurisprudence, or compatibility with the contractual expectations of parties). Data was not collected on the procedural laws applicable to the dispute.

Arbitral seat: Where available, recording arbitral seats provides insights into parties' preferred seats. It may also provide insights with respect to the mandatory procedural rules that apply to the arbitration, which can impact, *inter alia*, the validity of the arbitration agreement, jurisdiction of the tribunal, and recognition and enforcement efforts.

Arbitral institution administering the dispute: Where available, recording which arbitral institutions are most frequently used to administer space-related disputes may provide insights into user experiences, particularly an institution's ability to satisfactorily facilitate dispute resolution (*e.g.*, type of facilities, quality of service, perceived neutrality), as well as an institution's reputation.

Amount claimed or awarded: Where available, recording the quantum in dispute may provide insights on compensation for the alleged harm suffered at the hand of the respondent.

Size of panel/number of arbitrators elected to tribunal: Where available, recording parties' preferred size of arbitral panel may provide insights on perceived size and complexity of dispute, as well as costs and length of arbitration.

12 F. von der Dunk, *Space for Dispute Settlement Mechanisms: Dispute Resolution Mechanisms for Space?* Proceedings of the Forty-Fourth Colloquium on the Law of Outer Space, 1-5 October 2001, p. 446.

Year dispute concluded: Where available, disputes were also coded by the year the arbitral decision was issued, or alternatively, the year the dispute settled between the parties. This was done to assess trends over time.

6. Results

Out of the total results yielded, only 38 reported disputes were considered relevant enough to be analyzed for key trends. This section describes the main challenges and limitations of the study, as well as the breakdown of research results by category.

The low number of results can be attributed to at least three main challenges and limitations.

First, as expected, the confidential nature of arbitration resulted in missing data points and unreported awards. These limitations reduced the comprehensiveness of the research undertaken and affected the reliability of results. Going forward, and where possible, these limitations may be overcome by monitoring and periodically iterating the research conducted. The low turnout of decisions and information may also be supplemented by surveying individuals involved in the space arbitration community, who may have first-hand knowledge of such space-related disputes.

Second, the adopted search strategy and databases used likely contributed to the low yields in relevant arbitral decisions. As there exists no universally accepted definition of "space-related dispute," the corpus used to elicit relevant hits may not have adequately captured all relevant space-related disputes. The scope of the adopted working definition affected the total number of relevant disputes ultimately analyzed. Moreover, the two comprehensive international arbitration databases employed had certain coverage limitations (*e.g.*, Westlaw's coverage for ICC-administered disputes spanned the period 1975-2004 only). Going forward, these limitations might be overcome by expanding the corpus of words and terms, and expanding the databases searched to include those belonging to arbitral institutions.

Third, the relevance of results generated was determined subjectively, which may have led to improper exclusions. The differentiation between telecommunications law and space law, and between space operations and space applications, was particularly challenging. Going forward, development of an inclusion/exclusion criteria and/or assistance from a second reviewer may be useful in confirming the relevance of results generated.

6.1. Type and Subject Matter of Dispute

Of the 38 total disputes, 32 were commercial disputes (84.2%), and six were investor-state disputes (15.7%). Research results yielded no disputes arising

from cooperation and project-based agreements, nor from institutional regimes and operating agreements.
Further, out of the 38 total disputes, 34 disputes were reported as satellite-related disputes (89.4% of total). Out of the two disputes that were not satellite related disputes (5.2% of total), one related to seizure of assets arising from space-related transactions, and the other related to a space-craft launch service partnership agreement. The subject matter of two disputes was unknown (5.2% of total).
Most satellite-related disputes triggered multiple subject-areas or topics. Out of the 34 satellite-related disputes, a majority of disputes related to launch and delivery of satellites into orbit (10 disputes, or 29.4% of satellite-related disputes); regulatory measures and policies (9 disputes, or 26.4%); and lease of satellite capacity (8 disputes or 23.5% of satellite-related disputes). Insurance disputes and disputes relating to commercial arrangements and partnerships comprised six disputes each (17.6% of satellite-related disputes). Finally, a minority of disputes included disputes stemming from onboard technical failure (5 disputes, or 14.7% of satellite-related disputes); manufacturing, sale, and purchase of satellites (5 disputes, or 14.7% of satellite-related disputes); and lease of spectrum rights and orbital slots (4 disputes, or 11.7% of satellite-related disputes).

6.2. Disputants Employing International Arbitration

Of the 38 total disputes, disputes between two purely commercial parties formed the largest category of disputants (19 disputes, or 50% of total). Disputes between commercial and state (or state-related) parties formed the next largest category of disputes (13 disputes, or 34.2% of total). Within these 13 disputes involving a commercial and state (or state-related) party, 8 disputes were commercial arbitration cases, and 5 disputes were investor-state arbitration cases. Taking into consideration privatization of intergovernmental organizations, disputes between former intergovernmental organizations and commercial entities, and former intergovernmental organizations and states (or state-related) parties comprised 3 (7.8%) and 2 (5.6%) out of the total 38 disputes, respectively. Finally, only 1 dispute concerned an existing intergovernmental organization and commercial entity (2.6% of total). Notably, there were no instances of intra-state disputes, or intra-intergovernmental organization disputes.

6.3. Applicable Law

Although data was unavailable for half the disputes (19 disputes), reported results reveal a wide variety of laws were applied to the space-related disputes studied. English law, Indian law, Spanish law, Swedish law, and United Arab Emirates law were all applied to substantive claims in commercial cases. Other applicable laws included California law, New York law, and Ontario law. International law applied to investor-state claims, particularly as

negotiated under investment treaties and free-trade agreements. Applicable law was unavailable for disputes which were discontinued at an early stage of the proceedings.

6.4. Preferred Seat of Arbitration

Although data was unavailable for a significant number of disputes (12 disputes, or 31.5% of total), known results reveal a wide variety of seats were chosen for the space-related arbitrations studied. Paris (5 disputes, or 13.1% of total), London (5 disputes, or 13.1% of total), and New York (4 disputes, or 10.5% of total) led the pack of known seats. Other known seats included Geneva, Madrid, Moscow, New Delhi, Stockholm, and The Hague. One dispute was discontinued before seat selection.

6.5. Arbitral Institutions Administering the Dispute

Of the 38 total disputes, data on the administering arbitral institution was unavailable or inapplicable for 7 disputes (18.4%). Out of the remaining disputes for which data was available, a fair number of disputes were resolved at the ICC (12 disputes, or 31.5% of total). The ICDR and the LCIA administered 6 disputes (15.7% of total) and 4 disputes (10.5% of total) respectively. Other notable administering institutions included the SCC, HKIAC, ICSID, IUSCT, Moscow-based International Commercial Arbitration Court (ICAC), and the PCA.

6.6. Claimed Amount in Dispute

Of the 38 total disputes, data on claimed amounts (or in the alternative, amounts awarded) was unavailable or inapplicable for 13 commercial and investor-state disputes (34.2%). Out of the 23 commercial space-related disputes for which data was available, the plurality of the amounts claimed (or in the alternative, amounts awarded) were in the USD 10-49 million category (9 disputes, or 23.6% of total). Amounts sought in the next largest category of commercial cases ranged between USD 200-499 million (6 disputes, or 15.7% of total), and four disputes sought amounts in the range of USD 1-9 million (10.5% of total). A total of three commercial disputes were sought in the range of USD 50-199 million (7.8% of total). Amounts greater than USD 10-49 million were claimed in only one dispute (2.6% of total). On the investor-state side, information was available on only two cases: one dispute sought amounts less than USD 1 million (2.6% of total), and the other dispute sought amounts in the range of USD 50-99 million (2.6% of total).

6.7. Number of Arbitrators

Although data was unavailable for a significant number of disputes (12 disputes, or 31.5 %), a majority of space-related arbitrations employed a panel of three arbitrators (21 disputes, or 55.2% of total). There were only

three known cases with sole arbitrators (7.8% of total). This variable did not apply to two disputes (5.2% of total), where the tribunal was not constituted because the dispute was discontinued.

6.8. Year Dispute Concluded

Out of the 38 total disputes, information about the year a space-related dispute was concluded was available for 28 space-related disputes. Ten disputes from the total of 38 were excluded from the analysis since they were either pending, unknown, or discontinued. Out of the disputes for which information was available, the majority were concluded between 2010-2020 (15 disputes, or 39.4% of total), of which commercial disputes comprised an overwhelming amount (14 disputes). The remaining disputes were concluded in 2000-2009 (11 disputes, or 28.9% of total), and one dispute was concluded each in 1990-1999 (3.5% of total), and 1980-1989 (3.5% of total).

7. Discussion

A dispute resolution mechanism broadly comprises three considerations: (1) the type of dispute; (2) the disputing parties and their substantive obligations; and (3) the methods adopted to resolve those disputes.[13] The results from the survey point to at least three emerging themes of interest in the arbitration of space-related disputes.

7.1. An Overwhelming Amount of Arbitration Disputes Concern the Satellite Industry

An overwhelming majority of disputes resolved by international arbitration arise from commercial contracts in the satellite industry. Indeed, out of the 38 total disputes studied, 34 disputes were reported as satellite-related disputes arising from commercial disagreements (89.4% of total). Moreover, issues relating to satellite launch and delivery, regulatory measures and policies affecting satellites, and lease of satellite capacity featured most frequently in international arbitrations. This suggests that commercial satellite-related disputes are likely to continue being resolved through international arbitration.

Although there is wide variance in the amounts claimed in dispute, the majority of disputes involved damages requests over the USD 10 million mark. The absence of other types of disputes is noteworthy in light of this observation. We observed no space-related disputes stemming from arbitration agreements in cooperation and project-based agreements, or institutional regimes and operating agreements. Moreover, only a small

13 G.M. Goh, *Dispute Settlement in International Space Law: A Multi-Door Courthouse for Outer Space* (2007), p. 83.

number of disputes came from investment treaties (15.7% of total). In at least one instance, a commercial dispute between a private entity and state-related actor gave rise to parallel investor-state arbitration claims.[14] Since regulatory measures and policies affecting the satellite industry frequently contribute to space-related disputes, it remains to be seen whether commercial agreements signed by state-related actors will give rise to more investor-state arbitrations in the future. The suitability of international arbitration to resolve disputes arising in other space-related industries has not yet been tested and also remains to be seen.

7.2. Space-Related Arbitration Disputants Are Changing

Our research shows that although commercial entities form the largest category of disputants, states and state-related entities (*e.g.*, state-owned enterprises, agencies, or instrumentalities) are also quite likely to be involved in international arbitration of space-related disputes. Specifically, the second largest category of disputes occurred between commercial entities and state (or state-related) parties (13 disputes, or 34.2% of total), which arose from arbitration agreements found in commercial contracts and investment treaties. However, there were no documented instances of intra-state disputes, or intra-intergovernmental organization disputes, which may be a function of the confidentiality of arbitration, and/or may suggest the use of other dispute resolution mechanisms.

Interestingly, at least one former intergovernmental organization, Eutelsat, seems to be a habitual user of international arbitration to resolve disputes both with other commercial parties and with states.[15] We found only one international arbitration involving an existing intergovernmental organization (Intersputnik) and another commercial entity.[16]

7.3. Existing International Arbitration Infrastructure Appears Adequate

While it can be safely assumed that other dispute resolution methods are being utilized to settle space-related disputes, the increase in the use of international arbitration over time suggests that parties are satisfied with the

14 S*ee Devas Multimedia Private Limited v. Antrix Corporation Limited*, ICC Case No. 18051/CYK, Final Award, 14 September 2015; *CC/Devas (Mauritius) Ltd., Devas Employees Mauritius Private Limited, and Telcom Devas Mauritius Limited v. Republic of India*, PCA Case No. 2013-09, Award on Jurisdiction and Merits, 25 July 2016.

15 E.g., *Eutelsat S.A. v. United Mexican States*, ICSID Case No. ARB(AF)/17/2) (pending).

16 *Intersputnik International Organization of Space Communications v. Alrena Investments Limited*, reported in A. Jan van den Berg (ed.), *Yearbook Commercial Arbitration* (2017) (Cyprus No. 4, *Intersputnik International Organization of Space Communications v. Alrena Investments Limited*, Supreme Court of Cyprus, Appeal no. 298/2013, 4 April 2017).

existing international arbitration regime to resolve space-related disputes. The diversity of applicable laws, seats, and arbitral institutions revealed by our study results suggest that disputants are taking advantages of one of international arbitration's key strengths – the flexibility it allows parties to customize their dispute resolution process. While there is always room for improvement, there is no indication that a centralized institution nor a more specialized legal regime is warranted at this time. As such, Böckstiegel's 1992 pronouncement would appear to hold true nearly 30 years later:

> An attempt to create anything specific for this field for the space industry would therefore neither seem feasible nor necessary. Indeed, it might be a step backwards, because a multilateral system of enforcement of arbitration awards is available for international commercial arbitration and has been accepted worldwide by industrialized and developing countries …[17]

That said, while a specialized legal regime appears unnecessary, there exists an opportunity for players in the arbitration market, whether they be arbitral institutions or legal jurisdictions, to develop a reputation for comparative expertise in space-related dispute resolution within the existing international arbitration regime. Luxembourg represents one such notable example.[18]

8. Conclusion

In conclusion, our study confirms that international arbitration is indeed used by both state and non-state actors in the resolution of publicly-known space-related disputes. This method of dispute resolution is primarily employed in the resolution of commercial disputes, followed by investor-state disputes. To date, there are no publicly known instances of international arbitration used to resolve public international law inter-state space related disputes, or disputes arising from cooperation and project-based agreements.

In addition to the empirical data generated from this study, three themes have also emerged. First, even as the space industry grows and evolves, satellite-related disputes continue to dominate space-related disputes resolved by international arbitration. Second, the changing face of the space industry is reflected in the parties to space-related international arbitration. Third, despite these changes, the existing international arbitration regime appears to meet users' needs and further specialization does not seem to be warranted at this time. These trends and analyses may be used by scholars, policymakers, and legal practitioners, to assist in the resolution of any future space-related disputes, and assess the successes and failures of the current dispute-resolution infrastructure for resolving space-related disputes.

17 K.H. Böckstiegel, *Developing a System of Dispute Settlement Regarding Space Activities*, 35 Proc. IISL 34.

18 Luxembourg Trade & Invest, Business Sector Space, https://www.tradeandinvest.lu/business-sector/space/, (last accessed 1 January 2021).

Finally, future comparative research will be required to enrich the applicability of this study. For example, most space-related disputes documented concern satellites. We hypothesize this is due to the relative importance of the satellite industry, rather than any inappropriateness of international arbitration as a mechanism for resolving other types of space-related disputes. However, additional research will be needed to confirm this hypothesis. Likewise, further research into the resolution of all satellite-related disputes may reveal the comparative importance of the international arbitration mechanism, and whether there continues "to be a ... demand to develop techniques for the settlement of disputes,"[19] or whether there exist particular features of such disputes which make them better suited for one dispute mechanism over another.

19 K.H. Böckstiegel, *Proposed Draft Convention on the Settlement of Space Law*, 12 JSpaceL 136.