The Legal Aspects of International Space Financing

Project Finance Perspective for the Current Space Industry

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Nayoung Youn

aus Daegu, Republik Korea

Referent: Prof. Dr. Dr. h.c. Dr. h.c. Stephan Hobe

Korreferent: Prof. Dr. Ulrich Ehricke

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List of Abbreviations

ADB	Asian Development Bank
ADBI	Asian Development Bank Institute
AECID	Spanish Agency for International Development Cooperation
AfDB	African Development Bank
AIG	Airport International Group
ASA	African Space Agency
ASEAN	Association of Southeast Asian Nations
AU	African Union
BDOT	Build-Develop-Operate-Transfer
BLT	Build-Lease-Transfer
BOO	Build-Own-Operate
BOOT	Build-Own-Operate-Transfer
BOT	Build-Own-Transfer
BT	Build-and-Transfer
BTL	Build-Transfer-Lease
BTO	Build-Transfer-Operate
CESAIR	Commission of Experts of the Supervisory Authority of the International Registry
CFR	Code of Federal Regulations

DLR	The German Aerospace Center
DOD	United States Department of Defense
EBIT	Earnings Before Interest, and Taxes
EBITDA	Earnings Before Interests, Taxes, Depreciation, and Amortization
ECA	Export Credit Agency
ELDO	European Launcher Development Organization
ESA	European Space Agency
ESC	Economic and Security Committee
ESRO	European Space Research Organization
EU	European Union
FAA	Federal Aviation Administration
GATS	General Agreement on Trade in Services
GBT	Group on Basic Telecommunications Services
GIZ	German Corporation for International Cooperation
IATA	International Air Transport Association
IBRD	International Bank for Reconstruction and Development
ICAO	International Civil Aviation Organization
ICT	Information and Communication Technology
IDA	International Development Association
IFC	International Finance Corporation
ILC	International Law Commission

IRAB	International Registry Advisory Board
IRR	Internal Rate of Return
ISAS	Institute of Space and Astronautical Science
ISS	International Space Station
ITAR	International Traffic in Arms Regulations
ITU	International Telecommunication Union
JAXA	Japan Aerospace Exploration Agency
LEO	Low-Earth Orbit
MoU	Memorandum of Understanding
MSCs	Medium-term Service Contracts
NAL	National Aerospace Laboratory of Japan
NAS	National Airspace System
NASA	National Aeronautics and Space Administration
NASDA	National Space Development Agency of Japan
NGO	Non-Governmental Organization
OECD	Organization for Economic Co-operation and Development
PFD	Project Financing and Development Section
PFIP	Privately Financed Infrastructure Projects
PPI	Private Participation in Infrastructure
PPIAF	Public-Private Infrastructure Advisory Facility
PPP	Public-Private Partnership
QAIA	Queen Alia International Airport

RFP	Request for Proposal
ROO	Rehabilitate-Own-Operate
ROT	Rehabilitate-Operate-Transfer
S&P	Standard & Poor's
SARPs	Convention and Standards and Recommended Practices
SHSs	Solar Home Systems
SOT	Supply-Operate-Transfer
SPV	Special Purpose Vehicle
USD	United States Dollar
U.S.	United States
UN	United Nations
UNCITRAL	United Nations Commission on International Trade Law
UN Doc	United Nations Documents
UNGA	United Nations General Assembly
UNCLOS	United Nations Convention on the Law of the Sea
UNCOPUOS	United Nations Committee on the Peaceful Uses of Outer Space
UNCTAD	United Nations Conference on Trade and Development
UNIDROIT	International Institute for the Unification of Private Law
UNOOSA	United Nations Office for Outer Space Affairs

USSR	Union of Soviet Socialist Republics
VCLT	Vienna Convention on the Law of Treaties
VMEEA	Vice-Ministry of Electricity and Alternative Energy
WTO	World Trade Organization

Introduction

In nearly a half-century after humans left footprints on the Moon, space exploration has mostly focused on manned low-Earth orbit (LEO) missions and unmanned scientific research. Currently, due to expansions in private finance and technological advancement, and growing interest of the public sector in the use of outer space as a critical national industry, the use of space assets has become prerequisite to many countries.

We have come a long way since the foundation of the space industry in the early days, when only two space-faring nations, the United States of America (United States) and the Soviet Union at that time were capable of researching and developing outer space activities and technologies. In the most recent years, efforts for space exploration have increased, driven by private companies and foreign States such as Europe, Japan, China, and India.[1] Within these rapid developments, funding for the space industry has become increasingly important and necessary; therefore the Protocol to the Convention on International Interests in Mobile Equipment on Matters Specific to Space Assets (Space Protocol) [2] was adopted, which was derived from the Convention on International Interests in Mobile Equipment (Cape Town Convention)[3]. Countries who expressed interest in - and ratified - the Space Protocol recognize the importance of promoting commercial

[1] See, The Conversation, *Private Companies are Launching New Space Race – Here's What to Expect*, available at: https://theconversation.com/private-companies-are-launching-a-new-space-race-heres-what-to-expect-80697 (last accessed 11 July 2021).

[2] Protocol to the Convention on International Interests in Mobile Equipment on Matters Specific to Space Assets, adopted on 9 March 2012 (hereinafter, 'Space Protocol').

[3] Convention on International Interests in Mobile Equipment, 2307 UNTS 285, adopted on 16 November 2001, entered into force on 1 March 2006 (hereinafter, 'Cape Town Convention').

use of outer space for telecommunications, national disaster management, and Earth observation.[4] While some of these countries do not yet have any assets or the necessary infrastructure for satellite uses, they are eager to acquire technology and build space infrastructure jointly with private parties who are prepared to sell, produce, and construct such assets.

Notwithstanding the fact that the Space Protocol has not yet entered into force, the Cape Town Convention established a new international legal regime for financing assets, taking a significant step forward in the unification of international law as an instrument for asset-based finance.[5] However, the creation of this legal framework raises potential intersections or conflicts between the Space Protocol – including the Cape Town Convention – and the existing international space treaties.

It is noteworthy that the Protocol to the Convention on International Interests in Mobile Equipment on Matters Specific to Aircraft Equipment (Aircraft Protocol)[6] was widely successful while the Space Protocol failed to be generally accepted. One of the reasons is that the current space manufacturing industry is quite distinct from the international aircraft manufacturing industry. Indeed, the aircraft finance sector is highly developed and is equipped with a sophisticated leasing market and a well-established system for the transfer of property of aircraft, engines and parts which include complex asset-based financing structures. On the other hand, the space manufacturing industry is still a developing sector currently expanding its market through asset-based finance. It appears that rather than structuring the industry from asset-based financing schemes, using project finance

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[4] See, UNIDROIT, *Status – UNIDROIT Protocol to the Convention on International Interests in Mobile Equipment on Matters Specific to Space Assets (Berlin, 2012)*, available at: https://www.unidroit.org/status-2012-space (last accessed 11 July 2021).

[5] Sundahl, Mark J., *The Cape Town Convention: Its Application to Space Assets and Relation to the Law of Outer Space*, Brill/Nijhoff, Leiden/Boston (2013), p. 1.

[6] Protocol to the Convention on International Interests in Mobile Equipment on Matters Specific to Aircraft Equipment, adopted on 16 November 2001, entered into force on 1 March 2006 (hereinafter, 'Aircraft Protocol').

structures would be more efficient for laying the foundations for the current space manufacturing industry.

Consider the cases of some African States such as South Africa and Nigeria, who are interested in using outer space for national security purposes for satellite raw data analysis or for natural disaster management, but do not have the essential infrastructure or technology to do so.[7] Countries confronted with these kinds of obstacles would significantly benefit from a project finance regime aimed at developing their national space technology sector. Similarly, small companies and start-ups would be able to use this funding framework to develop new technologies such as in-orbit servicing vehicles with refuelling purposes, refurbishing or re-boosting satellites, or constructing new infrastructure for human settlement on the Moon or Mars.

To determine the feasibility of project finance in the space sector and to raise awareness about the need for its international regulation, this thesis analyses project finance cases, particularly on shipping, infrastructure, and transport. The shipping manufacturing industry appears to be more comparable to the space manufacturing industry than the aircraft manufacturing industry in regard to the assembling times of ships and rockets, the transportation of packages and satellites and the numbers of property transfer and/or of leasing. Moreover, project finance has been a critical instrument for the shipping manufacturing industry and infrastructure projects involving constructions of roads, pipelines, and energy plants throughout the world.

Due to the fact that the majority of cases using project finance have a public sector component and all space activities must be conducted under the continuous supervision of the appropriate States pursuant to the Outer Space Treaty, a project finance regime appears to be more

[7] Oduntan, Gbenga, *Geospatial Sciences and Space Law: Legal Aspects of Earth Observation, Remote Sensing and Geoscientific Ground Investigations in Africa*, Geosciences, Vol. 9, No. 4 (2019) p. 149.

suitable to the space industry.[8] In this context, this thesis examines precedents from other fields with comparable legal challenges faced by the modern space sector. The objective is to reach legally sound solutions for the issues that technology development brings under the overarching principles established in Article III of the Outer Space Treaty.

It is extremely important to verify the hypothesis that the space industry is completely globalized before starting this thesis. The hypothesis once proven makes cross-border project finance transactions similar to those found in the shipping industry and to be able to draw parallels from the shipping industry allows to be much feasible and likely even more efficient in fostering the development of the industry on the basis of international cooperation from the public and the private sectors.

One of the most notable benefits of these kinds of transactions is that they will be generally free from political considerations. This thesis demonstrates that project finance provides a better-equipped tool for the space manufacturing industry than the current asset-based finance structure. In order to do so, this analysis is performed on the basis of the underlying principles of the Outer Space Treaty and the entire *corpus iuris spatialis*, and the Guidelines of numerous international organizations including the World Bank as well as the core principles of project finance.[9]

This thesis aims to demonstrate that a solid legal regime similar to that incorporated by the Cape Town Convention and the Space Protocol, but based on project finance, will be enormously advantageous to the development of the space industry and to the fostering of space assets

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[8] Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, 610 UNTS 205, adopted on 27 January 1967, entered into force on 10 October 1967 (the 'Outer Space Treaty').

[9] For example, the United Nations Commission on International Trade Law (UNCITRAL) adopted the UNCITRAL Legislative Guide to Privately Financed Infrastructure Projects (PFIP Guide) in 2001; the UNCITRAL Model Legislative Provisions on Privately Financed Infrastructure Projects (Model Provisions) in 2003.

acquisition. It is worth noting that the current international legal space regime, although based on asset finance, is the first private law regime that aims at providing a uniform legal framework. Hence, it should be analysed first in developing a space project finance regime. In this sense, this thesis proposes a framework for project finance based on the underlying core principles of the Cape Town Convention.

To formulate a more stable and efficient project finance framework for the space industry that promotes international cooperation and encourages developing countries to establish their own infrastructures, this thesis is divided into three Chapters.

First Chapter covers the history and evolution of the current framework for funding and financing space activities. It starts with the era of the space-faring nations and ends with the current era of privatization of the space industry. In addition, it provides a brief overview of the generalities of asset-based finance and project finance. To discuss the international legal regime of space financing in the second Chapter, the Chapter also provides the context for general financing understanding as well as the history of the space industry.

Second Chapter examines the main public international space law treaties, the Cape Town Convention, and the Space Protocol. This Chapter also compares these instruments to the Aircraft Protocol utilized by the international aircraft manufacture and airline industries. This analysis tries to explain why the Space Protocol has not yet entered into force.

Third Chapter analyses project finance through the lens of the *corpus iuris spatialis* to determine the legal feasibility of the project finance regime proposed in the prior Chapter. This Chapter also discusses alternative structures for such a framework, which appears to better address the needs of the current space industry. Moreover, it examines some examples of project finance used by other industries in order to apply the underlying rules to the space industry.

Lastly, based on the analysis above, this thesis draws concluding remarks and offers recommendations on how to elaborate a regulatory framework for the current space industry that is eager to utilize international project finance.

Chapter One: The Current Financing Framework of Space Activities

The space industry has rapidly transitioned into a government-driven to a market driven model. With a burst of commercial space companies entering the domain, the global space economy has grown exponentially. These changes have in turn affected not only space-faring States but also new participants and aspirants. The United States has acted as a major enabler of this fundamental change as it adopts a whole of government approach to fostering this growth. For example, instead of the National Aeronautics and Space Administration's (NASA) owning and operating space shuttles to maintain the International Space Station, it now contracts with commercial service providers to deliver cargo via their privately owned spacecraft instead.[10] The United States Department of Defense (DOD) purchases communications bandwidth from commercial satellite companies in order to support the industry and to create redundancy, despite the possession of its own satellite communications capabilities.[11] TerraSAR-X/TadDem-X mission serves as another example of the private sector driving space industry further in Europe. The German Aerospace Center (DLR) Space Administration signed an agreement to share risks and cost with Airbus Defence and Space GmbH and its subsidiary Infoterra GmbH/ Airbus DS Geo GmbH.[12]

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[10] See, Morgan, Daniel, *Commercial Space: Federal Regulation, Oversight, and Utilization*, Congressional Research Service 2018, available at: https://crsreports.congress.gov/product/pdf/R/R45416 (last accessed 06 July 2021).

[11] *Ibid*.

[12] The European Space Agency, *TerraSAR-X and TanDEM-X*, available at: https://earth.esa.int/eogateway/missions/terrasar-x-and-tandem-x (last accessed 09 November 2021).

To discuss the current international space legal regime, it is necessary to have a firm grasp on the history and evolution of the space industry, as well as the general financing framework, in order to determine any improvements to the financing regime to be elucidated. Therefore, this Chapter will first illustrate the history of space activities from its very beginning to the current state. Secondly, it will then give a general overview of the two existing models of finance - asset-based finance and project finance and their advantages and disadvantages. Thirdly, the Chapter will then compare between the two frameworks to identify parallels.

I. From the Era of Space-faring Nations to the Privatization of the Space Industry

1960 – Birth of the space industry

The earliest phase of space activity was dominated by two space-faring nations: the Union of Soviet Socialist Republics (USSR) and the United States. The first artificial satellite 'Sputnik 1' was launched in 1957 by USSR and this was quickly followed up with the first manned space flight by the USSR Cosmonaut Yuri Gagarin.[13] Not much later, the United States eclipsed these feats by placing mankind's first steps on the Moon. Other than these two superpowers, however, Europe and Japan also established their own space agencies in the 1960s [the European Launcher Development Organization (ELDO)[14], the

[13] Hobe, Stephan, *The Impact of New Developments on International Space Law (New Actors, Commercialisation, Privatisation, Increase in the Number of "Space-faring Nations")*, Uniform Law Review, Vol. 15, Issue 3-4 (2010) p. 869.

[14] Convention for the Establishment of a European Organization for the Development and Construction of Space Vehicle Launchers, 507 U.N.T.S. 177, adopted on 29 March 1962, entered into force on 29 February 1964.

European Space Research Organization (ESRO)[15],[16] and the Institute of Space and Astronautical Science (ISAS), the National Aerospace Laboratory of Japan (NAL), and the National Space Development Agency of Japan (NASDA)[17]] to rush into space activities because they understood the potential benefits of space activities such as the utilization of satellites to protect their own national security.[18] During this era, governments continued to strictly control outer space activities politically and strategically to develop as well as protect their strong military power. For a long period of time, these two space-faring nations and their allies led space activities because space activities were deemed too difficult, expensive, and risky for others to undertake.[19]

1980 – Privatization and greater inclusion

Notwithstanding these difficulties, the 1980s witnessed the birth of a new era. Space activities garnered increased interest and participation from private companies and governments in developing and emerging countries. New technologies such as the use of satellites for telecommunications, national disaster management, and earth observation enabling the monitoring of agricultural activities and environmental changes allowed the space industry commercially viable and integral to everyday life.[20] In 1980, a privately owned enterprise with legal and financial support from the ESA and its Member States,

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[15] Convention for the Establishment of a European Space Research Organization, 158 U.N.T.S. 35, adopted on 14 June 1962, entered into force on 20 March 1964.

[16] The European Space Agency (ESA) was established as a successor to those two organizations in 1975. See, Convention for the Establishment of a European Space Agency, 14 I.L.M. 864, adopted on 30 May 1975, entered into force on 30 October 1980.

[17] The Japan Aerospace Exploration Agency (JAXA) was found through the merger of those three institutions in 2003. See, JAXA, *Introduction of JAXA*, available at: https://global.jaxa.jp/about/jaxa/index.html (last accessed 11 July 2021).

[18] von der Dunk, Frans, *European Satellite Earth Observation: Law, Regulations, Policies, Projects, and Programmes*, Creighton Law Review, No. 42 (2009) p. 398.

[19] von der Dunk, Frans, *Billion-dollar questions? Legal aspects of commercial space activities*, Uniform Law Review, Vol. 23 (2018) p. 419.

[20] *Ibid*.

Arianespace emerged as the first commercial launch service provider.[21] Additionally, other private companies began to compete with the major international satellite communication organizations, INTELSAT and INMARSAT.[22] These private space companies first sprouted in the United States but they could soon be found all over the world.[23] Their existence resulted in a commercialization of the sector and its eventual privatization.

The Present Era

The latest era of the space industry is marked by private space companies pushing its development as well as the entry of even more nation States who were previously content to observe from the sidelines. Several well-funded private companies are currently developing manned missions on sub-orbital trajectories, space tourism, or long-term missions to harvest mineral resources on asteroids, also known as space mining, by utilizing their own launch and manufacturing technologies. In the United States, for instance, Space Exploration Technologies Corp., SpaceX launched seven Dragon missions, including three Crew Dragon missions, with its own spaceship for routine flights to dock directly with the International Space Station and reuse some of the spacecraft components.[24] Rocket Lab, a private American aerospace manufacturer and a provider of small satellite launch services, planned to launch a small satellite to the Moon in 2021 as a precursor to human missions and to collect data on the thin lunar

[21] *Ibid*.; *see also* van Fenema, Peter, *Legal Aspects of Launch Services and Space Transportation*, in: von der Dunk/ Tronchetti (eds.), Handbook of Space Law, Edward Elgar Publishing, Cheltenham (2015) p. 382.

[22] von der Dunk, *supra* note 19, p. 419.

[23] *Ibid*.

[24] See, Business Insider, *SpaceX made 4 vital changes to its Crew Dragon Spaceship, and a Promise for the Landing, after Analyzing its First Astronaut Mission*, available at: https://www.businessinsider.com/spacex-upgraded-crew-dragon-spaceship-for-next-nasa-astronaut-mission-2020-9?r=DE&IR=T (last accessed 11 July 2021); Spacenews, *SpaceX has busy manifest of Dragon missions*, available at: https://spacenews.com/spacex-has-busy-manifest-of-dragon-missions/ (last accessed 11 July 2021).

atmosphere.[25] Governments of the United States, India, the United Kingdom, Sweden, the People's Republic of China facilitate private sector participation in space applications, manufacturing, operations, and auxiliary services that were previously nearly impossible to participate in.[26] At the same time, Asian countries such as Singapore, Taiwan, Malaysia, and Thailand, as well as African countries such as Egypt, South Africa, Nigeria, Algeria, Ghana, Morocco, Kenya, Rwanda, Angola, Sudan and Ethiopia are more participating in space activities.[27]

All these recent players raise more and more investment and the space industry is growing at the highest rate. The global space economy is estimated to reach 423.8 billion USD in 2019, with an increase of 2.2 percent from 2018.[28] According to the Satellite Industry Association, a trade association based in the United States, the global space industry generated 271 billion USD in revenue in 2019 through ground equipment, satellite services, satellite manufacturing and launch

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[25] The Washington Post, *Virginia Has a Rocket Launch Site, and it's About to Grow with the Most Successful Startup since SpaceX*, available at: https://www.washingtonpost.com/technology/2020/10/02/virginia-has-rocket-launch-site-its-about-grow-with-most-successful-startup-since-spacex/ (last accessed 11 July 2021).

[26] von der Dunk, Frans, *Sovereignty Versus Space - Public Law and Private Launch in the Asian Context*, Singapore Journal of International & Comparative Law, Vol. 5 (2001) p. 24; *see also* Research and Markets, India Space Industry Report 2020: *An Evolving Ecosystem – New Commercial Participants Such as Agnikul Cosmos, Skyroot Aerospace, and Vesta Space Technology Enter the Landscape*, available at: https://www.globenewswire.com/news-release/2020/09/30/2101199/0/en/India-Space-Industry-Report-2020-An-Evolving-Ecosystem-New-Commercial-Participants-Such-as-Agnikul-Cosmos-Skyroot-Aerospace-and-Vesta-Space-Technology-Enter-the-Landscape.html (last accessed 11 July 2021); Spacewatch.global, *Scottish Space Industry Eager to Double Growth by 2030, Study Says*, available at: https://spacewatch.global/2020/10/space-scotland-spire/ (last accessed 11 July 2021).

[27] von der Dunk, *supra* note 26, p. 23; APA News, *Africa Joins Space Race*, available at: http://apanews.net/en/news/africa-joins-space-race (last accessed 11 July 2021).

[28] Space Foundation, *Global Space Economy Grows in 2019 to $423.8 Billion, The Space Report 2020 Q2 Analysis Shows*, available at: https://www.spacefoundation.org/2020/07/30/global-space-economy-grows-in-2019-to-423-8-billion-the-space-report-2020-q2-analysis-shows/ (last accessed 11 July 2021).

industry.[29] Not only did the sector of space products and its services grow, but also the sector of space infrastructure and supporting industries as well. Overall space commercial revenue grew 336.89 billion USD in 2019.[30]

Overview of existing space industry

The current space industry can be classified into three distinct sectors, satellites, launch services, and ground equipment.[31] While governments and businesses worldwide increasingly rely on satellite business, few companies play a part in satellite manufacturing and services with the skilled workforce, scale, engineering capability, and financial resources necessary to produce reliable complex systems.[32] Although satellite services have a small number of players, they are not limited to telecommunications. In 2017, Earth observation startups raised 96 billion USD.[33] The industry is also rapidly evolving from collecting imagery from around the world to transforming data into actionable intelligence.[34] Consumers, logistics companies such as FedEx, and ride-sharing service providers such as Uber all benefit from geolocation services provided by transportation-related satellites.[35] Nevertheless, in order to utilize satellites, the space industry requires the ability to launch these equipment into space. The final significant component of the space industry is ground equipment, which refers to

[29] SIA, *State of the Satellite Industry Report*, available at: https://sia.org/news-resources/state-of-the-satellite-industry-report/ (last accessed 11 July 2021).

[30] Space Foundation, *supra* note 28.

[31] Bockel, Jean-Marie, *The Future of the Space Industry*, General Report, Economic and Security Committee (ESC) of the NATO Parliamentary Assembly, 173 ESC 18 E fin (2018), p. 5.

[32] *Ibid*.

[33] *Ibid*., p. 6.

[34] *Ibid*.

[35] *Ibid*.

the Earth-based infrastructure that routes data transmitted by satellites to the appropriate transmitters and receivers.[36]

Elon Musk's SpaceX and Orbital Sciences Corporation awarded 3.5 billion USD in 2008 to shuttle US payloads to the International Space Station (ISS), and Boeing and SpaceX awarded 6.8 billion USD in 2014 to taxi American astronauts to the ISS.[37] On 19 September 2020, the Australian government launched the first 35kg small commercial rocket to the edge of space.[38] The technology for manufacturing and launching small rockets is the key differentiator because small rockets can carry smaller satellites much faster at a reduced cost.[39] Using the small rockets and small satellites, the number of commercial spacecrafts launched increased by 48 percent, reaching 251 in 2019, up from 170 in 2018.[40]

Likewise, space activities evolve at a breakneck pace to support public policies, provide consumer services such as satellite launch, manufacturing, repair, and recovery via active debris removal, and spur innovation and economic growth.[41] In other words, private entities are establishing themselves as key players in the space industry, instead of contractors to nation States. The most significant change in space activities, however, is the participants, namely, developed countries as well as developing and emerging countries, who are eager to participate

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[36] *Ibid*., p. 7.

[37] Pomeroy, Caleb/ Calzada-Diaz, Abigail/ Bielicki, Damian, *Fund Me to the Moon: Crowdfunding and the New Space Economy*, Space Policy, Vol. 47 (2019) p. 44.

[38] The Guardian, *Space Oddity: Australia Launches 35kg Commercial Rocket into Atmosphere*, available at: https://www.theguardian.com/australia-news/2020/sep/19/space-oddity-australia-launches-35kg-commercial-rocket-into-atmosphere (last accessed 11 July 2021).

[39] *Ibid*.

[40] *Ibid*.

[41] Sánchez Aranzamendi, Matxalen, *Space and Lisbon. A New Type of Competence to Shape the Regulatory Framework for Commercial Space Activities*, in Proceedings of the 53rd Colloquium of the International Institute of Space Law (2011) p. 146.

in the space industry.[42] They participate in space activities to support cartographic and cadastral activities, land use planning, agricultural monitoring, disaster prevention and management, monitoring of environmental changes and desertification, and border and coastal surveillance.[43] For instance, if they can refine data and topographical surveys using satellites, they can more precisely delimit agricultural land, advance the search for new water sources, and bolster the fight against desertification.[44] Satellite images have also aided in better understanding of urban perimeters, the shrinkage of agricultural lands, uncontrolled urbanization, and the structure of marine resources.[45]

Inefficiencies in the existing era

This launch of space technologies in developing and emerging countries by developed countries raises a number of concerns, including inefficient investment by developing country governments and a lack of space-specific legal regimes. In other words, when venture capital funds a space technology start-up or when governments guarantee demand for launch, satellite telecommunications, or other space-related services, emerging countries and start-ups create an improvised short-term loan due to the absence of international business regulations in the space industry.[46] Industries that rely heavily on this type of short-term capital support may oversupply capacity beyond its economic utility or demand, as is currently the case in the satellite industry.[47] While

[42] For example, the African Union (AU) endorsed the creation of an African Space Agency (ASA) in 2019 and Rwandan Government approves draft law establishing Rwanda Space Agency in 2020, See, APA News, *supra* note 27; Space in Africa, *Rwandan Government Cabinet Approves Draft Law Establishing Rwandan Space Agency*, available at: https://africanews.space/rwandan-government-cabinet-approves-draft-law-establishing-rwanda-space-agency/ (last accessed 11 July 2021).

[43] APA News, *supra* note 27.

[44] *Ibid*.

[45] *Ibid*.

[46] Cahan, Bruce/ Marboe, Irmgard/ Roedel, Henning, *Outer Frontiers of Banking: Financing Space Explorers and Safeguarding Terrestrial Finance*, New Space, Vol. 4 (2016) p. 2.

[47] *Ibid*.

privatization and globalization in conjunction with technology transfer can assist to develop the space industry, without space-specific legal regimes such as international business regulations, export control regulations and technology transfers, data protection regulations, and other policies applicable to space activities, space projects are prone to failure.

Due to the fact that, on the one hand, space technologies and goods are frequently subject to security considerations related to national security; and, on the other hand, serve purely commercial purposes, they require special regulations for dual-use purposes.[48] In order to utilize international financing safely and effectively, it is necessary to conduct extensive research into the current international finance and legal regime governing commercial space activities.

II. Generalities of Asset-based Finance

Before discussing the 'asset-based finance' and 'project-based finance' legal regimes, it is necessary to clearly define the term 'asset-based finance.' It is worth noting that the Cape Town Convention contains no specific definition of 'asset-based finance, despite the fact that it states its purpose of the convention is to facilitate asset-based financing and leasing by establishing clear rules to govern them.[49]

Nevertheless, from an economic perspective, 'asset-based finance' is based on the value of the assets, which includes accounts receivable, inventory, equipment, and occasionally real estate.[50] This type of

[48] Sánchez Aranzamendi, *supra* note 41, p. 152.

[49] Preamble of the Cape Town Convention.

[50] Hoffman, Scott L., *The Law and Business of International Project Finance*, Transnational Publishers, Ardsley, NY, (2nd ed. 2001) p. 11; *see also* SIEMENS, *Asset Based Lending from Siemens*, available at:

financing is often referred as 'asset-based lending,' 'asset-backed financing' and 'commercial finance.' As a loan secured by business assets, it is adaptable to most circumstances with manufacturers, distributors, service providers, or even retailers.[51] In other words, the process by which a company is evaluated for asset-based financing is distinct from the more familiar cash-flow financing process; which is typically measured using standard financial ratios such as funded debt divided by earnings before interests, taxes, depreciation, and amortization (EBITDA), EBITDA margin (EBITDA as a percentage of revenue), and operating cash flow.[52] Instead, with asset-based finance, the lender will prioritize the value of the company's assets, which will be used as collateral to secure the loan.[53]

This financing method is frequently used because of its advantages over conventional bank financing for specific purposes, such as supporting working capital or restructuring. For instance, asset-based financing promotes more efficient working capital management against assets or subjects with fewer and less restrictive financial and negative covenants than traditional bank financing.[54] This financing uses the company's current and non-current assets as the cornerstone for its debt structure, emphasizing liquidity and relying on collateral monitoring for comfort. It enables a business to design strategies to improve its daily cash position. Particularly for manufacturing companies, it may offer a seasonal advance or special accommodation to assist with overhead additional costs associated with purchasing raw materials, converting

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https://assets.new.siemens.com/siemens/assets/api/uuid:396bb600d24ec26408161b3431d324b31d1b83e1/sfs-asset-based-lending-brochure.pdf (last accessed 11 July 2021).

[51] See, Childers, Troy/ Marin, Marc J., *Asset-Based Lending: A Training Guide to Secured Financing*, The Commercial Finance Institute (2005).

[52] Bank of America, *Understanding Asset-Based Lending*, available at: https://www.bofaml.com/en-us/content/what-is-asset-based-lending-how-it-works.html (last accessed 11 July 2021).

[53] *Ibid*.

[54] Bank of America, *A Guide to Asset-Based Lending*, Bank of America Merrill Lynch Article (2014) p. 1; Childers/ Marin, *supra* note 51.

them to work in process inventories, and finishing them into saleable finished goods.[55] Hence, asset-based finance is referred to as a creative and adaptable method of financing.

III. Generalities of Project-based Finance

There is no formal, harmonized legal definition of 'project finance' nor is there a business definition. Project finance is frequently referred to as a new financing technique, despite the fact that it dates all the way back to 1299, when the English Crown financed its exploration by offering to repay the Florentine merchant bank, Frescobaldi with output from the Devon silver mines.[56] This financing structure, which places a higher value on the future cash flow of the project as a primary source of repayment of the loan advanced, was also used to finance the Suez Canal and numerous British railway projects.[57] Over the years, project finance has become a critical method of funding for governments in both developed and developing countries for large-scale infrastructure development.[58] It enables governments to leverage private capital to fund public assets such as transportation projects (e.g., toll roads, airports, and parking facilities), energy and water projects (e.g., water, sewerage, and electricity services, and power plants), social projects (e.g., hospitals and schools), and integrated multisite commodity-based projects (e.g., oil, gas and mining projects) due to their budgetary

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[55] Childers/ Marin, *supra* note 51.

[56] Kensinger, John W./ Martin, John D., *Project Finance: Raising Money the Old-Fashioned Way*, in: D.H. Chew jr., The New Corporate Finance: Where Theory Meets Practice, McGraw-Hill, New York (1993) p. 326.

[57] Beidleman, Carl R./ Fletcher, Donna/ Veshosky, David, *On Allocating Risk: The Essence of Project Finance*, Sloan Management Review, Vol. 31, No. 3 (1990) p. 47.

[58] Dewar, John, *International Project Finance -Law and Practice*, Oxford University Press, London (2011), p. 1.

constraints.[59] As a result, project finance has been used to finance the development of the North Sea oil fields, the Hibernia oil field project, and the Eurotunnel in recent years.[60]

Due to the complexity of project finance, there is no universally accepted definition; however, there are several definitions from international organizations, prominent scholars, and global corporations.

To begin, the World Bank,[61] one of the world's largest sources of funding and knowledge for developing countries with five institutions affiliated with the United Nations, defines project finance as the "use of nonrecourse or limited-recourse financing" and also financing, "which permits sponsors to raise funds secured by the revenues and assets of a particular project."[62]

Some eminent scholars and lawyers define 'project finance' in the following words:

"… is generally used to refer to a nonrecourse or limited recourse financing structure in which debt, equity, and credit enhancement are combined for the construction and operation, or the refinancing, of a particular facility in a capital-intensive industry, in which lenders based credit appraisals on the projected revenues from the operation of the facility, rather than the general assets or the credit of the sponsor of the facility, and rely on the assets of the facility, including any revenue-

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[59] *Ibid*.

[60] Farrell, Michael, *Principal-Agency Risk in Project Finance*, International Journal of Project Management, Vol. 21 (2003); Azaino, Efe Uzezi, *Project Finance Protection System: Can This Shield Effectively Cover Lenders' Exposure in Time of Default?*, Centre for Energy, Petroleum and Mineral Law and Policy (CEPMLP) Annual Review (CAR), Vol. 16 (2013), p. 4.

[61] See generally, The World Bank, *Who We Are*, available at: https://www.worldbank.org/en/who-we-are (last accessed 11 July 2021).

[62] World Bank, *World Development Report 1994: Infrastructure for Development*, Oxford University Press, New York (1994) p. 94.

producing contracts and other cash flow generated by the facility, as collateral for the debt."[63]

Other authors included their own definition of 'project finance' in following terms:

"a financing of a particular economic unit in which a lender is satisfied to look initially to the cash flows and earnings of that economic unit as the source of funds from which a loan will be repaid and to the assets of the economic unit as collateral for the loan."[64]

According to another author, 'project finance' is defined as follows:

"… the raising of funds to finance an economically separable capital investment project in which the providers of the funds look primarily to the cash flow from the project as the source of funds to service their loans and provide the return of and a return on their equity invested in the project."[65]

Nonetheless, Standard & Poor's Corporation[66] defines 'project finance' using six specific criteria, all of which must be met in order for Standard & Poor's to issue a credit rating for a project finance transaction:

"The project is structured as a limited-purpose entity, … lenders typically only have recourse to the project's assets, cash flows, and contractual agreements, … debt issue or bank loan is dependent on the future cash flows generated by the operations of the asset once constructed and fully operational, … a limited asset life with restricted

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[63] Hoffman, *supra* note 50, p. 3; Hoffman, Scott L., *A Practical Guide to Transactional Project Finance: Basic Concepts, Risk Identification, and Contractual Considerations*, The Business Lawyer, Vol. 45, No. 1 (1989) p. 1.

[64] Nevitt, P.K./ Fabozzi, F.J., *Project Financing*, Euromoney, London (2000) p. 1.

[65] Finnerty, John D., *Project Financing: Asset-Based Financial Engineering*, John Wiley & Sons, New York (1996) p. 2.

[66] Standard & Poor's (S&P) is the largest of the Big Three credit-rating agencies as an American financial services company. It is a division of the McGraw-Hill Companies that publishes financial research and analysis on stocks, bonds, and commodities.

activities, … structured to issue senior secured debt, which is backed by covenants and forms of security for the benefit and credit protection of senior secured lenders, … and specified responsibilities that limit risk over the life of project."[67]

Due to the fact that project finance has numerous definitions, this thesis will now focus on the common characteristics of project finance in order to better understand what it is.

1. The project is organized as a distinct financial and legal entity. To complete a particular project, project participants typically establish a special purpose vehicle (SPV) such as a limited liability company or a company limited by shares, which is a newly formed, thinly capitalized company.[68] One of the primary reasons for forming a SPV is to completely separate the debt of the project company from the sponsors' direct obligations. This means that the debt is directly related to the potential cash flow of the project.

2. If there are any guarantees from sponsors to lenders, they generally do not cover all the risks associated with the project. That is why the World Bank refers to project finance as 'non-recourse' or 'limited-recourse' financing. The project sponsor is not legally obligated to reimburse the debt if the project's cash flows are insufficient to service debt.[69]

3. Typically, lenders pledge revenues from the project's business and project assets such as contracts with third parties as security. Thus, the cash flow generated by revenue-producing project contracts and

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[67] Standard & Poor's Ratings Services, *Standard & Poor's Project Finance Ratings Criteria -Reference Guide*, pp. 14-15, available at: https://www.spratings.com/documents/20184/86990/SPRS_Project%2BFinance%2BRatings%2BCriteria%2BReference%2BGuide_FINAL/cdfde690-57d1-4ff4-a87f-986527603c22 (last accessed 11 July 2021).

[68] Dewar, *supra* note 58, p. 3; Pak, Igor, *Finance Architecture of Hydro-Energy Projects: Case Study of Rogun Dam Project in Tajikistan*, Graduate Lawyers at Tulane Law Review, Vol. 1 (2015) p. 12.

[69] Hoffman, *supra* note 50.

contractual commitments of third parties such as construction contractors, suppliers, purchasers of the project's output, and government authorities from the basis for project finance credit appraisal.[70]

Project Finance with these characteristics currently has few non-recourses, the majority of which are limited recourses, and it has also developed various types in response to growing global demand for various large-scale projects with a long-term contract. Especially, individual private participation has begun to be encouraged in infrastructure projects by a number of developing countries and major international contracting firms, depending on the contractual arrangement using a form of public-private partnership (PPP) such as Build-Own-Transfer (BOT), Build-Own-Operate-Transfer (BOOT), Build-Own-Operate (BOO), Build-Lease-Transfer (BLT), Build-and-Transfer (BT), Supply-Operate-Transfer (SOT), Build-Develop-Operate-Transfer (BDOT), Rehabilitate-Operate-Transfer (ROT) Rehabilitate-Own-Operate (ROO) and Build-Transfer-Operate (BTO).[71]

In simpler terms, common PPP structures, a BOT structure is a form of temporary privatization because a project company retains the right to build, operate, and manage the project for the duration of the agreed term, though the project is transferred to the host government upon completion of construction.[72] This structure can be provided for a specific project without involving the host government's budget, but the host government eventually acquires the infrastructure facility after it has been developed, constructed, and operated by the project

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[70] Dewar, *supra* note 58, pp 1-2.

[71] Khan, M. Fouzul Kabir/ Parra, Robert J., *Financing Large Projects -Using Project Finance Techniques and Practices*, Prentice Hall, New Jersey (2003) pp. 30-33; *see also* Ismail, Mohamed A.M., *International Infrastructure Agreements and PPPs in Developing Countries: Substantive Principles -With Special Reference to Arab and Latin American Countries*, European Procurement & Public Private Partnership Law Review, Vol. 6, Issue. 3 (2011) p. 149.

[72] Hoffman, *supra* note 50, p. 118.

company for a specified period of time.[73] However, BTO structure is distinct from BOT, which refers to the period during which a project company transfers ownership of an infrastructure facility. This structure entails a project company completing an infrastructure facility and then transferring it to the host government. On the other hand, if a project company uses BOO structure, it is exempt from the requirement to transfer an infrastructure facility to the host government at the conclusion of the concession period. As a result, the host government typically enters into an off-take agreement with a project company agreeing to build and operate an infrastructure facility.[74] The BOOT structure provides for the ownership of an infrastructure facility by a project company until it is transferred to the host government.

Likewise, PPP in infrastructure development entails private sector involvement in any or all of the phases of design, construction, financing, and operation of a public utility infrastructure, service, or both.[75] It has been used in developed countries such as the United Kingdom and Germany, as well as in some developing countries with enormous infrastructure needs such as China and India. It means the PPP concept has had a long history and with the introduction of public administration, collaboration between the public and private sectors for the provision of services have become possible.[76] For example, Taxi Service in ancient Rome, namely, Rome's ePrix, concessions were used

[73] Khan, *supra* note 71, p. 30.

[74] Dewar, *supra* note 58, p. 51.

[75] Alfen, Hans Wilhelm et al., *Public-Private Partnership in infrastructure development: Case studies from Asia and Europe*, Schriftenreihe der Professur Betriebswirtschaftslehre im Bauwesen, Bauhaus-Universität Weimar, No. 7 (2009) p. 9; *see also* Sarro, Douglas, *Do Lenders Make Effective Regulators: An Assessment of the Equator Principles on Project Finance*, German Law Journal, Vol. 13, No. 12 (2012) p. 1528.

[76] Sîrghi, Petru, *Public Private Partnership Case of Poland*, Thesis submitted to Warsaw School of Economics, Warsaw (2015) p. 13

to utilize harbor equipment, plazas, and thermal establishments.[77] Beginning in the 17th and 18th centuries, concessions were used in France to construct bridges and canals, and in the 19th century with railways and urban utilities constructed in this manner, it was considered the Golden Age of concessions and as a result the French doctrine of public services was formed.[78] Similar types of PPP were also used in the second half of the 19th century in the development of railways in the United States.[79]

To be more precise, there is no universally accepted definition of PPP. The World Bank defines it as "a long-term contractual arrangement between a public entity or authority and a private entity for providing a public asset or service in which the private party bears significant risk and management responsibility."[80] The 'significant risk and management responsibility' component of this definition is critical because it allows for the determination of the types of PPP as previously stated.

Despite the lack of a universally agreed definition, PPP has historically been motivated by the large disparity between available public financing and required expenditure, particularly in an era of expanding national debt and budget deficits. Within the context of the current global financial crisis, PPPs serve as an economic stimulant in developing countries and a source of sustainable global growth, despite the fact that the challenging economic environment has had a

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[77] *Ibid*.; Brady, Gordon, *Public Private Partnerships: Rome's EPrix, Auto Industry Mergers and Repercussions, Turnlikes and Toll Roads*, Journal of Infrastructure Policy and Development, Vol. 3, No. 2 (2019) p. 221.

[78] Sîrghi, *supra* note 76, p. 13

[79] *Ibid*.

[80] The World Bank, *Overview*, available at: https://www.worldbank.org/en/topic/publicprivatepartnerships/overview#1 (last accessed 11 July 2021); for more definitions, see, Burger, Philippe/ Hawkesworth, Ian, *How to Attain Value for Money: Comparing PPP and Traditional Infrastructure Public Procurement*, OECD Journal on Budgeting, Vol. 1 (2011) p. 3.

significant impact on the international project finance market.[81] They are a viable method of institutional interaction between the state and business, bringing market and private sector management practices into the public sector, and relying on a long-term contractual relationship between private operators and the public authority. In other words, expanding the use of PPPs will enable the government to provide critical public infrastructure while minimizing both short- and long-term costs, as well as leveraging the private sector's management skills, expertise, experience, creativity, and alternative funding sources.[82]

However, PPPs are at a disadvantage as they can entail a loss of management control by the public sector, a risk that tends to revert to the taxpayer.[83] Hence, PPPs - and indeed all project finance techniques - require numerous complicated legal documents to adequately protect the interests of all stakeholders. Especially those which 'bear significant risk and management responsibility' for a private entity, a PPP arrangement enables the private sector to finance the infrastructure asset's construction, operation, and maintenance while being compensated directly through user charges, indirectly through taxation, or through a combination of both.[84]

A PPP contract is structured to account for outputs and costs throughout the project's lifecycle, which may allow the private sector to save money while improving service quality.[85] PPP is not immune to the

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[81] Son, Seungwoo, *Legal Analysis on Public-Private Partnerships regarding Model PPP Rules*, Korean Journal of International Trade and Business Law, Vol. 22, No. 2 (2013) p. 4.

[82] *Ibid*.

[83] Pinto, João M./ Alves, Paulo P., *The Choice between Project Financing and Corporate Financing: Evidence from the Corporate Syndicated Loan Market*, ERN: Other Microeconomics: Intertemporal Firm Choice & Growth (2020) p. 7.

[84] Office of Evaluation and Oversight (OVE), *Evaluation of Public-Private Partnerships in Infrastructure* (2017) 3p, available at: https://publications.iadb.org/publications/english/document/Evaluation-of-Public-Private-Partnerships-in-Infrastructure.pdf (last accessed 11 July 2021).

[85] *Ibid*.

political cycle, the relatively large amount of resources required and the long-term commitment involved tend to instill discipline.[86] As the majority of PPP involves a significant amount of private financing, it has higher capital costs than projects that are entirely financed by public funds.[87]

Nonetheless, one of the primary goals of PPP is to delegate tasks and responsibility for infrastructure provision to the private sector in order to improve efficiency, cost predictability, and financial security.[88] In other words, the public sector's role is evolving from owner and provider to purchaser and guardian of the public interest.[89] The current space industry is adopting a PPP structure, in which governments act as purchasers and guardians and private entities are providers.

IV. Asset-based Finance v. Project-based Finance

Using the characteristics of asset-based finance and project finance generally as discussed above, this section compares these two financing methods from three main perspectives, namely, the nature of securities, risk and credit evaluation, and financial vehicle. The purpose of this analysis is to ascertain why project finance is more suited to the current space industry than asset-based finance. Although there are additional distinctions between finance systems, this thesis will focus on these three primary distinctions to facilitate comprehension.

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[86] *Ibid*.

[87] *Ibid*.

[88] Alfen, *supra* note 75, p. 10.

[89] *Ibid*.

1. The Nature of Securities

The guarantees for asset-based finance are the borrower's business assets, while the guarantee for project finance is the project assets that can be managed successfully after the project is completed. This means there is no guarantee for the debt from project company investors; thus, the contract is referred to as 'non-recourse' or 'limited-recourse' financing.[90]

For instance, if lenders use asset-based financing, they can use the secured business assets as collateral. Nonetheless, lenders who use project finance can only rely on the project's future cash flow to repay the loan and accrued interest.

In this regard, project finance can assist the current space industry by providing an opportunity for developing countries and private entities like start-ups that lack secured business assets but have highly feasible future projects, to participate in space activities.

2. Risk and Credit Evaluation

Asset-based finance is backed by the sponsoring company's complete balance sheet, as well as an audit of the client's books and records, which serves as the primary source of repayment for investors and

[90] Meseko, Alfred Ayodele, *Corporate Finance Versus Project Finance*, available at: https://www.academia.edu/15087234/CORPORATE_FINANCE_VERSUS_PROJECT_FINANCE (last accessed 11 July 2021).

creditors.[91] To be more precise, it looks at Earnings Before Interest, and Taxes (EBIT), EBITDA, or net operating profit margins to determine the company's enterprise value and net income to assess the overall company's performance.

On the other hand, project finance is concerned with the Internal Rate of Return (IRR) on cash flows, as this financing method evaluates the creditworthiness of future projects based on their cash flows and technical feasibility. That is why economic and technical feasibility studies, project documentation, licenses and contracts for the project company are frequently used to evaluate credit.[92]

The method for risk and credit evaluation is described on the same page as the nature of securities. If developing countries and private entities that use asset-based finance have less secured business assets or do not yet have an enterprise value or net income to assess the overall performance of the business, they risk oversupplying capacity beyond its economic utility or being unable to access capital due to bad credit. They can, however, be evaluated on the basis of technically feasible project documentation, contracts, or studies if they use project finance and obtain better credit than asset-based financing.

3. Financial Vehicle

As discussed in Chapter 1(III), project finance creates a single purpose entity called an SPV from the sponsors that is focused on a single

[91] International Finance Corporation (IFC), *Lessons of Experience No. 7: Project Finance in Developing Countries*, available at: https://www.ifc.org/wps/wcm/connect/publications_ext_content/ifc_external_publication_site/publications_listing_page/lessonsofexperienceno7 (last accessed 11 July 2021).

[92] Meseko, *supra* note 90.

project for the duration of the project. Due to the fact that the transaction cost and size of financing are both higher, capital investment should be managed separately from the sponsors' other activities. Such projects are typically quite long-term transactions; for example, the beginning project finance is the construction of new infrastructure, followed by the operation phase; thus, SPV is critical to apply in project finance.

On the other hand, in asset-based finance, a business typically borrows loans from its own entity for a variety of multi purposes, including general operations, business expansion, and so on.

The space sector, like other infrastructure industries, has a long-term project. Furthermore, as each project contains a high level of risk and requires a significant financial investment, project financing through a separate financial vehicle, or SPV, is a more appropriate financing method for participants in space operations than asset-based financing, in which a company manages all funds and risks for numerous uses.

V. Conclusion

To examine the current space legal regime, this Chapter discussed the history and current situation of the space industry, as well as general characteristics of both asset-based and project financing. As the space industry is relatively challenging, expensive, and risky as compared to other industries, along with providing dual-use capabilities for military and commercial purposes, for a long period of time, this industry was reserved for governments, particularly of the developed countries.

Nonetheless, several well-funded private companies are currently developing manned missions on sub-orbital trajectories, space tourism, or space mining, all of which will utilize their own launch and manufacturing technologies. Developing countries are increasing their

participation in space activities with an intention to assist with cartographic and cadastral work, land use planning, agricultural monitoring, disaster prevention and management, monitoring of environmental changes and desertification, along with border and coastal surveillance.[93] These factors have contributed to the rapid growth of space financing.

In general, the current space industry relies on two types of financing: asset-based finance and project finance. On the one hand, asset-based financing requires a secured business asset as collateral. It is usually a short-term transaction backed by the sponsoring company's complete balance sheet and an audit of the client's books and records. On the other hand, project finance is typically a long-term transaction that assesses the creditworthiness of future projects based on their cash flows and technical feasibility.

Comparing both types of financing methods, project finance seems to be more suitable than asset-based financing for the development of the space industry, considering it is still in its infancy, particularly for developing countries and private entities.

Currently, the method of project finance has shifted from solely public financing to private investment to undertake infrastructure development. Globalization has enabled private sector participants to contract with foreign governments for finance projects.[94] This is very common practice in developing countries where the need for infrastructure development is very high but financial constraints exist. When developing countries utilize project finance, they gain additional benefits in terms of capital, technology, and management skills, all of which are necessary for developing their own systems.[95]

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[93] APA News, *supra* note 27.

[94] Hoffman, *supra* note 50.

[95] *Ibid*.

Even though project finance should be based on predictable regulatory systems, established political environments, and stable markets, it is frequently used in developing countries where there are few regulations governing finance, and where there are additional risks such as time zone differences, logistical difficulties, language problems, foreign legal systems, and the like. With the expansion of project finance into new industries and countries, where no standards or regulations have been established yet, the associated legal issues have become increasingly complex, and the possibility of the project succeeding has decreased significantly.[96] As a result, it is critical to establish project finance standards or regulations that are suitable with emerging markets such as the space industry. In the following Chapter, we will examine the current space legal regime to determine whether it is capable of handling the current commercial space industry.

[96] Dewar, *supra* note 58, p. 4.

Chapter Two: The Current International Legal Regime of Space Financing

Numerous international treaties and resolutions exist to ensure sustainable and peaceful use of outer space. They laid the groundwork for the general conduct of space activities and covered relevant provisions in the context of the space industry. The five international treaties[97] and seven sets of principles[98] on space related activities, commonly known as the *Corpus Iuris Spatialis* or fundamental international space law, are the most critical legal regime, developed and multilaterally negotiated in the United Nations Committee on the Peaceful Uses of Outer Space (UNCOPUOS). Hence, it is imperative to study the *Corpus Iuris Spatialis* before discussing the private international space law.

This Chapter is divided into two parts. This, therefore, illustrates the *Corpus Iuris Spatialis*, and then, the current private international space

[97] The Outer Space Treaty; Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space, 672 UNTS 119, adopted on 22 April 1968, entered into force on 3 December 1968 (the 'Rescue Agreement'); Convention on International Liability for Damage Caused by Space Objects, 961 UNTS 187, adopted on 29 March 1972, entered into force on 1 September 1972 (the 'Liability Convention'); Convention on Registration of Objects Launched into Outer Space, 1023 UNTS 15, adopted on 14 January 1975, entered into force on 15 September 1976 (the 'Registration Convention'); Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, 1363 UNTS 3, adopted on 18 December 1979, entered into force on 11 July 1984 (the 'Moon Agreement').

[98] UNGA Res. 1962 (XVIII), Declaration of Legal Principles Governing the Activities of States in the Exploration and Uses of Outer Space, 13 December 1963; UNGA Res. 37/92, The Principles Governing the Use by States of Artificial Earth Satellites for International Direct Television Broadcast, 10 December 1982; UNGA Res. 41/65, The Principles Relating to Remote Sensing of the Earth from Outer Space, 3 December 1986; UNGA Res. 47/68, The Principles Relevant to the Use of Nuclear Power Sources in Outer Space, 14 December 1992; UNGA Res. 51/122, The Declaration on International Cooperation in the Exploration and Use of Outer Space for the Benefit and in the Interest of all States, Taking into Particular Account the Needs of Developing Countries, 13 December 1996 (hereinafter, 'Space Benefits Declarations').

law, the one and only, Cape Town Convention and the Space Protocol, are examined to understand how the legal frameworks is functioning and to determine the issues concerning the current space industry. This Chapter goes over the reasons why the existing space treaties are insufficient in the provision of a space financing framework.

This Chapter further investigates the Aircraft Protocol which is heavily used by the international aircraft manufacturing and airline industries. Corresponding to the Space Protocol, the Aircraft Protocol has also been supplemented by the Cape Town Convention to address the particular requirements of aircraft finance and contracts of sale of aircraft equipment.[99] Furthermore, the Aircraft Protocol has already demonstrated its effectiveness and significance through its high rate of ratifications and registrations. On the contrary, the Space Protocol has not yet been widely embraced by the industry. To ascertain these results, it is necessary to examine a successful example within the same legal system, namely the Cape Town Convention. This Chapter analyses the current legal framework to properly understand the fundamental needs and conflicts between law and reality.

I. The *Corpus Iuris Spatialis*

The *Corpus Iuris Spatialis* largely comprises public international law and describes the rights and obligations of States in relation to each other and their use and exploration of outer space.[100] As such rapid

[99] Preamble of the Aircraft Protocol.

[100] Brownlie, Ian, *Principles of Public International Law*, Oxford University Press, Oxford (9th ed. 2019) pp. 255 - 259; *see also* Johnson, Christopher Daniel, *Financing for Commercial Space: Asset-backed Financing, International Space Law and the UNIDROIT Draft Protocol on Space Assets*, Thesis submitted to Institute of Air and Space Law, Leiden University, Leiden (2010) p. 22.

commercialization of the space industry was unexpected when the five international treaties were drafted, the *Corpus Iuris Spatialis* includes few references to commercial space industries or the protection of property rights of space objects. However, the full apprehension of the relevant aspects of the *Corpus Iuris Spatialis* will help to set the tone for the general conduct of space activities and contains provisions pertinent to the space industry. It may influence private international law and conventions on conflict of laws. Hereinafter, this Chapter concentrates on three treaties and two United Nations General Assembly (UNGA) resolutions, which have connection issues relating to space financing.

1. International Space Treaties

A. The Outer Space Treaty of 1967

The Outer Space Treaty, the first international treaty on human activities in outer space, extensively addresses outer space and lays down the main legal framework for space activities.[101] Without any doubt, this treaty is the most significant agreement on human activities in outer space and it even foresaw the possibility of private space activities.[102] While the treaty enumerates the allowed human activities in outer space and on celestial bodies as exploration, use and scientific investigation, it fails to provide further details of these activities. As a result, activities such as constructing a hotel on a celestial body or mining for resources are arguably all covered under the notion of "using" outer space and the

[101] von der Dunk, *supra* note 19, p. 420.

[102] Hobe, Stephan, *Space Law*, Nomos; C.H. Beck; Hart Publishing, Germany (First Edition, 2019) pp. 58, 78.

celestial bodies, and this implies that "use" encompasses both commercial and non-commercial activities.[103]

For example, Article II of the Outer Space Treaty prohibits national appropriation of areas on celestial bodies or in outer space.[104] This clause expressly mentions "use" as a means of appropriating areas in outer space or on celestial bodies and prohibits it. In other words, Article II of the Outer Space Treaty clearly prohibits appropriation by ways of use in the context of Article I of Outer Space Treaty.[105] However, the utilization of outer space for economic purposes, rather than a claim of sovereignty or occupation, may generally refer to the exploitation of outer space and/ or the celestial bodies for the sake of economic profit.[106] Any use of outer space should be environmentally safe as specified in Article IX of the Outer Space Treaty.[107]

Under the Outer Space Treaty, a State Party is responsible for its national activities conducted by both governmental entities and non-governmental entities and the statement implies that every private commercial entity is subject to the State's control and must adhere to the State's national laws and their financial regulations where the private entity's activity takes place. When a non-governmental entity conducts an activity in outer space, the launching State bears responsibility.[108] Article VIII of the Outer Space Treaty determines that a State Party who has registered a space object 'shall retain jurisdiction and control over such object.'[109] This indicates that the appropriate State must ensure that the private activities do not interfere with the

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[103] *Ibid*., p. 93.

[104] Article II of the Outer Space Treaty.

[105] Hobe, *supra* note 102, p. 96.

[106] Hobe, Stephan/Schmidt-Tedd, Bernhard/Schrogl, Kai-Uwe (eds.), *Cologne Commentary on Space Law*, Vol. I, Carl Heymanns, Cologne (2009) p. 35.

[107] Article IX of the Outer Space Treaty.

[108] Article VI of the Outer Space Treaty; *see also* Hobe, *supra* note 102, p. 78.

[109] Article VIII of the Outer Space Treaty.

activities of other States or private actors and do not cause harm to other space objects or persons in outer space or on Earth.[110]

In addition to international responsibilities, jurisdiction and control, States Parties are required to authorize and continuously supervise non-governmental entities in outer space including a licensing system by an appropriate State Party.[111] It is considered as an instrument to prevent a State Party from evading its international obligations under the space treaties: for instance, a State Party shall not contract out these activities to private entities.[112] At the same time, non-governmental entities may deem authorization and continued supervision by the appropriate State excessive, which inevitably leads to slow development of space technologies and industries.

Article VII of the Outer Space Treaty establishes the principle of liability on the launching State, further refined in the Liability Convention. In contrast to international responsibility, liability is defined as the occurrence of damage as the exclusive and necessary requirement, with no criterion for a breach of an international obligation.[113] However, when conduct consisting of an action or omission "is attributable to the State under international law", and "constitutes a breach of an international obligation of the State", every internationally wrongful act of the State contains the international

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[110] Hobe, *supra* note 102, p. 79.

[111] Article VI of the Outer Space Treaty.

[112] Cheng, Bin, *International Responsibility for National Activities in Outer Space*, in: Bernhard, R./ Bindschedler, R. (eds.), Encyclopedia of Public International Law, Instalment XI, North Holland, Amsterdam (1989) p. 299; *see also* Johnson, *supra* note 100, p. 23.

[113] von der Dunk, Frans, Liability Versus Responsibility in Space Law: Misconception or Misconstruction?, in: Proceedings of the 34th Colloquium of the International Institute of Space Law (1991) p. 365; *see also* Article 1 of the Draft Articles on Responsibility of States for International Wrongful Acts: "Every international wrongful act of a State entails the international responsibility of that State", International Law Commission (ILC), *Draft Articles on Responsibility of States for Internationally Wrongful Acts*, Supplement No. 10, UN Doc. A/56/10 (2001).

responsibility of that State.[114] That is why Article VII should be examined separately from Article VI, which establishes international responsibility. Based on Article VII, investors and stakeholders can seek compensation for the damages caused by space objects even if the launching State did not violate relevant legal obligations.

The provision is instrumental as the launching State bears liability for damage caused by its space object, and victims should not be subjected to ambiguity or proof difficulties.[115] The liability regime in space law expects that the victim may sue any of involved launching States, even if a private company procures one particular launch for another State from the territory of a third State, resulting in multiple launching States.[116] Compensation can be sought from each of the launching States in relation to third parties. In this regard, the commercial space industry must consider international liability as a critical matter in transfers of space object ownership.

B. The Liability Convention of 1972

Article VII of the Outer Space Treaty defines the international State liability for damage arising from its space objects.[117] As a general principle of liability on a launching State, it has to be further elaborated within the context of the Liability Convention.[118] Therefore, the

[114] Articles 1, 2 of the Draft Articles on Responsibility of States for International Wrongful Acts.

[115] Hobe, *supra* note 102, p. 81.

[116] *Ibid*.

[117] Article VII of the Outer Space Treaty.

[118] Hobe/ Schmidt-Tedd/ Schrogl (eds.), *supra* note 106, p. 129.

Convention is *lex specialis* to Article VII of the Outer Space Treaty[119] and hereinafter Article II and III of the Liability Convention, namely international State liability for damage resulting from a space object, will be discussed.

There are two key provisions. Article II of the Liability Convention stipulates that a launching State is strictly liable for all damage caused by its space objects either on the surface of the Earth or in airspace to aircraft; on the other hand, Article III specifies fault-based liability for all damage being caused elsewhere, namely in orbit.[120] Article II of the Liability Convention provides no further explanation to what constitutes absolute liability with contrast to Article III of the Liability Convention.[121] The term 'fault' is not defined nor any other criteria is specified in the Liability Convention.[122] Hence, as per the rules of interpretation of the term known to international law, Article 31 of Vienna Convention on the Law of Treaties (VCLT) [123] allows international treaties to be interpreted in line with the ordinary meaning, purpose, and context of the Convention.[124]

The legal definition of the term 'fault' is either negligent conduct or conduct that is intended to do harm.[125] This allows to interpret the term 'fault' under the context of international law, and it must be considered

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[119] *Ibid*.

[120] Articles II, III of the Liability Convention.

[121] Hobe, Stephan/Schmidt-Tedd, Bernhard/Schrogl, Kai-Uwe (eds.), *Cologne Commentary on Space Law*, Vol. II, Carl Heymanns, Cologne (2009) p. 122.

[122] Hobe, Stephan/Schmidt-Tedd, Bernhard/Schrogl, Kai-Uwe (eds.), *Cologne Commentary on Space Law*, Vol. III, Carl Heymanns, Cologne (2009) p. 647.

[123] Vienna Convention on the Law of Treaties, 1155 UNTS 331, adopted on 23 May 1969, entered into force on 27 January 1980.

[124] Brownlie, *supra* note 100, p. 630; *see also* Article 31 paragraph 1 of the VCLT: "A treaty shall be interpreted in good faith in accordance with the ordinary meaning to be given to the terms of the treaty in their context and in the light of its object and purpose."

[125] Hobe/ Schmidt-Tedd/ Schrogl (eds.), *supra* note 122, p. 648.

as negligent conduct and misconduct of a State.[126] If there are any collisions between space objects of two States, the victim State must prove fault and damage to its space object in outer space.[127] Whether direct or indirect commercial loss can be included is a question critical for any private space operators involved.[128]

The Liability Convention imposes liability on the launching State. This raises the issue of how the launching State can retain oversight and control over a space object once it has been transferred to creditors, located in another State and subject to its jurisdiction.[129] This type of transfer to creditors in another State may occur if the creditors acquire physical or constructive possession of space objects they financed.[130]

Assume that the financier decides to operate the space object in a way that results in damage to the surface of the Earth or to another space object in outer space. Under the Liability Convention, the launching State may be held liable and subsequently seeks recourse from the operator, namely financier. Should the operator be located in another country, holding the party responsible may become difficult.[131]

Due to the increase of commercial and private space activities, States involved in a launch and being held liable for accidents, are required to legislate new national space law to ensure adequate insurance against the relevant private enterprise.[132] However, not all national laws

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[126] *Ibid*; *see also* Imburgia, Joseph S., *Space Debris and Its Threat to National Security: A Proposal for a Binding International Agreement to Clean Up the Junk*, Vanderbilt Journal of Transnational Law, Vol. 44 (2011) p. 617.

[127] Kerrest, Armel, *Space Debris, Remarks on Current Legal Issues*, in Proceeding of the Third European Conference on Space Debris, Vol. 2, ESOC, Darmstadt/ Germany (2001) p. 869.

[128] von der Dunk, *supra* note 19, p. 421.

[129] Larsen, Paul B., *Future Protocol on Security Interests in Space Assets*, Journal of Air Law and Commerce, Vol. 67, Issue. 4 (2002) p. 1091.

[130] *Ibid*.

[131] *Ibid*.

[132] Hobe, *supra* note 13, p. 872.

contain the same legal regimes and provisions. At present, more than 20 States have national space legislations, and more countries are expected to follow suit by enacting national space law. As space law treaties including the Liability Convention were drafted during the time when most government-driven space activities took place, these treaties assume government operation.[133] The drafters made no provision for individual liability of private satellite operators when space assets were transferred through sale, lease, or secured financing to other private operators located in countries that are not launching States.[134] Lack of provisions that allow individuals to be held liable causes difficulties for private stakeholders and States in seeking compensation for damages from properly licensed private operators. The launching State is uncertain of its liability due to the transfer of the space assets.

C. The Registration Convention of 1975

Paragraph 1 of Article II of the Registration Convention states

"the launching State shall register the space object by means of an entry in an appropriate registry which it shall maintain. Each launching State shall inform the Secretary-General of the United Nations of the establishment of such a registry."[135]

The provision further elaborates the basic rule set forth in Article VIII of the Outer Space Treaty[136] and is a necessary component of this Convention as jurisdiction and control are inextricably linked to

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[133] Larsen, *supra* note 129, p. 1091.

[134] *Ibid*., p. 1092.

[135] Article II of the Registration Convention.

[136] Article VIII of the Outer Space Treaty.

registration.[137] After notifying the Secretary-General of the United Nations of the establishment of a registry and national registration, a State acquires its international jurisdiction and control over an object.[138] The information about the object is expected to aid in its identification and contribute to safety and security in outer space.[139] However, in practice, there are occasions when launching States are reluctant to provide such information to the Secretary-General, particularly if the spacecraft or the satellite is transmitting sensitive data or is part of a joint launch.[140]

There still is a widespread problem with highly inconsistent registration practices of member States.[141] However, even if a State is not a party to the Registration Convention, it may still notify the United Nations of its space objects in accordance with UNGA Resolution 1721 (B).[142]

Article I(a) of the Registration Convention defines and categorizes of a 'launching State.'[143] While the four categories of a 'launching State' may create confusion over which State bears international responsibility and liability for the space object, only one registering State can assert jurisdiction over it and determine, which rules apply to object-related interests, including financial interests.[144] Jurisdiction over a space object entails the authority to decide which laws apply, including those pertaining to financial interests in the object.[145] In other words, registration of a space object under the Registration Convention

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[137] Hobe/ Schmidt-Tedd/ Schrogl (eds.), *supra* note 121, pp. 251, 420.

[138] *Ibid*, p. 252.

[139] Hobe, *supra* note 102, p. 86.

[140] *Ibid*.

[141] *Ibid*.

[142] UNGA Res. 1721 (XVI) (B), International Co-operation in the Peaceful Uses of Outer Space, 20 December 1961.

[143] Article I(a) of the Registration Convention.

[144] Johnson, *supra* note 100, p. 24.

[145] *Ibid*.

carries significant implications for space project financiers pertaining to the applicable laws and regulations such as financial laws governing that objects. However, this international registration has no direct bearing on the commercial ownership of the space object or the beneficial rights that may result from such ownership.[146] It has been suggested to register both the creditor and the insurance company's interests in the Registry because it would benefit the launching State.[147]

2. International Space Legal Documents

There are two relevant UNGA Resolutions in the discussion of the legal regime for space financing, out of five treaties and seven sets of principles that compose the fundamental international space legal regime. Therefore, this Chapter highlights and analyses two: the Space Benefits Declarations of 1996 and UNGA Resolution on Registration Practice[148].

A. The Space Benefits Declarations of 1996

[146] *Ibid*.

[147] Ribbelink, Olivier M., *The Protocol on Matters Specific to Space Assets*, European Reviews of Private Law, Vol. 12, Issue. 1 (2004) p. 43.

[148] UNGA Res. 62/101, Recommendations on enhancing the practice of States and international intergovernmental organizations in registering space objects, 10 January 2008 (hereinafter, 'UNGA Resolution on Registration Practice').

The Space Benefits Declaration is a reinterpretation of existing concepts of international space law.[149] This declaration was prompted by a long-standing dispute between developing and developed countries over the interpretation of Article I, Paragraph 1 of the Outer Space Treaty.[150] As developing countries strongly claim that they were legally entitled to space benefits generated from the exploration and utilization of outer space under Article I of the Outer Space Treaty, the industrialized countries denied such a legal claim.[151]

To be precise, the term 'province of all mankind' in Article I of the Outer Space Treaty serves as a constraint on freedom of use, but it remains vague as long as the international community does not provide a clearer definition. The Space Benefits Declaration can be viewed as a subsequent interpretation of Article I of the Outer Space Treaty. However, it might be asserted that States are essentially free to cooperate with anyone and under any conditions.[152] This denies developing countries' claim to automatic organized cooperation along the lines of Part XI of the Law of the Sea Convention (UNCLOS),[153] which regulates the Area.[154] It is more or less an authentic interpretation of Article I of the Outer Space Treaty in line with Article 31(3)(c) of the VCLT.[155] Almost the same treaty Parties to the Outer Space Treaty have reconsidered the text of its Article I(1), in order to answer the pertinent question of whether this provision would *eo ipso*

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[149] Hobe, Stephan, *International Space Law in its First Half Century*, in: Proceedings of the 49th Colloquium of the International Institute of Space Law (2006) pp. 376-377.

[150] Hobe, *supra* note 102, p. 64.

[151] *Ibid*.

[152] Principle 2 of the Space Benefits Declaration.

[153] United Nations Convention of the Law of the Sea, 1833 UNTS 136, adopted on 10 December 1982, entered into force on 16 November 1994 (hereinafter, 'UNCLOS').

[154] Defined in Article. 1 of the UNCLOS as "The seabed and ocean floor and subsoil thereof, beyond the limits of national jurisdiction."

[155] Article 31(3)(c) of the VCLT stipulates as "There shall be taken into account, together with the context any relevant rules of international law applicable in the relations between the parties."

grant a division of benefits from uses of outer space.[156] As a result, it can be interpreted that nothing in the entire space legislation to this day carries any requirement for spacefaring governments to cooperate with non-spacefaring nations.[157]

It is still important to note that the Space Benefits Declaration emphasizes on the relevance of the interests and needs of developing countries as well as information exchange in accordance with their space capabilities and involvement in the exploration and utilization of outer space.[158] To achieve the goal of the Space Benefits Declaration, secure and sustainable financial mechanisms are required. Interests in space activities have grown enormously amongst developing countries and numerous private entities over the recent years. In order to bridge the gap between them and developed or space-faring countries before too late, adequate financial structures and regulations are a must. In other words, establishing a suitable legal framework for space financing is fundamental in ensuring equitable access by all participants in the exploration and utilization of outer space.

B. UNGA Resolution on Registration Practice

The UNGA Resolution on Registration Practice is a resolution to further activate the Registration Convention. Registration has become more of a concern as the number of non-registrations grows larger,

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[156] Hobe, *supra* note 102, p. 64.

[157] *Ibid*.; *see also* Hobe, Stephan/ Tronchetti, Fabio, *The 1996 Declaration on International Cooperation in the Exploration and Use of Outer Space for the Benefit and in the Interest of All States, Taking into Particular Account the Needs of Developing Countries (SB Declaration): Commentary*, in: Hobe/ Schmidt-Tedd/ Schrogl (eds.), *supra* note 122, pp. 330-354.

[158] Principles 7, 8 of the Space Benefits Declaration.

particularly in cases involving the private sector or international satellite organizations satellite launches. When satellites are used as collateral, the UNGA Resolution on Registration Practice and the Registration Convention should be included to address the appropriate State according to Article VI of the Outer Space Treaty.

The UNGA Resolution on Registration Practice recommends that countries provide additional, useful information to facilitate the identification and location of the space object. [159] It persuades international intergovernmental organizations that have not yet declared their acceptance of the rights and obligations under the Registration Convention due to the complexity of the responsibility structure in international intergovernmental organizations conducting space activities.

It also calls on States to thoroughly determine the State of a space object in the event of an orbital transfer, including information about the identification of the new owner or operator, and a change in supervision of a space object in orbit. Ownership transfer of space objects in orbit is a sensitive matter due to a complexity in determining a State to be held liable. There currently does not exist a provision for the ownership transfer from an initial launching State to another, who shall continue to oversee and retain control over the transferred space object. The issue directly links to the Outer Space Treaty, the Liability Convention, and the Registration Convention as they argue about jurisdiction, control and supervision by the appropriate 'launching State.'

Germany mandates the transfer of ownership of space objects in orbit, while the country studies the background paper under the Working Group of the Subcommittee on the practice of States and international organizations in registering space objects. Germany asserts that the amending ownership transfers information is practical, if the State responsible for the new owner of the space object intends to claim

[159] Hobe, *supra* note 102, p. 87.

directly in the spirit of international cooperation, despite the formal obligation of the launching State.[160]

Likewise, with increasing participation of private entities and international intergovernmental organizations in the space industry, timely updates of information on space objects, including the transfer of ownership in orbit, are a prerequisite for a functioning space industry.

II. The Current Asset-based Financing Legal Framework

Today, the Cape Town Convention and the Space Protocol constitute the sole private international space law, prepared under the auspices of the International Institute for the Unification of Private Law (UNIDROIT)[161]. The Cape Town Convention marked a significant step forward in the international law of asset-based finance because it established a new international regime for financing assets in not only the space industry, but also in the aviation, rail transportation, mining, agricultural and construction sectors, thereby facilitating investment in these capital-intensive sectors.[162] The Space Protocol, which amends the Cape Town Convention to include transactions involving space assets, is also a turning point in the field of space law.[163] Therefore, the

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[160] UNCOPUOS – Legal Subcommittee (Vienna 3-13 April 2006), *Registration of Space Objects: Harmonization of Practices, Non-registration of Space Objects, Transfer of Ownership and Registration/ Non-registration of "Foreign" Space Objects*, UN Doc. A/AC.105/867 p. 4.

[161] UNIDROIT, which has currently sixty-three Member States, is an independent intergovernmental organization that works towards the harmonization, modernization, and coordination of private and commercial law between States by formulating uniform law instruments, principles, and rules. See, UNIDROIT, *History and Overview*, available at: https://www.unidroit.org/about-unidroit/overview (last accessed 12 July 2021).

[162] Sundahl, *supra* note 5, p. 1.

[163] *Ibid*.

following Chapter, based on the *Corpus Iuris Spatialis*, discusses the background, purpose and major features of the Cape Town Convention and the Space Protocol in detail.

1. The Cape Town Convention

Due to variety of national approaches to the recognition of foreign security interests in mobile equipment, before the amendment of the Cape Town Convention, there were difficulties in recognition and enforcement of their security interests arose in the new *situs*.[164] As a general rule in a conflict of laws, proprietary rights and priority issues are governed by the law of the location of the object (*lex situs*) at the time of the relevant dealing. [165] However, interests in equipment are subject to the law of the State of registration (*lex registri*) in some jurisdictions. [166] The *lex situs* rule is often ill-adapted to mobile equipment, especially those which can be across national boundaries, and even the *lex registri* rule has issues with jurisdictions when the equipment moves internationally. Hence, a uniform and predictable law for the prioritization, protection, and enforcement of rights in multi-jurisdictional mobile equipment is necessary for international transactions which have numerous uncertainties and legal risks. If there

[164] Gopalan, Sandeep, *Harmonization of Commercial Law: Lessons from the Cape Town Convention on International Interests in Mobile Equipment*, Law and Business Review of the Americas, Vol. 9, No. 2 (2003) p. 256; *see also* Cuming, Ronald C.C., *International Regulation of Aspects of Security Interests in Mobile Equipment*, Uniform Law Review, Vol. os-18, Issue. 1 (1990).

[165] Goode, Roy, *The Priority Rules under the Cape Town Convention and Protocols*, Cape Town Convention Journal, Vol. 1, No. 1 (2012) p. 95.

[166] *Ibid*.

is a uniform law, it can reduce the availability of finance, increase its cost and raise the level of premiums for credit insurance.[167]

To address this issue, UNIDROIT set up a questionnaire in 1989 regarding the kinds of movable property involved in cross-border transactions and information in which security interests are usually taken in the course of preparatory work on the Cape Town Convention.[168] The questionnaire was gathered from not only business and financial circles, including banks, financial institutions, large industrial concerns, confederation of industries and airlines but also to representatives of academia and international organizations.[169]

The Governing Council of UNIDROIT also set up a Restricted Exploratory Working Group in 1992 as well as a sub-committee to prepare and answer the needs for feasibility of uniform rules governing international security interests with mobile equipment.[170] After several meetings of the sub-committee and Drafting Group over the following years, the text of a preliminary draft Convention was presented and approved by the Governing Council of UNIDROIT at its 77th session in 1998.[171]

The Cape Town Convention was established on this ground, and it includes an International Registry, priority rules, default remedies, and insolvency protections. Because the international legal harmonization in the area of private law is notoriously slow and difficult process, the

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[167] *Ibid*.

[168] UNIDROIT 1989 – Study LXXII – Doc. 2, International Regulation of Aspects of Security Interests in Mobile Equipment: Questionnaire (December 1989); *see also* Ametova, Lutfiie, *International Interest in Space Assets under the Cape Town Convention*, Acta Astronautica, Vol. 92, Issue. 2 (2013) p. 214.

[169] UNIDROIT 1989 - Study LXXII - Doc.3, Analysis of the Replies to the Questionnaire on an International Regulation of Aspects of Security Interests in Mobile Equipment (April 1991); *see also* Ametova, *supra* note 168, p. 214.

[170] Goode, Roy, *Official Commentary on the Convention on International Interests in Mobile Equipment and Protocol Thereto on Matters Specific to Space Asset*, International Institute for the Unification of Private Law, Rome (3rd ed., 2013) p. 3.

[171] *Ibid*.

Cape Town Convention has successfully attract widespread accolades and is regarded as one of the most innovative and successful international conventions in the field of commercial transactional law.[172] Since entering into force in March 2006, the number of ratifications to the Cape Town Convention has rapidly increased, depicting a worldwide map of Contracting States that reflects different legal traditions and levels of economic development today.[173]

The structure of the Cape Town Convention is widely known for its unprecedented use of supplementary protocols, which has a double function depending on certain different categories of mobile assets of high value.[174] The Cape Town Convention only stipulates the general principles on a regime of sale, leasing and asset-based financing of high value mobile assets, and its respective Protocols contain sector-specific rules in order to provide and amend the general rules of the Cape Town Convention, catered to the needs of different industry sectors.[175] In consequence, Consolidated Text is necessary to combine the provisions of the Cape Town Convention and Protocols into one document; and in the event of inconsistency between the Convention and Protocols, the Protocols prevail.[176]

There are three emphatic rules in the Cape Town Convention. Among the primary rules of the Convention, it first solves the problem of the

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[172] Goode, *supra* note 165, p. 95; *see also* Böger, Ole, *The Case for a New Protocol to the Cape Town Convention Covering Security over Ships*, Cape Town Convention Journal, Vol. 5, No. 1 (2016) p. 73; *see also* Böger, Ole, *A possible Protocol to the Cape Town Convention on renewable energy equipment*, Uniform Law Review, Vol. 23, Issue. 2 (2018) p. 244.

[173] In October 2020, there were 82 Contracting States, together with the EU as a regional economic integration organization. See, UNIDROIT, *Convention on International Interests in Mobile Equipment (Cape Town, 2001) – Status*, available at: https://www.unidroit.org/status-2001capetown (last accessed 12 July 2021); *see also* Rodríguez de las Heras Ballell, Teresa, *Complexities arising from the expansion of the Cape Town Convention to other sectors: the MAC Protocol's challenges and innovative solutions*, Uniform Law Review, Vol. 23, Issue. 2 (2018) p. 215.

[174] Sundahl, *supra* note 5, p. 22.

[175] Art 6(2) of the Cape Town Convention; Böger, *supra* note 172, p. 76.

[176] Article 6(2) of the Cape Town Convention.

lex situs since the location of the collateral does not affect the application of the Cape Town Convention to the transaction.[177] As mentioned *lex situs* and *lex registri* conflicts with each other in different domestic laws for proprietary rights. If the debtor is situated in a Contracting State of the Convention when the conclusion of an agreement is created for the international interest, an international interest in the mobile equipment follows *lex registri*, "first-to-file" priority rule under the Cape Town Convention no matter where the creditor is situated.[178]

Secondly, compared to national legal systems, the Cape Town Convention provides clear and simple rules for creation of an international interest as well as determination of the priority of competing claimants.[179] An 'international interest in mobile equipment' is an interest in a uniquely identifiable object under a security agreement, a title reservation agreement, or a leasing agreement from the charger, conditional seller or lessor.[180] Considering this definition of international interest, there are priority rules against third parties in Article 29 of the Cape Town Convention; it states that a registered interest has priority over any other interest subsequently registered and over an unregistered interest.[181] According to Article 29, 'registered' means registered in the International Registry under Chapter IV and V of Convention and 'registered interests' means a registered international interest, a non-consensual right, an interest which shall be registrable under Article 40, or a registered national interest specified in a notice of a national interest.[182] This rule is imperative because it generally

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[177] Sundahl, *supra* note 5, p. 21.

[178] Articles 3, 4 of the Cape Town Convention.

[179] Sundahl, *supra* note 5, p. 21; *see also* Goode, *supra* note 165, p. 96.

[180] Article 2(2) of the Cape Town Convention.

[181] Article 29(1) of the Cape Town Convention.

[182] Articles 1(s), 1(t), 16, 39, 40 of the Cape Town Convention; Goode, *supra* note 165, p. 97.

assigns priority to a registered interest over an unregistered one, even if its registration is impossible under the Cape Town Convention.[183] The first registered interest retains priority even if it is acquired or registered with knowledge of the other unregistered interest, and even as regards value given with such knowledge.[184] There are two purposes of this priority rule: one for avoiding transaction costs which would be incurred by pursuing lines of enquiry, and the other for avoiding factual disputes as to whether a party did have knowledge or not.[185]

Lastly, a centralized registry of international interests, the International Registry, is at the heart of the system of this Convention. The registry ensures transparency through a completely electronic and online system with no human intervention.[186] The International Registry registers international interests, prospective international interests, as well as a variety of other interests and transactions. It includes transactions affecting interests such as registrable non-consensual rights and interests, along with assignments and prospective assignments of international interests, acquisitions of international interests by legal or contractual subrogation, notices of national interests, and subordinations of interests.[187]

The Supervisory Authority is separated from the International Registry. The Registrar of the International Registry performs a significantly important function because it takes a neutral stance between contesting Parties in accordance with the international character of the Registrar's functions and operates based on a purely administrative standard.[188]

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[183] Goode, *supra* note 165, p. 97.

[184] Article 29(2) of the Cape Town Convention; *see also* Goode, *supra* note 165, p. 97.

[185] *Ibid*.

[186] Sundahl, *supra* note 5, p. 21.

[187] Article 16(1) of the Cape Town Convention; *see also* Goode, *supra* note 165, p. 97.

[188] Article 17(5) of the Cape Town Convention; *see also* McPhillips, Rory/ Rosen, Howard/ Kozuka, Souichirou/ Kennedy, Stuart, *Comparative analysis of aircraft, rail*

The Registrar does not get involved in the registration process for an individual registration, mainly to ensure that the risk of human error and possible delays in registration process is eliminated.[189] Their efforts enable efficient registration process in a searchable international interest worldwide without delay.

The Supervisory Authority as mentioned in the Article 17 of the Cape Town Convention appoints and supervises the Registrar. It also establishes administrative procedures along with providing regulations or guidance governing the registry to the Registrar for each category of equipment, as provided by each Protocols.[190] For its international legal personality, Article 27(1) and (2) of the Cape Town Convention stipulates that the Supervisory Authority shall be immune from legal or administrative process.[191] Nevertheless, the Supervisory Authority is not capable of adjudicating on disputes or matters pertaining to particular registrations due to protection from the jurisdiction of courts, similar to that of the International Registrar.[192]

2. The Space Protocol

Due to the rapid growth of private and commercial space activities in the early 1990s, financing of space activities has encountered numerous difficulties, particularly for start-up companies with no credit history

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and space international registries and their regulatory provisions, Cape Town Convention Journal, Vol. 5, No. 1 (2016) p. 31; *see also* Goode, *supra* note 170, p. 84.

[189] McPhillips/ Rosen/ Kozuka/ Kennedy, *supra* note 188, p. 32.

[190] Articles 16(2), 17(1), 17(2) of the Cape Town Convention.

[191] Article 27(1), (2) of the Cape Town Convention; *see also* McPhillips/ Rosen/ Kozuka/ Kennedy, *supra* note 188, p. 37.

[192] McPhillips/ Rosen/ Kozuka/ Kennedy, *supra* note 188, p. 35.

and no assets other than the satellite they operate.[193] Under these circumstances, the urgency of addressing the issue of security rights in space equipment has increased internationally. The primary issue with space equipment for creditors is that it is unclear which States' law applies to the creditor's security interest in such an equipment/object because space equipment/object is in outer space.[194]

Following the approval of the preliminary draft of the Cape Town Convention by the Governing Council of UNIDROIT at its 77th session in 1998, the Space Working Group was set up with other categories of equipment such as the Aviation and Rail Working Groups to address the issue of creditor's security interest in space equipment.[195] The Space Working Group was composed of academic experts as well as manufacturers, financiers, operators, insurers of space assets, and their customers. The Group worked in close collaboration with major international organizations involved in outer space activities, such as the United Nations Office for Outer Space Affairs (UNOOSA), the European Space Agency, and the International Bar Association for formulating a first draft of the Space Protocol.[196] They held five informal meetings in order to generate a preliminary draft protocol that would address numerous concerns raised by both the governments and industries.[197] The Space Working Group forwarded it to the Committee of governmental experts in 2001, which convened five sessions between December 2003 and February 2011 in an effort to consolidate

[193] Ribbelink, *supra* note 147, p. 38.

[194] Ametova, *supra* note 168, p. 215.

[195] Goode, *supra* note 170, p. 3; *see also* Ametova, *supra* note 168, p. 216; *see also* UNIDROIT 1998 - Study LXXII - W.P. 4, Revised Draft Articles of a Future UNIDROIT Convention on International Interests in Mobile Equipment: Preliminary Comments on the Application of the Revised Draft Articles to Space Property (July 1997).

[196] Goode, *supra* note 170, p. 4; *see also* Ametova, *supra* note 168, p. 216; *see also* UNIDROIT 1998 - Study LXXII - W.P. 4, *supra* note 195.

[197] Goode, *supra* note 170, p. 4.

solutions developed from the intersessional meetings preceding the intergovernmental consultation processes.[198]

Finally, in May 2011, the Committee of Governmental Experts was authorized to submit a preliminary draft protocol for adoption to a diplomatic conference.[199] While the Space Protocol was adopted in Berlin in 2012, it was initially signed by three States (Saudi Arabia, Burkina Faso, and Zimbabwe) at the time of the diplomatic conference and today there are four States (including Germany), regrettably though, it is not yet in force.[200] Despite everything the fact, the Space Protocol is the first agreement in the discipline of international space law in over 30 years, and it establishes the first international private law governing the commercial space industry. This Protocol is a component of the Cape Town Convention system and aims to promote commercial financing for space activities by utilizing the system of registering international interests in space assets.[201]

To be more precise, the Space Protocol incorporates several significant features and modifications to the Cape Town Convention in order to make it applicable to space equipment and industries.

To begin with, the Space Protocol regulates the concept of a 'space asset,' which has a broader definition than 'space objects' in the *Corpus Iuris Spatialis* and the concept includes property on the surface of the Earth.[202] Due to registration of international interests through assets under the Cape Town Convention system and the Protocol's limitation

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[198] *Ibid*., p. 5; Ametova, *supra* note 168, p. 217; UNIDROIT, *Overview Space Protocol*, available at: https://www.unidroit.org/overview-2012-space-assets (last accessed 12 July 2021).

[199] *Ibid*.

[200] *Ibid*.

[201] van Fenema, Peter, *The UNIDROIT Space Protocol, the Concept of 'Launching State', Space Traffic Management and the Delimitation of Outer Space*: The 41st session of the UNCOPUOS Legal Subcommittee, Vienna, 2-12 April 2002, Air & Space Law, Vol. 27 (2002) p. 274.

[202] Larsen, *supra* note 129, p. 1087.

of its scope of application, it is essential that assets are identifiable consistently and sufficiently. It has to ensure that all registrations are discovered to be distinguishable in the International Registry.[203]

According to the Article 1(2)(k) of the Space Protocol, a 'space asset' is defined as:

"any man-made uniquely identifiable asset in space or designed to be launched into space, and comprising

(i) a spacecraft, such as a satellite, space station, space module, space capsule, space vehicle or reusable launch vehicle, whether or not including a space asset falling within (ii) or (iii) below;

(ii) a payload (whether telecommunication, navigation, observation, scientific or otherwise) in respect of which a separate registration may be effected in accordance with the regulations; or

(iii) a part of a spacecraft or payload such as a transponder, in respect of which a separate registration may be effected in accordance with the regulations, together with all installed, incorporated or attached accessories, parts and equipment and all data, manuals and records relating thereto."[204]

The term 'man-made' is included in the definition of 'space asset' to exclude celestial bodies or other objects that exist naturally in space. This is in accordance with the Article II of the Outer Space Treaty, which states that outer space, including the Moon and other celestial bodies, is not subject to national appropriation through a claim of sovereignty, through means of use or occupation, or through any other

[203] Article XXX of the Space Protocol; *see also* Sundahl, Mark J., *The Space Assets Protocol One Year Later: An Update and Reassessment*, The Air & Space Lawyer, Vol. 26, No. 1 (2013); *see also* McPhillips/ Rosen/ Kozuka/ Kennedy, *supra* note 188, p. 56.

[204] Article 1(2)(k) of the Space Protocol.

means.[205] The Space Protocol is not limited to assets in space but also applies to assets on Earth or within the Earth's atmosphere that are primarily designed for use in space.[206] Due to the fact that the majority of financing for a spacecraft occurs prior to launch, the Space Protocol applies to an object at the point of manufacture during which it can be identified as a space asset.[207]

The Article defining 'space asset' provides a mechanism for excluding components, especially those incorporated into spacecraft in such a way that, when the components lose their identity and become unavailable to the creditor, it prevents the Protocol from being applied ineffectively.[208] The Article may also apply to new types of space assets in the future, such as a space hotel.[209]

The Space Protocol expressly states that it is not applicable to an aircraft object because it is designed to be in space temporarily.[210] This provision is included to avoid potential conflicts between the Space Protocol and the Aircraft Protocol, such as the implications of human space travel on suborbital spaceflight.[211]

Second, based on this definition of 'space assets,' there is a provision for identification criteria of space assets to distinguish for the purposes of registration in the International Registry established pursuant to the Space Protocol called the Space Registry.[212] Due to the unique nature of space assets, this provision is more stringent than for other equipment where serial numbers are frequently omitted as space assets that are

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[205] Goode, *supra* note 170, p. 166.

[206] *Ibid*., p. 167.

[207] *Ibid*.

[208] *Ibid*.

[209] *Ibid*.

[210] Article 2(4) of the Space Protocol.

[211] Ametova, *supra* note 168, p. 214.

[212] Article XXX of the Space Protocol.

already in orbit without or invisible serial numbers are impossible to accurately identify.[213]

Therefore, in accordance with the Registration Convention, the sub-committee of the Committee of Governmental Experts supplemented additional data, such as the name of the asset, its orbital parameters which includes information such as inclination, nodal period, apogee, and perigee, the country of administration in respect of the space asset, the ground station, and the date of launch.[214] And it was decided to leave everything to the regulations as Article XXX states.[215] It is worth noting that leaving the identification criteria to regulation confers a degree of flexibility on the current and future space industries that would be lost if the criteria were made permanent in the Protocol.[216]

Thirdly, with the definition and identification of a 'space asset,' the Space Registry is required for proper operation since it enables the Supervisory Authority to identify any international interests of space assets. However, before discussing the related Articles, it is necessary to note that the Space Registry is unique in comparison to other equipment's registries in that only cases of national registration have been discovered, whereas both national and other equipment's registrations are found in other international registries. More precisely, no State has ever established a title registry, exclusively dedicated to space assets prior to the establishment of the Space Protocol; and only a few countries have registries for security interests in personal property with a debtor-based financing structure, rather than an asset-based financing structure covering space assets.[217]

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[213] Goode, *supra* note 170, p. 206.

[214] *Ibid*.

[215] *Ibid*.

[216] *Ibid*.

[217] McPhillips/ Rosen/ Kozuka/ Kennedy, *supra* note 188, p. 55.

Meanwhile, global registries for the use of radiofrequency have existed under the regime of public international space law, specifically, the United Nations General Assembly Resolutions 1721 (XVI) B and the Registration Convention, which are administered by the Secretary General of the United Nations, as well as the other Registry, held by the International Telecommunication Union (ITU).[218]

Articles 16 and 17 of the Cape Town Convention establish a general international registration system for various matters capable of registration for whole systems of an international interest in certain categories of mobile equipment. However, the international space registry's circumstances had to add a new Article 16(1) *bis* under Article XXXII of the Space Protocol. The Article adds further items such as the recording of rights assignments and rights reassignments, the recording of the acquisition of debtor's rights by subrogation, the registration of public service notices under Article XXVII(1) of the Protocol and the registration of creditors' notices under Article XXVII(4) of the Protocol.[219]

The amendment intends to include the public service notice against the registration of the international interest arising from an assignment of debtor's rights.[220] However, Article XXXII and specifically Article 16(1) *bis*, is only applicable to space assets and Contracting States that have ratified the Space Protocol.[221]

Article XXVIII of the Space Protocol specifies the manner in which the Supervisory Authority for the International Registry for space assets and its primary function shall be designated. The Supervisory Authority shall be designated at or pursuant to a resolution of the diplomatic

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[218] *Ibid*.

[219] Article XXXII(1) of the Space Protocol.

[220] Goode, *supra* note 170, p. 205.

[221] *Ibid*.

Conference, and the Supervisory Authority shall issue the first regulations prior to the entry into force of the Space Protocol.[222]

Fourthly, Article IV of the Space Protocol covers the outright sales, prospective sales, and salvage of space assets.[223] This Protocol specifically mentions 'salvage' of a legal or contractual right or interest in, relating to or derived from a space asset that vests in the insurer upon the payment of a loss relating to the space asset. The Cape Town Convention or the Space Protocol cannot affect any legal or contractual right to salvage recognized by the applicable law.[224] This provision is included because insurance is a significant factor in financing of space assets in the space industry.

While drafting the Space Protocol, salvage insurers expressed concerns that the priority rule in Article 29(1) of the Cape Town Convention could impair their rights to salvage, be it title salvage or revenue salvage on acquiring title or rights to revenue from a space asset following payment on a constructive total loss.[225] As a result, this Article provides that any priority dispute involving legal or contractual rights of salvage conferred by the applicable law will be resolved in accordance with the applicable law as determined by the rules or private international law of the States.[226] As a consequence of this salvage regulation, the Protocol can ensure that insurance values in the space industry remain stable.

Fifthly, in order to address the unique needs of the space industry and the assignment and reassignment of debtor's rights, the Space Protocol modifies the default remedies of the Cape Town Convention.[227] There

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[222] Articles XXVIII(1), XXIX of the Space Protocol.

[223] Article IV of the Space Protocol.

[224] Article IV(3) of the Space Protocol.

[225] Goode, *supra* note 170, p. 171.

[226] *Ibid*.

[227] *Ibid*., p.189.

are two types of remedies under the Space Protocol: the application of remedy provisions to rights assignments and reassignments, and the placement of data and materials.[228] Article XVIII of the Space Protocol applies the default provision of Chapter III of the Cape Town Convention governing the enforcement of a security interest to defaults by the debtor or assignor under a rights assignment or rights reassignment, which is only applicable to intangible property.[229]

Under Article XIX of the Space Protocol, the placement of command codes and related data, as well as materials, with another person in order to take possession of, establish control over, or operate the space asset is applicable.[230] Arrangements involving a satellite command code that is an encryption key to grant control of a satellite can be made to deposit the code in the escrow account with a third party and to give the creditor the ability to change the command code and seize control of the satellite in the event of the debtor's default.[231] This provision, however, will not apply if a Contracting State has its laws and regulations that prohibit, restrict or impose conditions on the placement of command codes and related data and materials.[232]

The reasonable days' requirement of prior notice, which is specified in Article 8(4) in the Cape Town Convention as 14 or more calendar days, is modified in the Space Protocol to a minimum of 10 working days.[233] There is also a modification to the 'speed relief' provision of Article XX of the Space Protocol to provide greater certainty.[234]

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[228] Articles XVIII, XXVI, XIX of the Space Protocol.

[229] Article XVIII(1) of the Space Protocol; *see also* Goode, *supra* note 170, p. 190.

[230] Article XIX of the Space Protocol.

[231] Goode, *supra* note 170, p. 190.

[232] *Ibid*.

[233] Article XVII(2) of the Space Protocol; *see also* Goode, *supra* note 170, p. 191.

[234] Article XX of the Space Protocol; *see also* Article 13 of the Cape Town Convention.

The most significant changes to the remedies, however, are the provisions on physically linked assets and the public service restriction under Articles XVII(3) and XXVII.[235] The provision on physically linked assets is intended to protect the operation of a physically linked asset without any risks by creditors who may give negative effects. There are several examples that include relocation of the enforcing creditor's asset, depriving the other creditor of the ability to enforce, reducing or restricting the linked asset's access to power, preventing communications with the asset, and interfering with its radio frequency communications.[236]

Concerning the limitation of remedies in respect of public service, the public service restriction is an extremely necessary regulation given the nature of the space industry, which has the potential to impair public health, national security, and other critical public services.[237] Thus, Article XXVII of the Space Protocol provides a middle ground that seeks to strike a balance between creditors' remedies and the debtor's solvency for their interests with the public service provider in order to ensure the continuation of public services.[238]

The Space Protocol also provides creditor remedies tailored to the unique characteristics of space assets. As a result, financial institutions can stay more confident in their ability to seize a debtor's space assets in the event of a debtor's default. The Protocol also benefits project finance structures that rely on a strong security package.[239]

Finally, this Protocol contains not only the aforementioned features but also significant provisions regarding the jurisdiction and waiver of

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[235] Articles XVII(3), XXVII of the Space Protocol; *see also* Goode, *supra* note 170, p. 193.

[236] *Ibid*.

[237] *Ibid*., p. 194.

[238] *Ibid*.

[239] Sundahl, *supra* note 5, p. 21.

sovereign immunity, relationship with other existing bodies of space law, such as the Outer Space Treaties or instruments of the International Telecommunications Union. The Space Protocol does not affect the power of Contracting States to regulate the grant or transfer of licenses, the export of controlled goods, or matters of national security.[240]

III. The Legal Issues Concerning Current Asset-based Finance Legal Framework

As previously discussed, the Cape Town Convention and the Space Protocol are unquestionably pioneering system of international harmonized private law. However, why the Space Protocol has not been regarded as useful as it should have been in terms of contract regulation remains unanswered. This Chapter examines a number of issues in the Space Protocol and reasons that it has not been regarded as constructive including the definition of 'space assets,' the risks associated with an asset-based registry for space assets, the provision of 'public service restriction,' the declarations option, and the designation of the 'Supervisory Authority.'

1. The Concept of Space Asset

Under the Space Protocol, a 'space asset' is defined to include a spacecraft, as well as a payload, a part of a spacecraft or payload such as a transponder that is in space or is 'designed to be launched into

[240] Articles XXXIII, XXXV, XXVI of the Space Protocol.

space.'[241] The latter two types of assets, a payload and a part of a spacecraft or payload, qualify as space assets only to the extent that they are capable of being registered separately in accordance with the regulations.[242] This definition allows the creation of an international interest in an asset that is already in outer space and a space asset that has not yet been launched.[243] As the majority of funding for a spacecraft occurs before launch, the Space Protocol applies to an object at the moment of manufacture when it can be identified as a space asset.

In some instances, it may be difficult to determine whether an asset is designed to be launched into space or not. With the unique design requirements for an asset to survive the space environment, it appears straightforward to define what constitutes a space asset designed for use in space. An ongoing legal argument over the delimitation of air space and outer space as well as technological development in process makes it hard to distinguish objects that are designed for launch into space.

This definition is unique in that it provides for the recognition of a payload, parts of a spacecraft or a payload as international interests which is not permitted under other Protocols along with the Aircraft Protocol.[244] However, because there are numerous payloads and parts of a spacecraft or payload, delegations at the Diplomatic Conference were unable to determine what will be the subject of financing transactions under the Cape Town Convention and the Space Protocol in practice.[245] Furthermore, the Supervisory Authority will regulate whether a payload, a part of a spacecraft or payload should be the

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[241] Article I(2)(k) of the Space Protocol.

[242] *Ibid*.

[243] Sundahl, *supra* note 5, p. 35.

[244] McPhillips/ Rosen/ Kozuka/ Kennedy, *supra* note 188, p. 58.

[245] *Ibid*.

subject of registrable international interests or not after it is created.[246] Hence, Article I(2)(k) of the Space Protocol specifically includes the phrase; "in respect of which a separate registration may be effected in accordance with the regulations."

2. The Error Risk Asset-based Registry

Apart from the issue regarding the definition of a 'space asset,' the other one is the identification of an asset. As the Cape Town Convention and the Space Protocol are based on asset registration, they are not able to organize international interests properly if asset identification is not applicable.

Due to the lack of a universally consolidated system for allocating serial numbers to space assets, each manufacturer uses different serial numbering systems and a coordinated system does not exist. To address this problem, the Preparatory Commission adopted a 'unique identification number'[247] for space asset identification, issued by the Registrar.[248] The owner of a space asset may request issuance of a 'unique identification number' by providing the following information: (a) the name of the owner, (b) the name of the manufacturer, (c) the manufacturer's contract reference number and (d) the category of space asset.[249] However, one may discover that it is not feasible to identify

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[246] Kozuka, Souichirou/ Taniguchi, Fuki, *An Economic Assessment of the Space Assets Protocol to the Cape Town Convention*, Uniform Law Review, Vol. 16 (2011) p. 934.

[247] Section 5.3 of the Space Registry Regulations, Prep. Comm. Space/4/Doc. 6 rev. 2 (2015).

[248] McPhillips/ Rosen/ Kozuka/ Kennedy, *supra* note 188, p. 56.

[249] Annex 2 of the Space Registry Regulations.

each space asset uniquely simply with the item, type, and associated contract in order to cover all present and future space assets.[250]

To ensure that this system is properly utilized, an internationally standardized classification of space assets should be established to serve as a common reference point for identifying space assets.[251]

Article XVII(3) of the Space Protocol provides that

"[u]nless otherwise agreed, a creditor may not enforce an international interest in a space asset that is physically linked with another space asset so as to impair or interfere with the operation of the other space asset if an international interest or sale has been registered with respect to the other space asset prior to the registration of the international interest being enforced."[252]

This means that a creditor should be aware of pre-existing international interests in the space asset as well as those in other space assets that are physically linked to the former while registering the space asset.[253] Due to the provision of physically-linked assets, if a payload or transponder is registered as an international interest prior to being attached to a spacecraft, its international interest registration will not be included into the unique identification number of the spacecraft.[254] As a result, even if the creditor conducted a thorough check of the Registry for information about the spacecraft before registering the asset, the creditor may face difficulties in collecting the funds.

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[250] See, International Organization for Standardization (ISO), *ISO/TC 20 Business Plan*, available at: https://isotc.iso.org/livelink/livelink/fetch/2000/2122/687806/ISO_TC_020_Aircraft_and_space_vehicles_pdf?nodeid=1195698&vernum=-2 (last accessed 12 July 2021); *see also* Ametova, *supra* note 168, p. 223.

[251] *Ibid*.

[252] Article XVII(3) of the Space Protocol.

[253] McPhillips/ Rosen/ Kozuka/ Kennedy, *supra* note 188, p. 59.

[254] *Ibid*.

3. Matters Relating to Public Service Restriction

One could argue that the nature of 'public service' and the provision of public service restrictions were the most complicated issues to resolve during the establishment of the Space Protocol. Space activities have historically and continuously served dual purposes: military and civil. They have been dominated and controlled by sovereign States and/ or private entities, or jointly occupied and controlled regardless of purposes.[255] Such distinctive characteristic of the space industry concerned the sub-committee as they discussed default provisions for a space asset, one that is used for a public service. The committee particularly expressed concerns over potential possible discontinued public functions of a satellite as a result of uniform default provisions.[256] To find a proper balance between a creditor's exercise of remedies and the protection of the public interest in this regard, the committee included certain limitations on remedies clauses for a public service space asset in the Space Protocol.

Article XXVII of the Space Protocol specifies that if a public service notice is registered, a creditor cannot enforce any remedy against the space asset if the enforcement of that remedy "would make the space asset unavailable for the provision of the relevant public service."[257] At the same time, the Article provides a number of restrictions on the application of this provision on remedies in order to mitigate the creditor's economic impact. It states that the clause applies only to the

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[255] Johnson, *supra* note 100, p. 51.

[256] UNIDROIT, *Annual Report – 2009*, II. Legislative Activities, A. Work in Progress. 1. International Interests in Mobile Equipment a. Preliminary draft Space Protocol, Rome (2009) p. 9*; see also* Johnson, *supra* note 100, p. 51.

[257] Article XXVII(3) of the Space Protocol.

enforcement of an international interest in a space asset that performs a public service indicated in a registered 'public service notice.'[258] The clause on the enforcement of remedies will not apply to international interests that were registered prior to the registration of the public service notice.[259] The clause on remedies precludes the exercise of remedies that impair the provision of the public services.[260] It means if the public service provider fails its obligations to the debtor, the stay is immediately lifted allowing the creditor to pursue all available remedies.[261]

However, the limitation of the enforcement of remedies under Article XXVII (9) applies only in three circumstances. First, the international interest was created before the debtor entered into the public service agreement.[262] Second, the creditor did not know the service agreement when registering its international interest.[263] Third, the relevant public service notice was registered more than six months after the launch of the relevant space asset.[264]

It is also an issue that there is no consensus regarding the definition of a 'public service' in Article XXVII of the Space Protocol. Related parties can ascertain that a space asset is being used for a public service only by registering a 'public service notice' in the International Registry, and the notice should describe the services intended to support the provision of a public service recognized as such under the applicable laws of the relevant Contracting State at the time of registration.[265]

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[258] Article XXVII(1) of the Space Protocol.

[259] Article XXVII(9) of the Space Protocol.

[260] Article XXVII(8) of the Space Protocol.

[261] *Ibid*.; *see also* Sundahl, *supra* note 5, p. 105.

[262] Article XXVII(9) of the Space Protocol.

[263] *Ibid*.

[264] Article XXVII(10) of the Space Protocol.

[265] Article XXVII(2)(a) of the Space Protocol; Goode, *supra* note 170, p. 195.

Even if the space asset is not intended for a public use, it may be protected by the public service restriction provision if the debtor registered it with the public service notice. The absence of a definition of 'public service' yields the scope of the provision too vague to determine to which extent the term 'public service' can be interpreted without upsetting the balance between remedies and public interest protection.

4. The Declarations Option of Contracting States

The Cape Town Convention and the Space Protocol have opt-in and opt-out clauses with no-reservation to prohibit reservations but permit specific opt-out declarations.[266] Opt-in clauses are defined as optional clauses which are based on the will of the Contracting States to accept the additional obligation set out in the clause. Opt-out clauses are the opposite of opt-in clauses such that Contracting States must declare to be subject to additional legal obligations.[267] Most of the Contracting States already use some of these clauses enthusiastically.

For instance, Article 60(1) of the Cape Town Convention contains opt-in clauses establishing priority rules for pre-existing rights or interests. Three States, Canada, Mexico, and Ghana, have declared an opt-in to this provision.[268] Except Seychelles, Syrian Arab Republic, and

[266] Article 56 of the Cape Town Convention; *see also* Articles XLI, XLII, XLIII of the Space Protocol.

[267] Galbraith, Jean, *Treaty Options: Towards a Behavioral Understanding of Treaty Design*, Virginia Journal of International Law, Vol. 53 (2013) p. 322.

[268] Article 60(1) of the Cape Town Convention.

Zimbabwe, all Contracting States have declared an opt-out of Article 54(2), which stipulates extra-judicial remedies.[269]

The purpose of these clauses is to provide States with flexibility, whereas opt-in and opt-out clauses are binding without any acceptance of other Contracting States. However, this goes against the very purpose of the Cape Town Convention and the Space Protocol, which are established to harmonize prioritization, protection and enforcement of rights in multi-jurisdictional mobile equipment.

Fortunately, opt-in and opt-out provisions have restrictions even though Contracting States declared to include or exclude certain clauses. The priority of a pre-existing right or interest over a registered international interest should be restricted to a right or interest created or arising prior to the registration of the international interest under Article 60.[270] Even if Contracting States declared to exclude Article 50, internal transactions can also be registered as an international interest and considered the equivalent priority as other international interests.[271] These restrictions consolidate the Cape Town Convention and protect the entirety of the Convention's original intent, which is to build a uniform and predictable international registration system.

Nonetheless, because the Space Protocol has not yet entered into force, no Contracting States have declared to opt-in or/ and opt-out of particular clauses. As a result, it is highly improbable that the declarations option under the Space Protocol will have any effect on the Contracting States or the Protocol itself.

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[269] Article 54(2) of the Cape Town Convention.

[270] Article 60 of the Cape Town Convention.

[271] Article 50 of the Cape Town Convention.

5. Issues Regarding the Supervisory Authority with UNDROIT

Initially, it was proposed that the UNCOPUOS should serve as the Supervisory Authority for the registrar at the beginning in 2003.[272] The attempt failed due to the opposition, which argued that the commercially-oriented activities were outside the scope of the competence of the United Nations. Rather than the UNCOPUOS, the ITU expressed its interest in taking over as the Supervisory Authority of the International Registry for Space Assets in 2011.[273] The ITU Council 2012-2016 examined the role of the Supervisory Authority, the participation of the ITU in the Space Protocol, and the impact of the acceptance or the rejection of the ITU.[274] However, no international organization has yet emerged that agrees to perform as the Supervisory Authority on a regular basis, and hence the position remains vacant.

IV. Comparison with the Aircraft Manufacturing Industry

The space industry is still developing and does not have a solid business structure yet. Even though numerous private companies and developing countries are involved in the industry, it remains almost exclusively in the hands of a few space powers. One reason is with financial and

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[272] van Fenema, *supra* note 201, p. 275.

[273] See, ITU, *Supervisory Authority of the Future International Registration System for Space Assets*, available at: https://www.itu.int/en/ITU-R/space/Pages/spaceAssets.aspx (last accessed 12 July 2021); *see also* Tâiatu, Claudiu Mihai, *The International Telecommunication Union (ITU) as the Proposed Supervisory Authority of the Future International Registry for Space Assets*, Uniform Law Review, Vol. 23 (2018) p. 508.

[274] See, *Ibid*.; *see also* Preparatory Commission for the Establishment of the International Registry for Space Assets Pursuant to the Space Protocol, Prep. Comm. Space/5/Doc.2 (2017) p. 4.

technological concerns and another is with space-faring States' national security, or the protection of their own sovereignty. The aviation industry was similar to the space industry in that it was initially developed for military purposes and led by a government. It is still exclusively government business in some countries, though recently there are a large number of private companies operating successfully in the aviation industry without the government's management.

The majority of aircraft manufacturers such as Airbus and Boeing are also building satellites. It indicates that the aviation and space industries are strongly connected and share comparable development processes and purposes of use. Thus, the study on how the aviation industry has evolved is a key to understand why the Aircraft Protocol succeeded while the Space Protocol failed. The deduction could be demonstrated through a comparison of the current commercial aviation industry with the future structure of the space industry and the need for the legal regime.

1. The Background of Aircraft Manufacturing Industry

Commercial aircraft manufacturing began in the 1920s, and during World War II, the industry grew exponentially in response to the increasing passenger demand generated by remarkable global market expansion.[275] Boeing notes in its commercial market outlook 2021-2040 that since 1961 the number of commercial operators increased to

[275] von Planta, Niclas, *The Aircraft Protocol to the Cape Town Convention on Aircraft Financing: A Civil Lawyer's Perspective*, Thesis submitted to Institute of Air and Space Law, McGill University, Montreal (2009) p. 9.

nearly 200, while passenger traffic has grown by a factor of nearly 70.[276] The global airline network has expanded 2.5 times since 2000, and air traffic between emerging markets drove its growth in the last decade.[277] Due to rapid growth in passenger traffic and the need to replace used aircrafts, commercial carriers were forced to seek alternative sources of financing for aircraft acquisitions, such as various types of lease financing or short-term bank loans.[278] Besides, the International Air Transport Association (IATA) reported in 2021 that net industry losses are expected to reduce to 11.6 billion USD in 2022 after 51.8 billion USD loss in 2021 as a result of the Coronavirus pandemic.[279] This decline has had a significant impact on the aircraft manufacturing industry as well. Even prior to the global travel shutdown, the industry saw a gradual decline in the number of general aviation and air taxi aircraft as the fleet aged and required more repairs and maintenance, despite the fact that the economy continued to grow and more people spent disposable income on travel.[280]

The aviation industry today is a key component of the global economy infrastructure and is an extremely attractive enterprise resulting from globalization.[281] As a result, banks, other private investors, and institutional lenders have developed a variety of methods for aircraft financing to support the aircraft industry in purchasing or manufacturing an aircraft or even a part of an aircraft despite the high

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[276] Boeing, *Commercial Market Outlook 2021-2040*, available at: http://www.boeing.com/commercial/market/commercial-market-outlook/ (last accessed 12 July 2021).

[277] *Ibid*.

[278] Chen, Qian, *Legal Aspects of Aircraft Financing and New Challenges for China*, Thesis submitted to Institute of Air and Space Law, McGill University, Montreal (2008) p. 1.

[279] IATA, *Losses Reduce but Challenges Continue – Cumulative $201 Billion Losses for 2020-2022*, available at: https://www.iata.org/en/pressroom/2021-releases/2021-10-04-01/ (last accessed 28 February 2022).

[280] Gordon Brothers, *Aircraft Manufacturing & Inventory Trends*, available at: https://www.gordonbrothers.com/insights/industry-insights/commercial-and-industrial-aircraft-engine-and-parts (last accessed 12 July 2021).

[281] Chen, *supra* note 278, p. 1.

risks associated with the world's complicated and unharmonized legal system. Financiers initially sought to mitigate the risks associated with aircraft financing through the 1948 Geneva Convention on International Recognition of Rights in Aircraft[282]. The Geneva Convention was merely a treaty that granted the State of Registration the privilege of perfecting property rights over aircraft, including mortgages, but it did not establish uniform international rules for financing, leasing, and sale of aircraft.[283]

There are numerous rules governing aircraft transfers, including the domicile of the owner of the aircraft (*lex domicilii*), the instrument of transfer (*lex actus*), the *lex situs*, and the *lex registri* that were significantly discussed in the *Blue Sky* litigation,[284] which raised concerns about aviation financing.[285] The litigation arose out of transactions entered into in 2006 against the backdrop of the United States sanctions prohibiting the sale of aircraft and aircraft with significant components of the United States to Iranian individuals or companies.[286] The English High Court determined which law applied to property transactions and confirmed that the *lex situs* rule (excluding *renvoi*) is the orthodox rule, extending it to aircraft mortgages.[287] The Court rejected the application of *lex registri* as the proper law and made no reference to the property aspects of outright title transfer.[288]

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[282] Convention on the International Recognition of Rights in Aircraft, 310 UNTS 151, adopted on 19 June 1948, entered into force on 17 September 1953 (hereinafter, 'Geneva Convention').

[283] Arani, Mojtaba Eshraghi, *The Legal Impediments to the Accession of Iran to the Cape Town Convention on International Interests in Mobile Equipment and the Aircraft Protocol*, Uniform Law Review, Vol. 24, Issue. 1 (2019) p. 235.

[284] Blue Sky One Ltd and Others v Mahan Air and Another – the case was heard in two phases, (2009) EWHC 3314 (Comm) and (2010) EWHC 631 (Comm).

[285] Glaister, William J/ Murphy, Robert/ Chan, Marisa/ Dunne, Ellie/ Acratopulo, Julian, *Lex Situs after Blue Sky: is the Cape Town Convention the Solution?*, Cape Town Convention Journal, Vol. 1, No. 1 (2012) p. 10.

[286] *Ibid*., p. 8.

[287] *Ibid*., p. 9.

[288] *Ibid*.

The decision in the *Blue Sky* litigation disturbed grave concern the aviation industry, the United Kingdom as well as other countries where English law is chosen as the applicable law, because it can be affected to other transactions by financiers' lack of physical and jurisdictional control over the aircraft which is highly mobile and can be operated anywhere in the world.[289] UNIDROIT, in collaboration with the International Civil Aviation Organization (ICAO), highlighted the Cape Town Convention and the Aircraft Protocol as enhancing and unifying international private law regarding the financing, leasing, and sale of high value, mobile equipment through this litigation.[290]

2. The Aircraft Protocol of the Cape Town Convention

As with the Space Protocol, the Aircraft Protocol supplements the Cape Town Convention to address the unique requirements of aircraft finance and aircraft equipment sales contracts.[291] The Cape Town Convention and the Aircraft Protocol are intended to mitigate risks and to increase the value of aircraft objects and receivables used as collateral.[292] States Parties that adopted the necessary declarations ('qualifying declarations') are eligible for a discount (the 'Cape Town Convention discount') on the rate of premiums charged to operators, borrowers,

[289] *Ibid*., p. 10.

[290] Arani, *supra* note 283, p. 235.

[291] Preamble of the Aircraft Protocol.

[292] Goode, Roy, *Official Commentary on the Convention on International Interests in Mobile Equipment and Protocol Thereto on Matters Specific to Aircraft Equipment*, International Institute for the Unification of Private Law, Rome (3rd ed., 2013) p. 201.

purchasers, and lessors of aircraft based in a Contracting State for officially supported export credits.[293]

The Aircraft Protocol is also unique as it includes a set of supplemental definitions, additional default remedies outside of insolvency, specific insolvency remedies, the Supervisory Authority and Registrar, and the International Registry.[294] Thus, this Chapter will discuss the four primary modifications from the Cape Town Convention that were made to accommodate the unique needs of the aircraft industry.

To begin with, the Cape Town Convention and the Aircraft Protocol define the term 'aircraft objects' to refer to airframes, aircraft engines, and helicopters.[295] The Aircraft Protocol stands out in that it treats airframes and aircraft engines separately, even if the aircraft engine is already installed on the airframe.[296]

The term 'aircraft' is derived from the purposes of the Convention on International Civil Aviation (the 'Chicago Convention'), which is a public aviation law aimed at developing a safe and orderly international civil aviation system as well as an equal opportunity system that is financially sound and economically feasible for the international air transport services.[297] However, Article 3 of the Chicago Convention refers only to civil and State aircraft and makes no direct reference to the term 'aircraft.' Instead, Annex 7 of the Chicago Convention states that an aircraft is "any machine that can derive support in the

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[293] *Ibid*.; *see also* OECD, *OECD Sector Understanding on Export Credits for Civil Aircraft*, TAD/PG (2019)1, 2 January 2019.

[294] Goode, *supra* note 292, p. 203; *see also* Articles I, VII, IX, X, XI, XVII, and XIX of the Aircraft Protocol.

[295] Article 2(3) of the Cape Town Convention; *see also* Article I(2)(c) of the Aircraft Protocol.

[296] Goode, *supra* note 292, p. 203.

[297] Preamble and Article 3 of the Convention on International Civil Aviation, 15 UNTS 295, adopted on 7 December 1944, entered into force on 4 April 1947 (the 'Chicago Convention'); *see also* Article I(2)(a) of the Aircraft Protocol.

atmosphere from the reactions of the air other than the reactions of the air against the earth's surface."[298]

As the Aircraft Protocol is based on the Chicago Convention and its Annexes, the terms 'aircraft' and 'aircraft objects' are used in a straightforward manner. The terms 'aircraft engines,' 'airframes,' and 'helicopters' which were recently added to the international legal system, are defined in detail under Article 1(2)(b), (e), and (l) of the Aircraft Protocol.[299] These definitions treat airframes, aircraft engines, and uninstalled helicopter engines as distinct objects that can be registered and become an international interest under the Cape Town Convention and the Aircraft Protocol.[300]

Specifically, an aircraft engine, whether installed on an airframe or not, is not an accessory to the airframe; rather, it constitutes a distinct object, and its installation has no effect on rights under Article XIV (3) and (4) of the Aircraft Protocol.[301] Due to the high cost of aircraft engines and their importance to the operation of an aircraft, airlines typically own spare engines, lease them from engine lessors, or have access to a pool of spare engines shared with other operators in order to keep their aircraft operational in the event of an engine repair or overhaul.[302] As a result, an aircraft engine can be treated as an international interest and it can be registered separately from any distributions such as installation on or removal from an aircraft. It does not, however, conflict with international interests in airframe, which appear to be objects excluding

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[298] Annex 7 of the Chicago Convention; *see also* Goode, *supra* note 292, p. 204.

[299] Article I(2)(b), (e), (l) of the Aircraft Protocol.

[300] Goode, *supra* note 292, p. 205.

[301] Article XIV (3), (4) of the Aircraft Protocol; *Ibid*.

[302] Crans, Berend, *How Many Engines on a Boeing 737? An Analysis of Accession Rules in Relation to Aircraft Engines*, Air & Space Law, Vol. 38, Issue. 3 (2013) p. 229.

engines.[303] An international interest in helicopter engines vanishes once the engines are installed on a helicopter.[304]

Secondly, Articles IX, X, XI (Alternative A, paragraph 8) and XIII of the Aircraft Protocol modify the default rules of the Cape Town Convention and add new remedies to address the unique demands of the aviation industry.[305] Creditors may obtain the de-registration of the aircraft, as well as the export and physical transfer of the aircraft object from the territory in which it is located, in addition to the remedies specified in Chapter III of the Cape Town Convention.[306]

The purpose of these two additional remedies is to seize and transfer to the creditor any aircraft or aircraft objects that remain in the debtor's control.[307] As the Chicago Convention does not provide for de-registration, these new provisions provide an efficient method of de-registering an aircraft in one Cape Town Convention Contracting State and re-registering it in the transferee State, which is governed by the transferee State regardless of whether the State is a party to the Cape Town Convention or not.[308] While the de-registration provisions apply only to aircraft because only aircraft are registered, the export and physical delivery provisions apply to an aircraft object including both installed and uninstalled engines as well as to the aircraft itself.[309]

The Aircraft Protocol adds a more general duty of commercial reasonableness to Article 8(3) of the Cape Town Convention to provide greater certainty for the parties.[310] While Article X of the Aircraft

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[303] See, the definition under Article 1(2)(e) of the Aircraft Protocol.

[304] McPhillips/ Rosen/ Kozuka/ Kennedy, *supra* note 188, p. 58.

[305] Goode, *supra* note 292, p. 216.

[306] Article IX (1) of the Aircraft Protocol.

[307] Goode, *supra* note 292, p. 217.

[308] *Ibid*.

[309] *Ibid*.

[310] Article IX (3) of the Aircraft Protocol; *see also* Goode, *supra* note 292, p. 227.

Protocol applies only when a Contracting State has made a declaration to that effect, it also modifies Article 13 of the Cape Town Convention regarding speedy relief, pending final determination of the creditor's claim.[311]

Thirdly, similar to the Space Protocol, the Aircraft Protocol establishes the Supervisory Authority and the International Registry for aircraft objects. Although there is no specific Supervisory Authority for the International Registry of space objects, the Council of ICAO is the Supervisory Authority under the Aircraft Protocol.[312] The only International Registry for aircraft objects recognized by the Secretariats of the ICAO and the UNIDROIT was set up and is operated by Aviareto Limited[313] as a Registrar, a joint venture company between SITA SC[314] and the Irish Government.[315] The Registrar is governed by the Regulations and Procedures for the International Registry.[316]

The Supervisory Authority is advised by the Commission of Experts of the Supervisory Authority of the International Registry (CESAIR), a body of governmental civil aviation officials established pursuant to Article XVII(4) of the Aircraft Protocol. While the International Registry Advisory Board (IRAB), an industry-specific group of legal and technical experts appointed by Aviareto Limited advises the

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311 *Ibid*., p. 228.

312 ICAO, *Regulations and Procedures for the International Registry*, Doc 9864 (2010) available at: https://www.icao.int/publications/Documents/9864_4ed.pdf (last accessed 12 July 2021).

313 Aviareto, an Irish incorporated limited liability company having its registered office in Dublin, Ireland, is a joint venture registered office in Dublin, Ireland, is a joint venture of the Irish government and SITA, a multinational information technology company proving IT and telecommunication services to the air transport industry.

314 SITA SC is a multinational air transport telecommunications company owned by the world's airlines. See, SITA, *About us*, available at: https://www.sita.aero/about-us/ (last accessed 12 July 2021).

315 *Ibid*.

316 ICAO, *supra* note 312; McPhillips/ Rosen/ Kozuka/ Kennedy, *supra* note 188, p. 30.

Registrar on matters relating to the needs of the users in connection with the operations of the Registry, Aviareto Limited is assisted by the IRAB.[317]

Finally, under the Article XVI of the Aircraft Protocol, a debtor who is a conditional buyer or lessee is granted quiet possession vis-à-vis its creditor, the conditional seller or lessor, and the holder of another interest in the object.[318] The Aircraft Protocol does not define the term 'quiet possession' or specifies the types of acts that constitute an infringement of the right to 'quiet possession,' but the concept of quiet possession refers to protection against interference with the debtor's possession, use or enjoyment of the aircraft object.[319] As a result, any act of interference either through physical seizure, incapacitation of the aircraft object, or through restriction of access to it constitutes a violation of the right to quiet possession.[320]

Article XVI of the Aircraft Protocol extends the protection of the conditional buyer and lessee to the debtor in the 'capacity of buyer,' which is a priority outright buyer.[321] Although such a buyer is technically not a debtor, the buyer is treated as a debtor for the purposes of Article XVI of the Aircraft Protocol.[322]

3. Reasons for the Success of the Aircraft Protocol

[317] Goode, *supra* note 292, p. 231.

[318] *Ibid*., p. 265.

[319] *Ibid*., p. 267.

[320] *Ibid*.

[321] *Ibid*., p. 266.

[322] *Ibid*., p. 267.

Ever since its entry into force, the Aircraft Protocol has demonstrated its effectiveness and significance.[323] As of 2022, the Aircraft Protocol has 80 contracting States, and according to the most recent data available in 2019, registrations of approximately 987,463 aircraft objects have been effected on the International Registry since 2008.[324] This was the highest number of registrations ever recorded, and all areas of activity, including applications, searches, and registrations, grew in 2018.[325] As a result, financing and leasing of aircraft and engines have drastically shifted in a relatively short period of time from purely national registrations to registrations under the Cape Town Convention in the Registry, and in many cases, a combination of both.[326]

A relatively high rate of ratification and registration according to the Aircraft Protocol explains the need for a legal framework to mitigate credit risk in the aircraft transaction market and aircraft finance.[327] Due to the unique characteristics of the aviation industry, financing costs and risks have been extremely high, including credit risk and policy risk. To address these needs and requirements, the Cape Town Convention and the Aircraft Protocol were practically established by market participants, particularly aircraft manufacturers and financiers, as well as relevant industry organizations. As aviation is dependent on an aircraft and other equipment such as aircraft engines, infrastructure, and other air

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[323] See generally, Klang, Jeffrey, *Perspectives on the Cape Town Convention and Aircraft Equipment Protocol*, The Air and Space Lawyer, Vol. 31, Issue. 1 (2018).

[324] UNIDROIT, *Protocol to the Convention on International Interests in Mobile Equipment on Matters Specific to Aircraft Equipment – Status*, available at: https://www.unidroit.org/status-2001capetown-aircraft (last accessed 6 March 2022); *see also* Aviareto, *International Registry of Interests in Aircraft Equipment: Thirteenth Annual Statistical Report 1 January 2018 – 31 December 2018*, p. 11, available at: https://www.aviareto.aero/wp-content/uploads/2020/07/13th-Annual-Statistical-Report-of-the-Registrar-2018_.pdf (last accessed 6 March 2022).

[325] See, Aviareto, *supra* note 324, p. 5.

[326] See, Weber, Ludwig, *Public and private features of the Cape Town Convention*, Cape Town Convention Journal, Vol. 4, No. 1 (2015) p. 53.

[327] Eberg, Artur/ Weber, Ludwig, *The Cape Town Convention and Its Implementation in the Commonwealth of Independent States (CIS)*, Air and Space Law, Vol. 39, No. 1 (2014) p. 4; *see also* Weber, *supra* note 326, p. 54.

transportation services, aircraft financing has evolved into a variety of forms to meet the needs of various parties including manufacturers, investors, trustees, lessors, and end users.[328] With these diverse perspectives from practitioners, the Cape Town Convention and the Aircraft Protocol systems are able to address the market needs.

The separate protection of aircraft engines by the International Registry is an essential success factor. As the purpose of an aircraft engine is to transport an aircraft from one jurisdiction to another, financier's legal rights were unpredictable, resulting in numerous risks and inconsistent requirements and restrictions between countries.[329] Because an aircraft engine could be considered a permanent part of the aircraft, national laws rarely permit the registration of ownership rights or secured interests in an engine, in contrast to aircraft.[330] To address this issue, long before the Cape Town Convention system was established, engine manufacturers expressed a strong desire for a robust and efficient engine financing market.[331] Within the framework of these engine industry requirements, an engine is eligible for registration in the International Registry under the Cape Town Convention and the Aircraft Protocol. It has been demonstrated that registering an interest in an aircraft engine is a highly efficient method of notifying all countries, and encouraging parties to consistently use the framework of the Cape Town Convention and the Aircraft Protocol to register aircraft engine interests. The majority of used aircraft engine sales are now registered as sales on the International Registry, creating a searchable

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[328] Tenev, Jovi, *Some Observations on Dr Ole Böger's 'The Case for a New Shipping Protocol to the Cape Town Convention Covering Security over Ships' – a Modest Proposal*, Cape Town Convention Journal, Vol. 5, No. 1 (2016) p. 114.

[329] See, Wilson, F. Scott, *Reflections on Two Cape Town Convention Innovations*, The Air & Space Lawyer, Vol. 31, No. 1 (2018).

[330] *Ibid*.

[331] *Ibid*.

record of chain of ownership.[332] This system increases transparency and trustworthiness of aircraft engine transactions.

Finally, a 'Cape Town discount' for aircraft operators, which lowers the cost of credit, is another compelling reason to ratify the Cape Town Convention and the Aircraft Protocol. This discount is being offered by governmental export credit agencies in accordance with an Organization for Economic Co-operation and Development (OECD)'s Aircraft Sector Understanding that began in 2006.[333] Members of the Cape Town Convention and the Aircraft Protocol may qualify for a 10 percent reduction in the Minimum Premium Rates charged by governmental export credit agencies.[334]

The Aircraft Protocol was established to increase the ability of airlines to access capital at lower financing costs, while providing aircraft and engine manufacturers with expanded markets and increased sales, as well as to ensure the safety of the global aviation industry via the International Registry.[335]

V. Conclusion

This Chapter found that the *Corpus Iuris Spatialis* does not address typical commercial and private law issues such as the international financing schemes for space activities and the corresponding legal

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[332] *Ibid*.

[333] Eberg/ Weber, *supra* note 327, p. 4; *see also* Weber, *supra* note 326, p. 54.

[334] OECD, *Aircraft Specific Rules*, available at: http://www.oecd.org/trade/topics/export-credits/arrangement-and-sector-understandings/aircraft-specific-rules/ (last accessed 12 July 2021); *see also* Traschler, Thomas, *The Significance of the Qualifying Declarations Under the Cape Town Convention*, Uniform Law Review, Vol. 24 (2019) p. 43.

[335] See, Klang, *supra* note 323.

security rights and collateral to be held.[336] The *Corpus Iuris Spatialis* contains few commercial and private legal issues as it is public international law that applies between sovereign States. And the rapid commercialization of space activities was unanticipated at the time it was drafted. However, along with international responsibility and liability, jurisdiction and control under the *Corpus Iuris Spatialis* are key issues for space financing because they establish appropriate jurisdictional States and are applicable to international or national space legislation. After several decades, a first attempt at resolving space financing issues resulted in the Space Protocol, which would apply a more general international regime of the Cape Town Convention to international mobile assets in the space sector.

Although the Cape Town Convention and the Space Protocol address the international private law aspects of asset-based financing and they do not seek to regulate the ownership of space assets, their implementation may have certain implications for the original owner's international legal obligations, as well as those of the launching State.[337] For example, the seizure of property rights or control may have an effect on the launching States' ability to meet their obligations.[338]

However, the Space Protocol is not in force yet, due to the difference in definitions of the terms 'space assets' under the Space Protocol and 'space objects' under the *Corpus Iuris Spatialis*, the risks associated with an asset-based registry for space assets, the provision of 'public service restriction,' the declarations option, and the 'Supervisory Authority.' Furthermore, the space industry is still in its infancy. Hence, there are not as many space assets to trade for finance purposes as there are in the aircraft manufacturing industry. On the contrary, even in international aircraft financing, where multiple jurisdictions are involved and complicated conflicts of law exist, the Cape Town

[336] von der Dunk, *supra* note 19, p. 423.

[337] Ribbelink, *supra* note 147, p. 42.

[338] *Ibid*.

Convention and the Aircraft Protocol have been successfully adopted.[339] Based on well-developed markets for asset-based finance in the aircraft transaction market and aircraft finance industry, the Cape Town Convention and the Aircraft Protocol have already demonstrated their effectiveness and significance.

In comparison to the aviation industry, the space industry is still in its early stages of development. While both industries faced economic and legal challenges as a result of increased commercialization, the aviation industry overcame a lack of economic regulatory framework through the Chicago Convention and the resulting ICAO, and accepted the Cape Town Convention and the Aircraft Protocol, while the space industry was not ready to move forward.[340] If the space industry accepts the Cape Town Convention and the Space Protocol, which are based on asset-based financing, it opens up opportunities for less expensive funds. A uniform and transparent legal regime would benefit start-up companies and developing countries, or 'economies in transition,' which encounter significant difficulties financing space-based systems for telecommunications, meteorological services, telemedicine, environmental monitoring, and disaster forecasting, among other applications.[341]

The Cape Town Convention and the Space Protocol are estimated to have a cost-cutting effect of 20-40 percent on the financing of space activities if the Space Protocol is in force.[342] Because the Cape Town Convention and the Space Protocol provide significant risk reduction to lenders in secured financing transactions, lower funding costs on export

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[339] Chen, *supra* note 278, p. 2.

[340] See, Eng Teong, *Commercialization of Space Activities- The Laws and Implications*, Journal of Air Law and Commerce, Vol. 82, Issue. 1 (2017) p. 168.

[341] Kozuka, Souichirou/ Taniguchi, Fuki, *The Economic Assessment of the Space Assets Protocol to the Cape Town Convention*, in Proceedings of the 52nd Colloquium of the International Institute of Space Law (2012) pp. 409, 419; *see also* Sundahl, *supra* note 5, p. 21.

[342] Ribbelink, *supra* note 147, p 38.

credit, risk reduction through the registration system, and minimum legal fees to the space industry.[343] As asset-based financing allows actors in the space industry to create a new lower risk level for financiers, the Cape Town Convention and the Space Protocol dramatically facilitate an uniform regulatory regime for the recognition, protection, and enforcement of security interests in space assets.[344]

Nonetheless, during the 2011 UNIDROIT Space Protocol Workshop, ING Bank stated as follows:

"the satellite finance market is not an asset-based finance market as a satellite system is specifically designed to support a business case using pre-determined radio frequencies and tailored antennas. Therefore, the lending has to be based on the cash flow projections of commercially viable businesses. The cash flow will drive the valuation of the satellite. There is no secondary market for space assets, apart from 'placeholder satellites,' used to safeguard certain orbital frequency rights, or those assets used for 'early entry' strategies."[345]

This indicates that the current space industry is not yet ready to leverage asset-based financing. Alternatively, the industry could benefit from project finance, which is based on future cash flows. That is why the following Chapter will provide an adequate legal framework for the

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[343] Linetsky, Vadim, *Accession to the Cape Town Convention by the UK: An Economic Impact Assessment Study*, available at: https://ctcap.org/wp-content/uploads/2020/02/Acession-to-the-CTC-by-the-UK-Economic-Impact-Study-Linetseky-2010.pdf (last accessed 5 April 2022); *see also* Linetsky, Vadim, Economic Benefits of the Cape Town Treaty, available at: https://ctcap.org/wp-content/uploads/2020/02/Economic-Benefits-of-the-CTC-Vadim-Linetsky-2009.pdf (last accessed 5 April 2022); *see also* Kozuka/ Taniguchi, *supra* note 341, pp. 409, 419; *see also* Sundahl, *supra* note 5, p. 21.

[344] Hameed, Hamza, *Asset-based Financing in the Space Sector: the Space Protocol of the Cape Town Convention*, available at: https://prezi.com/p/ueedmqetgnb2/space-protocol-of-the-cape-town-convention/ (last accessed 1 March 2022).

[345] UNIDROIT, *UNIDROIT Space Protocol Workshop Summary*, available at:https://www.space-institute.org/wp-content/uploads/2011/01/UNIDROIT-Space-Protocol-Workshop-Summary-final.pdf (last accessed 12 July 2021).

implementation of a sustainable and transparent international project finance in the current space industry.

Chapter Three: Proposal for a New Legal Framework of Project-based Financing

In budding industries like the space industry, dependence on project specific constraints within the license or concession along with limiting governing pricing, service quality, and competition creates significant risk.[346] And such risk is exacerbated if unpredictable contract amendments are made periodically from negotiations and the government lacks the expertise and bargaining leverage to guarantee that the regulatory contract strikes an adequate balance between public and private interests.[347] Hence, a suitable legal framework is a key component in reducing risk of failure. However, the international legal regime for the space industry is limited to a single convention and a protocol on space financing, which is not in force yet.

Despite the absence of laws in the space industry, space financing via project finance is growing popular on a global scale. NASA, for example, invests through the PPP regime to expand its space capabilities.[348] The National Laboratory aboard ISS is also an excellent example of a PPP concept that is successfully working in space.[349] Unfortunately, there have been failures where PPPs were inadequately

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[346] Stewart-Smith, Martin, *Private Financing and Infrastructure Provision in Emerging Markets*, Law and Policy in International Business, Vol. 26, No. 4 (1995) p. 997.

[347] *Ibid*., p. 998.

[348] NASA, *Space Tech Public-Private Partnerships*, available at: https://www.nasa.gov/directorates/spacetech/solicitations/tipping_points (last accessed 09 November 2021); *see also* AEROSPACE, *Public-Private Partnerships in Space*, available at: https://csps.aerospace.org/papers/public-private-partnerships-space (last accessed 09 November 2021).

[349] ISS National Laboratory, *Public-Private Partnerships in Space*, available at: https://www.issnationallab.org/research-on-the-iss/public-private-partnerships-in-space/ (last accessed 09 November 2021).

conceived and prepared, most notably the Galileo concession project from 2004 to 2007, but project finance is becoming increasingly essential for the EU's large satellite infrastructure projects and the satellite communication industry.[350]

To create a uniform legal regime while the number of cases grows and ensure the sustainability and transparency of project finance in the space sector, this Chapter presents two ideal legal frameworks for space industry project finance that must be developed in the near future.

I. Amendment to the Current International Financing Legal Framework

It is important to understand how the amendment of the Cape Town Convention system solves current issues concerning protection for transactions of the project finance universally. Bank loans generate transactions, that are either project finance or asset-based finance, and the system give rights to banks to collect payments as well as the security interests, which secures the loan. In the Cape Town Convention, the security interests are stipulated as 'associated rights' to securely protect and promote asset-based financing and leasing.

Thus, this Chapter focuses on the 'associated rights' with the related international interest to include transactions of the project finance under the scope of the Cape Town Convention.

[350] See, Nardon, Laurence/ Venet, Christophe, *The Development of Public-Private Partnerships in the European Satcom Sector*, Actuelles de I'Ifri, The Europe & Space Series, No. 4 (2011).

1. Definition of 'Associated Rights' under the Space Protocol

Understanding of the term 'associated rights' under the Cape Town Convention and the Space Protocol is a prerequisite for the discussion on the necessity of the amendment to the Space Protocol. Unlike other mobile assets, space assets are difficult to re-possess, and even if they are physically repossessed, these assets will be significantly devalued.[351] Thus, constructive possession through the control and use of command codes, rather than physical control of a space asset is typically the most practical method for creditors to protect their interest.[352] As a result, the Cape Town Convention and the Space Protocol apply to space assets as well as to rights assignments made by a debtor to a creditor and future reassignments made by the creditor or a subsequent assignee, allowing project finance to be safeguarded under the Space Protocol.[353]

However, it is significant to remember that the Cape Town Convention system is an asset-based registration system, and it is not a debtor-based registration system. Therefore, associated rights such as assignments and reassignments of debtor's rights cannot be protected by independent registration under the Cape Town Convention registration system.[354] They can be only recorded against the registration of an international interest for priority purposes.[355] This record against

[351] Yun, Zhao, *Revisiting Selected Issues in the Draft Protocol to the Cape Town Convention on Matters Specific to Space Assets*, Journal of Air Law and Commerce, Vol. 76, Issue. 4 (2011) p. 818.

[352] *Ibid*.

[353] Article II(1) of the Space Protocol; *see also* Goode, *supra* note 170, p. 163.

[354] Goode, *supra* note 170, p. 164.

[355] *Ibid*.

international interests ensures the successful establishment of project finance in relation to financial risks.

What is the exact definition of the term 'associated rights?' Article 1(c) of the Cape Town Convention defines 'associated rights' as "all rights to payment or other performance by a debtor under an agreement which are secured by or associated with the object."[356] In other words, associated rights are 'secured by' a security agreement or 'associated with' a title reservation or leasing agreement.[357] That is why, associated rights are made of three significant factors: 'debtor,' 'agreement,' and 'secured by or associated with.'

First of all, associated rights are limited to performance of debtor's obligations and only a creditor can assign it.[358] Obligations by third-parties do not fall under the term, associated rights, unless the debtor has agreed to ensure their performance in the agreement.[359]

Second, performance only by the debtor 'under an agreement' is relevant.[360] The debtor's rights to perform its obligations under other agreements do not qualify as associated rights unless the debtor undertakes in an agreement either specifically stated or referred to in generic terms to perform obligations under those other agreements.[361] Hence, if the debtor enters into a loan agreement and a separate security agreement to secure the loan agreement's performance, the rights to such performance constitute associated rights.[362]

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[356] Article 1(c) of the Cape Town Convention.

[357] Goode, *supra* note 165, p. 104.

[358] *Ibid*.; *see also* Goode, *supra* note 170, p. 105.

[359] Goode, *supra* note 165, p. 104.

[360] *Ibid*.

[361] *Ibid*.; *see also* Goode, *supra* note 170, p. 105.

[362] Goode, *supra* note 165, p. 104.

Third, performance must be 'secured by' or 'associated with' the agreement. In case of a security agreement, the relevant obligations are covered by the security, and other unsecured obligations are not included.[363] In the case of a title reservation agreement, on the other hand, all obligations must be fulfilled by the debtor to obtain qualified title.[364]

Article 31(1) of the Cape Town Convention allows assignments of associated rights. It provides that an assignment of associated rights made in accordance with the prescribed formalities also transfers the related international interest as well as all of the assignor's interests and priorities under the Convention to the assignee, unless the parties agree differently.[365] Regrettably, associated rights cannot be independently registered. They can be protected through the registration of the assignment of the international interest to which they relate.[366]

To be valid under the Cape Town Convention and the Space Protocol, an assignment of associated rights must be in writing and enable the associated rights to be identified by reference to the contract under which they arose.[367] Where the process has been done, the debtor is obligated to make payment or provide other performance to the assignee if the debtor has been given written notice of the assignment by or with the consent of the assignor, and the notice identifies the associated rights.[368] The key point is that Article XXIV of the Space Protocol adds a requirement that the debtor's consent to the assignment

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[363] *Ibid*.

[364] *Ibid*.

[365] Article 31(1) of the Cape Town Convention; *see also* Goode, *supra* note 170, p. 107.

[366] Goode, *supra* note 170, p. 30.

[367] Article 32(1) of the Cape Town Convention; *see also* Goode, *supra* note 170, p. 241; Sundahl, *supra* note 5, p. 67.

[368] Article 33 of the Cape Town Convention; *see also* Goode, *supra* note 170, p. 110.

should be in writing, even if that consent is general and may be given in advice.[369]

At last, the Space Protocol is applicable to all transactions and to direct transactions such as the sale of, lease of, and security interest in a space asset as well as accounts receivable, payment instruments, and any number of other forms of performance obligations that could be owed to the owner of the space asset.[370] That is why associated rights in the Space Protocol are able to involve any interests related with project finance transactions.

2. Proposed Amendment to the Space Protocol

Before discussing the proposal, it is worth emphasizing that there already exist several opt-in and opt-out declarations under the Cape Town Convention as mentioned in Chapter 2(III)(4) above. The opt-in and opt-out clauses are not a new system for the Convention and the Space Protocol.

Using the concept, this thesis proposes amending the Space Protocol to include a new opt-in clause that would treat the project through the project finance as an asset, thus subjecting it to the Cape Town Convention and the Space Protocol. New opt-in clause would bring two main benefits.

To begin with, the opt-in clause will be applicable only to the Contracting States who accept and declare the new clause based on their will. This new provision applies to all Contracting States who wish that project finance be under the terms of the Cape Town Convention and

[369] Goode, *supra* note 170, p. 110.

[370] Sundal, *supra* note 5, p. 73.

the Protocol. Contracting States that do not adopt and declare the new provision will not be subject to the provision and will continue to be subject to the same previous application.

Second, if a project under project finance is regarded as an asset, associated rights to the project can be protected through registration as an international interest under the Cape Town Convention and the Space Protocol. Adding the new provision without introducing a new legal framework will apply project finance to the well-established Cape Town Convention system, and significantly eliminate possible confusions from a new regulation.

II. A New Legal Framework for Project-based Financing

Before proposing a new legal framework for project finance in the current space industry, it is essential to see whether there are any connections between space law and alternative fields, and to understand the reasons why the analysis of other legal frameworks and cases should be considered.

Space law has developed in response to parallel areas of international legal regime, most notable maritime and air law. Space industry has developed its body of law in parallel with the maritime and aviation industries. These industries have gone through similar legal challenges posed by new private participants and rapidly evolving technologies. Hence, experiences gained from the legal challenges in other industries may be instructive for the modern space sector.[371] Outer space, as defined in Article III of the Outer Space Treaty, is subject to specific

[371] Viikari, *supra* note 19, p. 20.

rules with the *corpus iuris spatialis* and other international laws.[372] Thus, in order to discuss an ideal legal regime governing international space financing, more precisely international project finance, this examines the respective model laws containing sector-specific rules under international organizations including World Bank.

1. Examples of Project-based Financing

There is no legally enforceable international legal instrument such as international investment law that regulates international project finance. However, multilateral development banks such as the World Bank, the African Development Bank[373], and the Asian Development Bank[374] have developed standards and procedures that serve as the foundation for an international project finance regulatory framework. Multilateral agencies can assist in mitigating legal and political concerns, thereby establishing financial standards.

Using the standards and processes of multilateral development banks, participating parties can identify the degree of risk and allocate it predictably and efficiently between sponsors, suppliers, customers, financiers, and the host government. If the sponsors desire non-recourse

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[372] Article III of the Outer Space Treaty; Degrange, Valentin, *Active Debris Removal: A Joint Task and Obligation to Cooperate for the Benefit of Mankind*, in: Froehlich, Annette (ed.), Space Security and Legal Aspects of Active Debris Removal, Studies in Space Policy, Volume 16, Springer Nature Switzerland AG (2019) p. 7.

[373] African Development Bank contributes to the economic and social progress of its regional member countries. See, African Development Bank Group, *African Development Bank (AfDB)*, available at: https://www.afdb.org/en/about/corporate-information/african-development-bank-afdb (last accessed 24 September 2021).

[374] Asian Development Bank (ADB) is committed to achieving a prosperous, inclusive, resilient, and sustainable Asia and the Pacific, while sustaining its efforts to eradicate extreme poverty. See, ADB, *About ADB*, available at: https://www.adb.org/who-we-are/about (last accessed 24 September 2021).

project financing, a matrix of project agreements that superfluous requirements of local and international lenders, and other investors is essential for mitigating financing challenges.[375]

In light of the present global financial crisis, multilateral development banks need to promote growth through infrastructure development by providing additional resources more effectively and flexibly.[376]

These banks can assist in covering financing gaps if private sector funds are insufficient, by mobilizing long-term resources through capital markets, co-financing, and promoting market activities through the issuance of prime name credit papers and local currency bonds.[377] They continue to serve as (i) money banks, providing loans and guarantees and catalyzing private sector financing, for example, raising funds in international capital market and lending funds with a small spread; (ii) knowledge banks, providing policy and technical advice; (iii) capacity builders for legal, regulatory, policy, and procedural components; and (iv) honest brokers, by coordinating multiple stakeholders.[378]

The International Bank for Reconstruction and Development (IBRD) and the International Development Association (IDA) have historically financed infrastructure heavier than other sectors in the World Bank Group.[379] Among various types of infrastructure projects, energy and transportation have traditionally occupied a key position, not just in World Bank funding but also in overall government development

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[375] Stewart-Smith, *supra* note 346, p. 1001.

[376] Bhattacharyay, Biswa Nath, *Infrastructure Development for ASEAN Economic Integration*, ADBI Working Paper Series, No. 138 (2009) p. 18.

[377] *Ibid*.

[378] *Ibid*.

[379] Stewart-Smith, *supra* note 346, p. 1006.

finance.[380] Considering these circumstances, the World Bank published the Handbook for Evaluating Infrastructure Regulatory Systems for energy and power sectors in 2006 to encourage and support stable and sustainable long-term economic and legal commitments by both governments and investors.[381] In the Handbook, the World Bank has organized guidelines or standard rule with sections.

Along with the World Bank Group, the Export Credit Agency (ECA) promotes international project finance by providing loans, loan guarantees and insurance to help eliminate some of the uncertainty associated with exportations. OECD published an Arrangement on Officially Supported Export Credits (OECD Arrangement)[382] in 2018 to provide a framework for the orderly use of officially supported export credits. Eight participating countries and the European Union (EU) have agreed to it with seven Annexes including ships (Annex I), civil aircraft (Annex III), and project finance (Annex VII).[383] Other participating countries are Australia, Canada, Japan, Republic of Korea (South Korea), New Zealand, Norway, Switzerland, and the United States.

The OECD Arrangement contains general provisions such as financial terms and conditions along with tied aid, which provides essential external resources to countries, sectors, or projects with limited or no access to market financing, and procedures for export credits, as well as sector-specific provisions (Sector Understanding). Participants have the option of joining one or more Sector Understandings, which set out specific guidelines for the predictable, consistent, and transparent

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[380] *Ibid*.

[381] See generally, Brown, Ashley C./ Stern, Jon/ Tenenbaum, Bernard/ Gencer, Defne, *Handbook for Evaluating Infrastructure Regulatory Systems*, The World Bank, Washington, D.C. (2016).

[382] OECD, *Arrangement on Officially Supported Export Credits*, TAD/PG(2018)8 (2018).

[383] Chapter I, Paragraphs. 3, 6, 7 of the Arrangement on Officially Supported Export Credits.

supported export credits in connection with export contracts. The OECD Arrangement separately legislates for new aircraft (Part 2) and used aircraft, spare engines, spare parts, maintenance, and service contracts (Part 3) under the Sector Understanding for Civil Aircraft. This part describes the Cape Town Convention system in its entirety, including the engine and other spare parts.

The Sector Understanding for Civil Aircraft refers to the Cape Town Convention and the Aircraft Protocol to establish a reduction of minimum premium rates (Cape Town List).[384] There are various criteria for transactions covered by the Sector Understanding for Project Finance, and civil aircraft and ship are specifically excluded.

The UNCITRAL adopted the UNCITRAL Legislative Guide on Privately Financed Infrastructure Projects (PFIP Guide)[385] in 2000 and the UNCITRAL Model Legislative Provisions on Privately Financed Infrastructure Projects (Model Provisions)[386] in 2003, and they provide a legal framework for the implementation of PPP projects. Although the Guide is not legally binding, it serves as recommended principles for developing a favourable legislative environment that achieves a balance between facilitating and encouraging private sector engagement in project finance.[387] The PFIP Guide and Model Provisions are not sector-specific guidelines, but basic policies. Hence, this Chapter examines the sector-specific legal framework instead of the PFIP Guide

[384] Annex III, Appendix II, Section 2 (II) of the Arrangement on Officially Supported Export Credits.

[385] UNCITRAL Legislative Guide on Privately Financed Infrastructure Projects, A/CN.9/SER.B/4, adopted on 29 June 2000 (PFIP Guide).

[386] UNCITRAL Model Legislative Provisions on Privately Financed Infrastructure Projects, adopted on 7 July 2003 (Model Provisions).

[387] UNCITRAL, *UNCITRAL Legislative Guide on Privately Financed Infrastructure Projects (2000)*, available at: https://uncitral.un.org/en/texts/procurement/legislativeguides/privately_financed_infrastructure_projects#:~:text=Infrastructure%20Projects%20(2000)-,UNCITRAL%20Legislative%20Guide%20on%20Privately%20Financed%20Infrastructure%20Projects%20(2000),private%20investment%20in%20public%20infrastructure (last accessed 15 July 2021).

and the Model Provisions to figure out the feasible legal regime for project finance in the space industry.

A. The Case of the Maritime Industry

As the inflationary boom of the early 1970's ended and loan demand decreased, bankers faced intense competition for lending funds, prompting them to disregard many of the established standards governing credit analysis and securing of loans.[388] As a result, most of the large-scale financing that had developed offshore, more than 20 billion USD in 1973, was placed on a less stable economic ground.[389]

Serious effects ensued from the shock of the 1973-74 oil crisis and the subsequent recession. In the area of general commercial lending, numerous enterprises that had previously been considered financially sound by their bankers went insolvent or bankrupt, resulting in loan defaults.[390] When the crisis struck, markets for numerous types of collateral collapsed, resulting in a classic liquidity squeeze for banks. The shipping industry was particularly hit hard by the recession since losses in international trade reduced the revenues of ship owners and the value of their assets.[391]

Since government export credit agencies typically provided primary financing for foreign ship purchases in exchange for first mortgages, commercial banks that had extended credits to cover the balance of the

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[388] Rauner, Stewart E., *Project Finance: A Risk Spreading Approach to the Commercial Financing of Economic Development*, Harvard International Law Journal, Vol. 24 (1983) p. 146.

[389] *Ibid*.

[390] *Ibid*.

[391] *Ibid*., p. 147.

purchase price were left with significant losses as second mortgages became worthless and shipowners defaulted.[392] Despite preceding difficulties, the ship industry remains a key component of our society's infrastructure for trade and transportation. The worldwide maritime transportation industry supports between 80% to 90% of global commodity market in terms of volume and greatly contributes to nations' welfare and development.

The shipping industry's most distinguished characteristics include the derived nature of demand for shipping services: (1) the non-storable nature of the underlying asset (the freight service), (2) the excessive volatility and clustering, (3) cyclicality and seasonality associated with freight rates and asset prices, the heightened sensitivity to international supply and demand forces and regulations due to the industry's hyperglobal nature, the fragmented structure of shipping business, as well as its capital and debt intensity.[393]

Some of those characteristics have appealed to the global investment community, and an increasing number of investment managers now includes it as an asset class in their portfolios, facilitating broader access for shipping businesses to the global equity and debt capital markets.[394] Accordingly, there have been various discussions about adding a new shipping Protocol to the Cape Town Convention in order to avoid future bankruptcies like the Hanjin Shipping's bankruptcy filed in August 2016 and to stabilize the shipping industry.[395] This, however, is merely the first step.

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[392] *Ibid*.

[393] Alexandridis, George/ Kavussanos, Manolis G./ Kim, Chi Y./ Tsouknidis, Dimitris A./ Visvikis, Iias D., *A survey of Shipping Finance Research: Setting the Future Research Agenda*, Transportation Research Part E: Logistics and Transportation Review, Vol. 115 (2018) p. 165.

[394] *Ibid*.

[395] See general, Tenev, *supra* note 328.

The UNCLOS is at the core of international maritime law and is a widely accepted comprehensive Convention on the Law of the Sea for the purpose of harmonizing sea-based activities. And yet it contains no provision for financing. Fortunately, two international guidelines exist, namely, the United Nations Conference on Trade and Development Guidelines for Port Authorities and Governments on the privatization of port facilities (UNCTAD Guidelines),[396] 1998 and the Port Reform Toolkit: Effective Support for Policymakers and Practitioners (Port Reform Toolkit) [397] by the World Bank and Public-Private Infrastructure Advisory Facility (PPIAF), [398] 2007. The Asian Development Bank also evaluates five best practices separately for increasing private sector participation in port infrastructure.[399]

The UNCTAD Guidelines contain sample clauses for leases, concessions and BOT arrangements, as well as tendering procedures and the contents of bidding documents, performance measures for determining the true financial value of bids and operational performance measures. [400] Port facilities should be updated with caution when it is necessary, as they are important tools for facilitating

[396] Guidelines for Port Authorities and Governments on the privatization of port facilities, UNCTAD/SDTE/TIB/1, adopted on 23 September 1998 (the 'UNCTAD Guidelines').

[397] Public-Private Infrastructure Advisory Facility (PPIAF), *Port Reform Toolkit Second Edition*, available at: https://ppiaf.org/sites/ppiaf.org/files/documents/toolkits/Portoolkit/Toolkit/index.html (last accessed 17 October 2021).

[398] PPIAF encourages knowledge transfer through funding research and tools, as well as building capacity to scale infrastructure delivery and assisting sub-national entities in obtaining financing without the need for sovereign guarantees. See generally, PPIAF, *About Us*, available at: https://ppiaf.org/about-us (last accessed 20 November 2021).

[399] Asian Development Bank, *Developing Best Practices for Promoting Private Sector Investment in Infrastructure: Ports*, available at: https://www.adb.org/publications/developing-best-practices-promoting-private-sector-investment-infrastructure-ports (last accessed 12 October 2021).

[400] The World Bank, *United Nations Conference on Trade and Development (UNCTAD) Guidelines for Port Authorities and Governments on the privatization of port facilities*, available at: https://ppp.worldbank.org/public-private-partnership/library/united-nations-conference-trade-and-development-unctad-guidelines-port-authorities-and-governments-privatization-port-facilities (last accessed 14 October 2021).

and promoting a country's external trade and represent significant accumulated capital investments.

The UNCTAD Guidelines carefully consider all potential privatization options and consequences, especially those which define ownership transfer of assets from public to private sector or the application of private capital to fund investments in port facilities, equipment, and system,[401] including financing through PPP mechanisms. The forms of privatization can be full or in part, depending on whether the public sector retains ownership.[402] Due to the fact that the grantee never has ownership of the facilities under a BOT structure, these Guidelines discuss various forms of privatization in detail. The UNCTAD Guidelines also describe each arrangement, including leases, BOT, BOO, BOOT, and joint ventures, specifically with distinguish features.

The Port Reform Toolkit is designed to reduce the time it takes to learn about institutional renewal. It provides background information, concrete examples, specific tools, and methods that policymakers and reformers need to proceed with the confidence.[403]

The Toolkit contains eight modules along with a financial model that policymakers can use to guide them step by step through the processes of reforming and re-inventing port institutions. It also includes a common language and a set of concepts that represent the common language used by port reformers to communicate with their various constituencies.[404] Module 4 (Legal Tools for Port Reform) in particular includes revised reference clauses and checklists for drafting port concession agreements and related legal documents along with

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[401] Chapter 1(2) of the UNCTAD Guidelines.

[402] Chapter 1(7) of the UNCTAD Guidelines.

[403] See generally, PPIAF, *Overview*, available at: https://ppiaf.org/sites/ppiaf.org/files/documents/toolkits/Portoolkit/Toolkit/overview.html (last accessed 17 October 2021).

[404] *Ibid*.

information on port laws and port regulations.[405] Annex I of Module 4 presents a comprehensive checklist of concessions/BOT agreement provisions which relates to a concession for the management and operation of an existing terminal and a potential extension.[406]

It discusses BOT, BTO and BOOT arrangements, which are typically included in concession agreements. Among the provisions of concession agreements, the Port Reform Toolkit emphasizes the need of lender security for the success of BOT arrangements, as their success is highly dependent on the capacity of the operator to secure funding for the construction work.[407] In many cases, lenders have recourse only to specific assets or income streams to secure repayment of their loans.[408] Occasionally, legal considerations should be addressed, most notably with regard to the establishment and enforcement of security interests in the host country that restrict or even prohibit the grant of a lien over port assets.[409] These constraints are a significant impediment for attracting private capital to port expansion.

However, St. Maarten, an island in the Caribbean Sea, is one of the successful examples of due diligence being used to maximize the lender's security.[410] Hurricanes struck the island in September 1995 severely damaging the port's facilities;[411] and it necessitated cruise ships to anchor in the bay and transfer passengers onshore by small tenders.[412] The cruise lines accepted this approach on a temporary basis.

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[405] Module 4 of the Port Reform Toolkit.

[406] Module 4 Annex I of the Port Reform Toolkit.

[407] Module 4 of the Port Reform Toolkit.

[408] *Ibid*.

[409] *Ibid*.

[410] *Ibid*.

[411] AP NEWS, *Hurricane Luis Devastates St. Maarten, Death Toll Overall At 19*, available at: https://apnews.com/article/178be85e40e1e07789fa004e78e3674f (last accessed 17 October 2021).

[412] Module 4 of the Port Reform Toolkit.

In 1997, the government reached an agreement with the cruise lines to partially finance the construction of a new cruise terminal by charging 5 USD per passenger.[413] The reconstruction of cruise terminal 1 became part of a corporate restructuring scheme and the terminal was to be expanded and the bay dredged to a depth of ten meters.[414]

The St. Maarten Cruise Terminal N.V. (joint stock company) was formed as a subsidiary of the St. Maarten Holding Company N.V., which is jointly owned by the government of St. Maarten and the Dutch government through the Participation Company for the Netherlands Antilles N.V.[415] The concession agreement, which is a BOO agreement, between the island government and the St. Maarten Cruise Terminal N.V. has three primary characteristics: limited construction risk, no political risk, and no hurricane risk. In general, it is important to expressly establish the lender's rights to the impacted assets in a concession contract with BOT or BOO arrangements. As a result, the St. Maarten government's proactive approach to taking care of the lender's rights contributed to the success.

South Korea is another good example of how PPP projects can be tremendously successful in expanding port infrastructure by enacting applicable legislation, implementing it, and systemically developing it over time.[416] The South Korean government worked hard to build the efficient PPP system and policies. It deserves great praise for successfully attracting private capital and keeping the government's share of construction subsidies at a low level, especially given the high

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[413] *Ibid*.

[414] *Ibid*.

[415] *Ibid*.

[416] Kim, Jay-Hyung/ Kim, Jungwook/ Choi, Seok Joon, *Public-Private Partnership Infrastructure Projects: Case Studies from the Republic of Korea, Volume 2: Cases of Build-Transfer-Operate Projects for Ports and Build-Transfer-Lease Projects for Education Facilities*, Asian Development Bank, Philippines (2011) p. 16.

risk associated with port facility development due to its reliance on market activities.[417]

However, for PPP port developments in South Korea, the 'free use period' can be contentious, as the Request for Proposal (RFP) does not specify such period,[418] and it states only that "the free use period can be up to fifty years."[419] The term 'free use period' refers to the time period specified in the concession agreement during which the private concessionaire is permitted to utilize the port facilities independently following the grant of port facility operation rights.[420]

The term 'free use period' is used because port facilities are constructed, returned to the government, and may be used without the payment of a separate lease charge through the grant of management operating rights. During the early stages of PPP port projects, the majority of projects include a free use period of 50 years in the concession agreement.[421]

However, the project proposers have begun to propose a reduction in the free use period for competing projects, because the possibility of reducing the free use period was reflected in the concession assessment.[422] As ports are semi-permanent in nature, and quay services are constantly repaired and maintained, the manner in which the 'free use period' is utilized may be a key competitive factor in leading a successful port project.

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417 *Ibid*.

418 *Ibid*., p. 83

419 *Ibid*.

420 *Ibid*.

421 *Ibid*.

422 *Ibid*.

B. The Case of the Aviation Industry

Air transport infrastructure is an essential driver of development, providing economic and social benefits, as well as regional integration. It serves as a significant component of a nation's infrastructure needs as it provides critical domestic and international connections necessary for economic development through flows of human capital, commerce, and tourism.

The availability of efficient airports in a country is important as it influences investors greatly, as air transportation permits faster transfers. That is why, the aviation industry has developed to the point where it is expected to be a self-sustaining, and it was financed by public subsidies. Governments in developing countries, in particular, are increasingly recognizing the value of incorporating the private sector in managing and financing of airports in order to improve service levels.

Throughout the 1990s, private sponsors invested 5.4 billion USD on projects involving 89 airports in 23 developing countries.[423] Following a number of landmark cases, such as the privatization of the British Airports Authority and the proliferation of PPP models in the development of seaport terminals, governments began to recognize the potential benefits of private sector involvement in airport operations and management.[424] Today, long-term concessions to private firms to manage all or a portion of an airport's operations are a predominant model, with governments typically taking less risk and maintaining a minority stake in the enterprise.[425]

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[423] See generally, Silva, Gisele F., *Private Participation in the Airport Sector: Recent Trends*, World Bank, Washington, D.C. (1999).

[424] PPP Knowledge Lab, *Airports*, available at: https://pppknowledgelab.org/node/9 (last accessed 02 November 2021).

[425] See, PPIAF, *Airport*, available at: https://ppiaf.org/sectors/airports (02 November 2021).

As airport assets are generally viewed as critical to national security, outright privatization of airports frequently encounters political opposition. Thus, operations and management contracts that include major capital spending have proven to be the most popular form of involving the private sector, accounting for roughly 70% of private investment in airport expansion.[426]

Airport revenues are mostly denominated in foreign currency, while operational expenditures are predominantly priced in local currency providing a buffer against currency risk and enabling project financing.[427] Revenue security has also been enhanced by the fact that the majority of developing countries' airports face limited competition from other airports and from other methods of transportation.[428]

The majority of projects have included either terminal and runway facilities or only terminal facilities.[429] Terminal projects are attractive to private sponsors because they can generate significant "non-aeronautical" revenues.[430] Nonaeronautical revenues come from commercial services, while aeronautical or traffic revenues are generated through passenger fees, aircraft landing and parking fees, as well as cargo and luggage handling fees.[431]

Due to the perception that airports have only a limited amount of competition from other airports and transport modes, traffic fees have historically been subject to price regulation.[432] Nonaeronautical activities, however, provide uncontrolled, and frequently huge revenue

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[426] Silva, *supra* note 423.

[427] *Ibid*.

[428] *Ibid*.

[429] *Ibid*.

[430] *Ibid*.

[431] *Ibid*.; See, PPP Knowledge Lab, *supra* note 424.

[432] Silva, *supra* note 423.

streams that are extremely attractive to private sponsors.[433] Private airport operators benefit from concession fees associated with these activities.

With these circumstances, the World Bank and the PPIAF developed a brief checklist of legal and regulatory issues for airport BOTs/ Concessions in general.[434] However, the most important document in the aviation industry is the Manual on Privatization in the Provision of Airports and Air Navigation Services (Doc 9980)[435] of the ICAO. The Manual is based on the principles of the Chicago Convention, including ICAO's Policies on Charges for Airports and Air Navigation Services (Doc 9082)[436], Airport Economics Manual (Doc 9562),[437] and Manual on Air Navigation Services Economics (Doc 9161),[438] on when Contracting States should consider materials relating to the commercialization or privatization of airports and air navigation services.

The purpose of the Manual on Privatization in the Provision of Airports and Air Navigation Services is to offer information on ownership and management developments occurring in various parts of the world and to ensure that service providers do not misuse any dominating position that they may have.[439] In order to provide guidance to States by presenting ownership and management options as well as major issues to consider when preparing for a change in ownership and management,

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[433] *Ibid*.

[434] See, World Bank/ PPIAF, *Airport BOTs/ Concessions Checklist of Legal and Regulatory Issues*, available at: https://ppp.worldbank.org/public-private-partnership/sites/ppp.worldbank.org/files/ppp_testdumb/documents/Airportconcessionschecklist_0.pdf (last accessed 03 November 2021).

[435] ICAO, *Manual on Privatization in the Provision of Airports and Air Navigation Services*, Doc 9980 (2012).

[436] ICAO, *ICAO's Policies on Charges for Airports and Air Navigation Services*, Doc 9082 (2009).

[437] ICAO, *Airport Economics Manual*, Doc 9562 (2013).

[438] ICAO, *Manual on Air Navigation Services Economics*, Doc 9161 (2013).

[439] See, ICAO, *supra* note 435.

the Manual defines PPP including several methods of project finance such as BOT, BOO, BOOT.[440]

The Manual begins with a glossary of terms and then discusses the establishment of autonomous authorities, the reasons for private participation and privatization in current aviation sector, and various forms of private participation with multiple case studies. It clarifies that while ownership and management of airports and air navigation services may be delegated to the private sector, overall responsibility for the provision of services remains with States in accordance with the Chicago Convention as well as Standards and Recommended Practices (SARPs)[441].[442] As privatization should not be construed as a waiver of the State's requirement to comply with international obligations, particularly those contained in the Chicago Convention, its annexes and air services agreements, States should bear in mind that they are ultimately responsible for the safety, security, and economic oversight of theses private entities.[443]

The manual also details several ownership and management options, their associated features and benefits as well as the regulatory aspects of changing the ownership and management structure. To be more specific, it suggests that the new legislation should include enabling provisions that allow the government to make minor changes to the ownership and management structure of airports and air navigation services without amending the law.[444] This would allow for greater flexibility, as most States require changes to the legal framework for

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[440] *Ibid*.

[441] ICAO, *SARPs – Standards and Recommended Practices*, available at: https://www.icao.int/safety/safetymanagement/pages/sarps.aspx (last accessed 03 November 2021).

[442] See, Chapter 4 of the Manual on Privatization in the Provision of Airports and Air Navigation Services.

[443] ICAO, *supra* note 435.

[444] See, Chapter 6 of the Manual on Privatization in the Provision of Airports and Air Navigation Services.

civil aviation when the ownership and management structure of airports and air navigation services change.[445]

ICAO has two programmes regarding project finance the infrastructure management programme and the Project Financing and Development Section (PFD)[446] which is a technical cooperation programme. ICAO's infrastructure management programme aims to enhance and promote the sustainable development of infrastructure necessary to provide and operate airports and air navigation services.[447] The programme provides solutions to strengthen providers' organizational and management capabilities, reduce governments' financial burdens, safeguard user's interests, and facilitate access to financing for long-term investment needs.[448]

The PFD intends to assist States in obtaining finance from external financing institutions by implementing strategies and materials, namely project financing documentation, for granting applications and funding proposals to financial institutions.[449] The PFD is being developed in partnership with different stakeholders involved in project finance such as the World Bank and other regional development banks, as well as aircraft, aircraft component manufacturers, and airlines, airports, air navigation services providers.

The percentage of airports under various ownership models in different regions of the world has gradually increased. Despite growing interest in private sector financing and management of airports, government-

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[445] *Ibid*.

[446] ICAO, *Project Financing and Development*, available at: https://www.icao.int/secretariat/TechnicalCooperation/Pages/pfd.aspx (last accessed 03 November 2021).

[447] ICAO, *Financing Aviation Infrastructure*, available at: https://www.icao.int/MID/Documents/2017/Aviation%20Data%20and%20Analysis%20Seminar/PPT6%20-%20Financing%20Aviation%20Infrastructure.pdf (last accessed 03 November 2021).

[448] *Ibid*.

[449] ICAO, *supra* note 446.

owned operators or airports exclusively managed by public authorities continue to account for the lion's share of airports globally.[450] However, when passenger traffic distribution is evaluated, the expanding role of private participation becomes apparent. Over 40% of worldwide airport traffic is handled by airports that are managed and/or financed by private stakeholders.[451] There are numerous examples of PPPs being used to build airports and/ or air navigation services providers in accordance with Doc 9980. One of the successful instances is the Queen Alia International Airport (QAIA) in Jordan, the first successful PPP airport in the Middle East.[452]

Opened in 1983, QAIA is Jordan's primary international airport which accounts for over 95% of the State's air traffic and serves as a key component of the country's transportation, trade, and tourism infrastructure.[453] Due to the airport's inability to meet growing demand, its age and small size, the Jordanian government sought to partner with the private sector to expand renovate the airport through the construction of a new 900,000 square foot terminal.[454]

This project was part of a broader strategy by the Jordanian government to increase the competitiveness of the State's airports and position Jordan as a regional transportation hub for business and tourism.[455] The concession for the QAIA was given to the Airport International Group

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[450] ICAO, *Public-Private Partnership (PPP)*, available at: https://www.icao.int/sustainability/Pages/im-ppp.aspx (last accessed 03 November 2021).

[451] *Ibid*.

[452] See generally, ICAO, *Public Private Partnership (PPP) – Case study*, available at: https://www.icao.int/sustainability/PPP%20Case%20Studies/PPP_Airport_Jordan.pdf (last accessed 03 November 2021); *see also* World Bank Group, *Public-Private Partnerships Briefs Jordan: Queen Alia Airport*, available at: https://library.pppknowledgelab.org/documents/1990/download (last accessed 03 November 2021).

[453] *Ibid*.

[454] *Ibid*.

[455] *Ibid*.

(AIG) in 2007 following a competitive bidding process monitored by the IFC.[456] AIG is composed of Abu Dhabi Investment Company (United Arab Emirates, 38%), Noor Financial Investment Company (Kuwait, 24%), EDGO Investment Holdings (Jordan), J&P-AVAX (Greece), Joannou & Paraskevaides Overseas (United Kingdom and Cyprus) and Aéroports de Paris Management (France), which each own 9.5%.[457]

The group is responsible for building a new terminal to replace the existing one, extending the associated facilities at the new terminal, and operating the entire airport under a 25-year BOT concession.[458] The government retains ownership of the airport and earns a percentage of gross revenues during the life of the BOT concession at 54.47% for the first six years and 54.64% thereafter.[459]

IFC served as a transaction advisor to the Jordanian government and played a leading role in raising the project's debt financing by giving 120 million USD in loans to AIG and organizing a 160 million USD syndicate from international banks.[460] Following the successful completion of the new terminal and its opening to traffic in March 2013, IFC provided a 21 million USD additional loan and arranged a further 47 million USD syndication to finance an expansion of the new terminal's associated facilities; thereby ensuring that overall airport capacity continues to meet traffic growth through mid-2014.[461]

Through the project, capacity of the airport increased from approximately 4 million passengers in 2007 to 12 million passengers by the end of 2016, and the number of international flights increased from

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[456] *Ibid*.

[457] ICAO, *supra* note 452.

[458] *Ibid*.

[459] *Ibid*.

[460] World Bank Group, *supra* note 452.

[461] *Ibid*.

120 flights per day from 55 international destinations in 2007 to over 175 daily flights from over 60 international destinations in 2015.[462]

Another instance of successfully implementing PPP model is the air navigation services providers, NextGen, which is the United States' new National Airspace System (NAS). The NextGen General Aviation Fund was established to replace the United States' existing air traffic control system, namely from a ground-based radar system to a satellite-based one.[463] This is a PPP fund formed by the U.S. Congress, the aerospace industry, and the private sector investment community to fund a variety of NextGen-related avionics upgrades including Automatic Dependent Surveillance-Broadcast, which enables both the pilots and the controllers to see real-time displays of air traffic. Along with this, the NextGen Data Communications enables the exchange of routine controller pilot messages and clearances via digital data transmission and System Wide Information Management and it offers services to better facilitate information sharing between actors and the installation of these items.[464]

Prior to the introduction of the NextGen General Aviation Fund, operators who first equipped with NextGen avionics had to pay a much higher price and endure greater risk while the others who were the last to equip gained the greatest financial benefit.[465] It is completely contrary to fairness. As a consequence, the NextGen General Aviation Fund solved the problem through proven regulatory/ policy

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[462] *Ibid*.

[463] ICAO, *Public Private Partnership (PPP) – Case study*, available at: https://www.icao.int/sustainability/PPP%20Case%20Studies/PPP_ANSP_United%20States.pdf (last accessed 03 November 2021).

[464] *Ibid*.

[465] See, ICAO, *Public Private Partnerships – Financing Environmentally Friendly Investments*, available at: https://www.icao.int/Meetings/acli/Documents/NEXA_24October-am.pdf (last accessed 03 November 2021).

mechanisms in conjunction with private sector capital, commercial leasing structures, and service contract commitments.

Under the supervision of the Assistant Administrator for Policy, International Affairs, and Environment, the Federal Aviation Administration (FAA) has established a dedicated group to fulfill its responsibilities of implementing the legislation.[466] Unlike traditional project finance, which relies on federal loan guarantees to support a single company, the NextGen General Aviation Fund uses an intermediary business model to support numerous companies efficiently.[467] This also protects the government from the risk of default of a single airline or aircraft operator, as the intermediary would have significant at-risk capital and cash reserves on hand, which would be utilized prior to the triggering of any federal loan guarantee.[468] Its direct investments enable the use of low-interest commercial loans backed by the United States government loan guarantees, and the NextGen General Aviation Fund also provides an initial capital which based of approximately 550 million USD. Over a 10 year period beginning in 2012, the direct investment is turn into approximately 1.3 billion USD in recurring financings for the general aviation sector.[469]

C. The Case of Roads and Highways

As industrialization accelerated urbanization and resulted in the construction of public networks and transport infrastructure, road infrastructure has become essential to the competitiveness of the

[466] *Ibid*.

[467] *Ibid*.

[468] *Ibid*.

[469] See, ICAO, *supra* note 463.

economy. Project finance is frequently used to create new roads or highways, owing to the capital-intensive character of these projects in a time of intense competition for limited government resources.

There are several legal instruments addressing transport infrastructure. One of them advises the overall legal and regulatory framework of surface transport infrastructure in order to protect the public interest and provide private partners with a stable business environment established by OECD.[470] However, this only explains the nature of the law for the general PPPs structure. Hence, hereinafter, this Chapter discusses the Toolkit for PPPs in Roads and Highways (Toolkit)[471] made by the World Bank and PPIAF.

The primary purpose of the Toolkit is to provide policymakers in developing countries in transition some guidance on how to design and implement PPP in the highway sector.[472] The Toolkit is divided into six modules and Module 3 (Policy & Planning) provides information on the public sector functions under PPP projects such as the appropriate national and sub national planning framework to ensure protection of the public interest.[473]

Module 4 (Laws & Contracts) examines the legal and regulatory environment of PPP projects in the road sector including framework adjustment to ensure that any existing legal framework is flexible enough to adapt to the changes in the infrastructure sector concerned.[474] The Toolkit also consists of five legislation frameworks such as

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[470] OECD, *Transport Infrastructure Investment: Options for Efficiency*, International Transport Forum (2008).

[471] World Bank/ PPIAF, *Toolkit for Public-Private Partnerships in Roads and Highways*, available at: https://ppiaf.org/sites/ppiaf.org/files/documents/toolkits/highwaystoolkit/index.html (last accessed 09 October 2021).

[472] Queiroz, Cesar, *Launching Public Private Partnerships for Highways in Transition Economies, Transport Papers*, The World Bank Group, Washington, D.C. (2005) p. 10.

[473] Module 3 of the Toolkit.

[474] Module 4 of the Toolkit.

Institutional Framework, Legislative Framework, Regulatory Framework, Framework Assessment, and Framework Adjustment. Among them, Framework Adjustment sector mentions exactly the PFI Guide and the Model Provisions for revising or adopting legislation related to PPP projects. Most countries engaged in PPP infrastructure projects either created new national legal frameworks when they lacked them, as Russia did, or altered their existing frameworks when urged to do so in order to attract private investors, as India did.[475] Module 6 (Tools) highlights a few case studies from different countries of highway PPP projects, financial models, and key issues.[476]

India is an example of a country that is developing PPP legislation, regulations, institutions, modalities, funding, sub national development, and expansion into non-traditional areas incrementally.[477] The Jaipur Kishangarh Road project was implemented in India as a model PPP road project.[478] The project was established on a BOT basis to increase the efficiency of toll operations and road maintenance, thereby increasing road safety and assisting in traffic emergencies. Due to massive infrastructure bottlenecks and a gap between infrastructure needs and the financial capacity of the public sector, the central government established rules in 1997 for the "Collection of Fees by any Person for the Use of Section of any National Highways/Permanent Bridges/Temporary Bridges on National Highways" to allow private sector participation in the management of national highways.[479] India is an instance of how existing frameworks can be successfully adapted to attract private investors.

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[475] *Ibid*.

[476] Module 6 of the Toolkit.

[477] *Ibid*.

[478] Kim, Jay-Hyung/ Kim, Jungwook/ Choi, Seok Joon, *Public-Private Partnership Infrastructure Projects: Case Studies from the Republic of Korea, Attachment: Global Country Comparison of Public-Private Partnership Frameworks and Projects*, Asian Development Bank, Philippines (2011) p. 192.

[479] *Ibid*., p. 194.

Another important instance is the Chonan-Nonsan Highway and nine more road projects in South Korea. South Korea realized the importance of monitoring PPP projects and having flexibility to adjust projects after the Asian financial crisis. To protect its infrastructure development against future crises, it has continued to make substantial adjustments to its PPP regulations.[480] Over the past, there have been many changes to its infrastructure development policies. Though South Korea is not unfamiliar with the concept of private participation, 'The Private Capital Inducement Act' was formally introduced in 1994[481] which established the first legal framework that promoted Private Participation in Infrastructure (PPI).[482]

The Private Capital Inducement Act classified PPI projects into two categories: Category I consisted of projects involving critical infrastructure projects such as roads (including railways, subways, ports, airports, water supply, and telecommunications); and Category II consisted of projects involving less critical infrastructure such as gas supply, bus terminals, power generation plants, tourism promotion area, sport complexes, and other commercial fields.[483] This meant that the private sector could acquire only category II projects.

As a result, category I PPI projects, particularly those involving roads, could only be implemented through the BTO scheme, whereas category II PPI projects were eligible for alternative financing structures such as BOT or BOO schemes, which can obtain ownership as well as the public-private joint venture company scheme in which less than 50

[480] Module 6 of the Toolkit.

[481] Private Capital Inducement Act for the Expansion of Social Overhead Capital and the Presidential Decree ('The Private Capital Inducement Act').

[482] Module 6 of the Toolkit.

[483] *Ibid*.

percent of the capital participation was by the state or local governments.[484]

The first PPI legal framework was not a complete success due to inadequate risk assessment and the Asian financial crisis of 1997. However, the unique circumstance prompted the Government to launch a new legal regime to increase the private sector involvement in infrastructure construction. In December 1998, a new PPI law, the 'Act on Private Participation in Infrastructure'[485] was enacted to remove the primary constraints to private investment in infrastructure and eliminated the previous categorization of infrastructure projects.[486] Through the amendment, ten road projects were operational by June 2002, including the Chonan-Nonsan Highway.

This was not the last South Korean legal adjustment. In 2005, the Act on Private Participation in Infrastructure was revised once again in order to include the Build-Transfer-Lease (BTL) plan and to broaden the scope of eligible facilities to include social infrastructure.

D. The Case of Energy Plants

Project finance has been extensively used as a financing method for the construction of new energy infrastructure in developed countries such as the United States as well as in emerging countries in Eastern Europe, the Pacific Rim, or in countries with massive new infrastructure requirements such as the Latin America.[487] In emerging countries,

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[484] *Ibid*.

[485] The Act on Private Participation in Infrastructure, Act No. 5624, adapted on 31 December 1998, lately revised 31 March 2020.

[486] Module 6 of the Toolkit.

[487] Izaguirre, Ada Karina, *Private Participation in Energy*, World Bank, Washington D.C. (2000); *see also* Scott L., Hoffman, *The Law and Business of International*

project finance provides an option to non-market-based development of electrical resources. Initially, electrical resources in these countries were owned by vertically integrated public monopolies that generated, transmitted and distributed electricity. And the resources were financed by the utility or by official borrowing, and were subsidized by the local government or various customer groups.[488] However, through the use of project finance, the traditional monopoly structure can be broken down through a variety of models including privatization of existing assets, encouragement of private development of new electrical generation, and establishing the government-owned utility as a purchaser of power for transmission and distribution over existing infrastructure or a combination of these processes.[489]

Within the circumstances relating to electricity infrastructure, strong legal basis is absent. Instead, there is a model law by the World Bank for cases on energy sector, specifically off-grid electrification, which includes the installation of decentralized facilities that are not connected to existing transmission and/or distribution grids.[490] The reason why the World Bank focused on off-grid electrification is because its regulatory issues have received less attention in the mainstream literature of power sector regulation even though it is likely to become increasingly more important for many communities and households, who are yet to be electrified due to being too remote or dispersed to be reached via grid extension.[491]

Project Finance, Kluwer Law International, The Netherlands (Second Edition, 2001) p. 20.

[488] Scott L., *supra* note 487, p. 21.

[489] *Ibid*.

[490] Reiche, Kilian/ Tenenbaum, Bernard/ Torres de Mästle, Clemencia, *Electrification and Regulation: Principles and a Model Law*, Energy and Mining Sector Board Discussion Paper, No. 18, World Bank, Washington D.C. (2016) p. 7.

[491] *Ibid*., p. 9.

The model law consists of four regulatory principles: adopt light handed and simplified regulation (Principle 1), delegate or contract out regulation (Principle 2), vary regulation by type of entity (Principle 3), and establish realistic and affordable quality standards (Principle 4) with various examples and cases.[492] This chapter will focus on Principle 2 with relevant examples, as using an external contractor to complete projects may be a time-saving option, but it may compromise project sensitive internal data.

Principle 2 of the model law for off-grid electrification states that the national or regional regulator should be permitted (or required) to delegate or 'contract out' regulatory functions to other government and nongovernment entities on a temporary or permanent basis.[493] 'Contract out' means "the use by a regulator of an external contractor, instead of its own employees to perform certain function(s). Such external contractors can be consultants, individuals, other government entities (in country or outside, including at a regional level) or NGOs."[494] In many countries, a rural electrification agency or a fund function serves as a *de facto* regulator.[495]

Typically, the agency or fund imposes conditions in exchange for giving grants or providing subsidized loans such as maximum acceptable tariff, a minimum technical standard for new installations, or a minimum technical and commercial standard for post-installation service.[496] While it may be legally required for a national or regional regulatory authority to hold final formal responsibility for all entities within a country that provides electrical services to consumers, delegation or 'contract out' regulatory functions could be a more efficient regulation.

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[492] *Ibid*.

[493] *Ibid*., p. 6.

[494] *Ibid*., p. 24.

[495] *Ibid*., p. 6.

[496] *Ibid*.

The agency can minimize the risk of duplication and overregulation than the regulator as it is almost always provider's specific technical operations, and it has a better understanding of the electrification and the cost implications of imposing different regulatory requirements with the coordination between subsidy rules and tariff regulation.[497]

Bolivia is one of the most successful cases to have utilized project finance approach to increase electricity access through Solar Home Systems (SHSs). The majority of Bolivia's non-electrified households live in highly dispersed rural areas and more than one-third of them are located too remote from the national grid to justify an economically viable grid extension. Their electrification requires innovative off-grid technologies and supply schemes that are flexible and cost-effective.[498] That is why, SHSs are the most promising alternatives for many of these families in the country. The World Bank approved the ten-year, 60 million USD Decentralized Infrastructure for Rural Transformation program, which aims to increase rural access to electricity, information and communication technologies through decentralized PPP that receives performance-based subsidies or output-based aid in 2003.[499]

From 2004, the government of Bolivia successfully bid out performance-based subsidies to encourage commercial operators. The first 20 million USD phase of the three-phase program installed at least 15,000 individual SHSs reaching more than 50,000 rural people in 14 target areas and four of the country's provinces.[500] In 2005, 14 service contracts were successfully bid out in one-stage and the project was

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[497] *Ibid*., p. 22.

[498] Reiche, Kilian/ Rysankova, Dana/ Goldmark, Susan, *Output-Based Aid in Bolivia: Balanced Tender Design for Sustainable Energy Access in Difficult Markets*, available at: https://openknowledge.worldbank.org/bitstream/handle/10986/11032/396070BO0OBApproaches1201PUBLIC1.pdf?sequence=1 (last accessed 06 October 2021).

[499] *Ibid*.

[500] Reiche/ Tenenbaum/ Torres de Mästle, *supra* note 490, p. 25; *see also* Reiche/ Rysankova/ Goldmark, *supra* note 498.

promoted by Energetica [501] and supported by the Multilateral Investment Fund-Inter-American Development Bank, the Spanish Agency for International Development Cooperation (AECID), the German Corporation for International Cooperation (GIZ), and municipalities.[502]

The Vice-Ministry of Electricity and Alternative Energy (VMEEA) acts as promoter, subsidizer, and *de facto* regulator.[503] The ministry is the regulator because it specifies the nature and duration of the service obligation, and it establishes a maximum price for the SHS installations. It details the quality-of-service standards that operators must meet and the method for monitoring compliance with the standards in the subsidy agreement with each operator, who were chosen through an international competitive bidding for 14 Medium-term Service Contracts (MSCs) in 2005.[504]

The ministry developed these significant regulatory parameters and requirements to ensure that potential operators are fully aware of the regulatory "rules of the game" prior to bidding on a planned number of connections for a specified total level of subsidies per area.[505] The ministry has a significantly better understanding of the economics and operational requirements of SHSs than the regulator, therefore serving as the *de facto* regulator was efficient in the circumstance.[506] The ministry, like a regulator, also understands the importance of striking a

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[501] Energetica Industries GmbH, headquartered in Liebenfels, Austria is a manufacturer of smart high-end photovoltaic solutions. See, Energetica Photovoltaic Industries, *About Us*, available at: https://www.energetica-pv.com/en/company/about-energetica/ (last accessed 06 October 2021).

[502] Eras-Almeida, A.A./ Fernández, M.; Eisman, J./ Martín, J.G./ Caamaño, E./ Egido-Aguilera, M.A, *Lessons Learned from Rural Electrification Experiences with Third Generation Solar Home Systems in Latin America: Case Studies in Peru, Mexico, and Bolivia*, Sustainability, Vol. 11, No. 24 (2019) p. 7146.

[503] Reiche/ Tenenbaum/ Torres de Mästle, *supra* note 490, p. 25.

[504] *Ibid*.

[505] *Ibid*.

[506] *Ibid*.

balance between the interests of consumers and the investors for the successful program.[507]

It is important to convince consumers that they are receiving 'fair value' for their money and are not being paid monopoly prices.[508] For the investors, a true potential of return on their investment is a significant matter. The project will be unsustainable until the ministry is able to appease these two constituencies, and it will almost certainly be perceived as a political failure. As a result, the ministry is likely to have more incentives than a regulator to strike a compromise between the consumer and investor interests.

Due to the fact that SHSs are not regulated in Bolivia, a technical monitoring entity was established within the Government's project implementing unit to monitor the broad range of service duties to which subsidies are applied.[509] The quality of projects, technical services, and commercial services are monitored through a combination of random external audits and continuing government audits.[510] If predefined targets are not attained, subsidies are withheld or fines are imposed.

In other countries such as Argentina and Brazil, the governments have decided that the best strategy for 'universalization' is to establish a regulatory so that the regulator will be forced to participate in setting the terms and conditions of SHSs or other forms of off-grid electrification, unless it has the legal authority to delegate the responsibility to some entity.[511]

The strategy of universalization may result in a more transparent and trustworthy process than Bolivia's 'contract out' model. However, the scale and scope of the project as well as the backup plan in case the

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[507] *Ibid*.

[508] *Ibid*.

[509] Reiche/ Rysankova/ Goldmark, *supra* note 498.

[510] *Ibid*.

[511] Reiche/ Tenenbaum/ Torres de Mästle, *supra* note 490, p. 26.

project fails should be assessed to determine whether 'contract out' should be used instead of 'universalization.'

E. The Case of Telecommunications Facilities

Innovations in Information and Communication Technology (ICT) and telecommunications have driven of modern economic growth by enabling near-instant communication, transforming the economy, and creating new opportunities across all industries and sectors.[512] Telecommunications infrastructure is comprised of a wide range of technologies from broadband and fixed-line networks to mobile connectivity and satellites.[513] Despite the fact that it has been state-owned and operated, telecommunications technology has been influenced by deregulation, privatization, and liberalization of telecommunications infrastructure industry.[514] The major drivers of the industry's recent transformation are increasing market demand and rapid speed of innovation.

Through the construction, ownership, and operation of telecommunications assets, the private sector has grown in popularity around the world. However, telecommunications projects continue to require significant upfront and ongoing capital investment, with high risks of the network becoming quickly obsolete or being surpassed by new technology.[515] Maturity of telecommunications markets and

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[512] See generally, The World Bank, *Telecommunications / Information & Communication Technology PPPs*, available at: https://ppp.worldbank.org/public-private-partnership/sector/telecom (last accessed 07 October 2021).

[513] *Ibid*.

[514] *Ibid*.

[515] *Ibid*.

quality of its services in a country become evident as the country shifts focus from infrastructure maintenance to its development.

There are almost 20 countries that have their own telecommunications services regulations including licensing, competition policy, quality service, or universal service.[516] Even though the content and the scope of universal service regimes aim to provide all citizens with access to key telecommunications infrastructure and services, the reality is different from country to country.[517] To address this, the European Electronic Communications Code[518] encourages investment in high capacity networks that are entirely comprised of optical-fiber elements up to the distribution point at the serving location or those capable of delivering comparable performance. It also permits national regulators to exempt the networks from network access regulations that would otherwise apply due to the operator's significant market dominance if the operator commits to co-investment.[519]

Along with legal framework of each country or a regional economic integration organization, there is an international agreement relating to telecommunications sector called the General Agreement on Trade in Services (GATS).[520] Members of the World Trade Organization (WTO)[521] established commitments to facilitate trade in the

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[516] See generally, The World Bank, *General Telecommunications Framework (by Country)*, available at: https://ppp.worldbank.org/public-private-partnership/sector/telecom/laws-regulations/telecommunications-frameworks (last accessed 07 October 2021).

[517] See generally, The World Bank, *Telecommunications Universal Access / Universal Service*, available at: https://ppp.worldbank.org/public-private-partnership/sector/telecom/laws-regulations/universal-access (last accessed 08 October 2021).

[518] European Electronic Communications Code, Directive (EU) 2018/1972, L 321/36 (2018).

[519] See generally, The World Bank, *supra* note 517.

[520] General Agreement on Trade in Services, Annex 1B, 1869 U.N.T.S. 183, 33 I.L.M. 1167, adopted on 15 April 1994, entered into force on 1 January 1995 (hereinafter, 'GATS').

[521] The World Trade Organization (WTO) is the only global international organization dealing with the rules of trade between nations. See generally, WTO, *The WTO*,

telecommunications sector during the 1986 Uruguay Round. Later in 1997 the GATS successfully included telecommunications services in an Annex[522] that guarantees reasonable access to and use of public telecommunications in a market where suppliers provide all services included in the member's commitments and the Regulatory Principles of the Group on Basic Telecommunications Services (GBT Agreement)[523]. The Annex on telecommunications deals with users' access to existing services and networks, and the GBT Agreement deals with the ability to enter telecommunications markets and sell services.[524] It also mandates collaboration with the International Telecommunication Union (ITU) in order to ensure efficient and advanced practices.[525]

The Annex contains seven sections, but its core obligations are included in a section on access to and use of 'public telecommunications transport networks and services' which effectively refers to basic public telecommunications.[526] Section 3 of the Annex defines 'Public telecommunications transport network' as "the public telecommunications infrastructure which permits telecommunications

available at: https://www.wto.org/english/thewto_e/thewto_e.htm (last accessed 08 October 2021).

[522] See generally, WTO, *Annex on Telecommunication*, available at: https://www.wto.org/english/tratop_e/serv_e/12-tel_e.htm (last accessed 08 October 2021).

[523] See generally, The World Bank, *WTO Reference Paper: Negotiating Group on Basic Telecommunications*, available at: https://ppp.worldbank.org/public-private-partnership/library/wto-reference-paper-negotiating-group-basic-telecommunications (last accessed 08 October 2021).

[524] See, Industrial Organization and Business Resources, Science, and Industry Division, *Telecommunications Services Trade and the WTO Agreement*, available at: https://www.everycrsreport.com/files/20021223_RS20319_b06e42584b84044c493fca8223cc7b7ad2f9a3f3.pdf (last accessed 08 October 2021).

[525] Section 6 of the Annex on Telecommunication; See generally, WTO, *The WTO and ITU*, available at: https://www.wto.org/english/thewto_e/coher_e/wto_itu_e.htm (last accessed 08 October 2021).

[526] See generally, WTO, *Explanation of the Annex on Telecommunications*, available at: https://www.wto.org/english/tratop_e/serv_e/telecom_e/telecom_annex_expl_e.htm (last accessed 08 October 2021).

between and among defined network termination points."[527] Along with the definition, the Annex also requires each Member to ensure that all service suppliers desiring to take advantage of scheduled commitments have reasonable and non-discriminatory access to and use of public basic telecommunications, both networks and services.[528] Members are subject to these obligations regardless of whether they have liberalized or scheduled commitments in the basic telecommunications sector.[529]

Because the Annex addresses user access to these services rather than market entry to sell such services, the latter is addressed in schedules of commitments.[530] As such, the Annex disciplines will benefit firms that provide any of services included in Member's schedule of commitments; not only value-added and competitive basic telecommunications suppliers, but also banking or computer services firms that wish to take advantage of market access commitments by a WTO Member.[531] The annex obligations strike a fragile balance between the needs of the users for fair terms of access and the needs of the regulators and public telecommunications operators to maintain a system that runs in accordance with public service objectives.[532]

The GBT Agreement focuses on markets more than the annex, which deals with users' access. The GBT Agreement grants enterprises from signature countries access to the telecommunications markets of other signatory countries including local, long distance, and international

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[527] Section 3 of the Annex on Telecommunication.

[528] Section 5 of the Annex on Telecommunication; See generally, WTO, *supra* note 526.

[529] *Ibid*.

[530] *Ibid*.

[531] *Ibid*.

[532] *Ibid*.

markets.[533] The importance of implementing GBT Regulatory Principles has been stressed since they provide foreign investors an assurance when it comes to investing in telecommunications projects in developing countries.[534]

The GBT Agreement permits the companies of one country to acquire and/or to hold significant ownership or control of telecommunications services and/or facilities in other participating countries.[535] This in part implies that market access commitments that empower foreign corporations can develop, own, and operate telecommunications network infrastructure.[536]

There are numerous instances of telecommunication infrastructure projects that have been financed through international project finance in both developed and developing countries via a universal access policy incorporated into each national law or the Annex on telecommunication. Moreover, there is only one case of WTO dispute resolution involving telecommunications services, namely, the Mexico-Measures Affecting Telecommunications Services.[537] Nevertheless, this thesis will not delve into WTO dispute resolution, as the case is not relevant to the subject of this study.

2. Criteria for Applicable Project Financing in the Space Industry

[533] Industrial Organization and Business Resources, Science, and Industry Division, *supra* note 524.

[534] Spector, Phillip L., *The World Trade Organization Agreement on Telecommunication*, The International Lawyer, Vol. 32, No. 2 (1998) p.221.

[535] Industrial Organization and Business Resources, Science, and Industry Division, *supra* note 524.

[536] *Ibid*.

[537] Mexico-Measures Affecting Telecommunications Services (United States v. Mexico) WT/DS204/R, Report of panel of 2 April 2004, Adopted on 1 June 2004.

This Chapter proposes a criterion for space-specific project financing on a par with those published by the World Bank for other industries. Project finance such as funding satellites or spaceports requires a variety of contracts including security packages as well as various financing regulations.

It is also critical to evaluate a project's capacity to earn revenues through operations and to mitigate risks with proper guarantees, insurance, and collateral pledges, [538] as the absence of certain paperwork can easily lead to creditors' right violations. Thus, it is necessary to foster a participation-friendly environment by simplifying complex paperwork and regulations. With the reasons, the World Bank and IMF have developed Project Finance guidelines,[539] but they need revisions to reflect the space industry's unique characteristics as below.

To begin with, provisions regarding military purposes can be quintessential as space industry serves both military and commercial purposes. When multiple entities participate in funding, especially with the adoption of cross-border project finance, extreme caution must be exercised to ensure that the funds are not used for military purposes. A new legal framework should also be considered to prevent potentially discontinued public functions of satellites similar to the clause of public service restrictions in the Space Protocol. Because when some satellites are used for public service, they should not be disrupted without any alternative methods or any proper reasons that they should be ceased.

Second, a provision on education is necessary as the ability to interpret and accurately informatize satellite data is essential. Satellite data is in great demands from various government ministries and entities to

[538] Cahan/ Marboe/ Roedel, *supra* note 46, p. 2.

[539] See, The World Bank, World Bank Disbursement Guidelines for Projects (English), available at: https://documents.worldbank.org/en/publication/documents-reports/documentdetail/410851468161639013/world-bank-disbursement-guidelines-for-projects (last accessed 23 June 2021).

address a variety of difficulties in agriculture, urban planning, disaster management, climate change, fishing, and weather forecasting.

In case of project finance in the aviation and maritime industries, self-production of aircraft or ships, or the establishment of airports or seaports takes precedence over data education. In the space industry, however, even if a developing country or a start-up builds a satellite and launches it into orbit, the data received from the satellite is useless if it cannot be transformed into valuable information. The ability to informatize key satellite data is more essential. As a result, the guidelines should incorporate the contents of the educational system to help properly utilize data from satellites.

Third, establishing a provision for whom to regard as the responsible State, or the 'launching State' pursuant to the Outer Space Treaty, the Registration Convention, and the Liability Convention is very crucial when a spaceport is installed, or satellites or rockets are manufactured through international project financing. This is a noteworthy characteristic that is unique to the space industry, and it is necessary to clearly identify the responsible State in advance as the State will carry international responsibility and liability.

There might be serious challenges when a country does not yet have national space legislation and wishes to accommodate private enterprises engaged in commercial space activities.[540] For example, if a new participant country is not a party to the *corpus iuris spatialis*, particularly the Outer Space Treaty, and does not have its own national space legislation, it is difficult to expect that the country will make a right decision as a launching State. Even though it was anticipated in Article VI of the Outer Space Treaty that non-governmental entities would become active in outer space, in the case above, the supervisory authority of the respective launching State should be mentioned first in a contract or legal documents before starting a program through

[540] Hobe, *supra* note 102, p. 212.

international project finance. Hence, a new legal framework should include a clause declaring a responsible State and requiring all participants to follow the *corpus iuris spatialis*, whether a country is a Party or not.

Fourth, project stakeholders such as investors and operators must share information in order to develop a shared vision or framework for project goals. This will serve as a point of reference for ensuring the achievement of shared objectives as well as for clarifying business models and expected revenue streams.[541]

Due to the space industry's relative lack of experience, only a few project financing based on space projects have been launched, and even fewer have run long enough to gather sufficient feedback on potential obstacles or constraints; and it is easy for projects to fail if participants do not exchange plans and information.[542] The exchange of information is also governed under Article XI of the Outer Space Treaty and the Space Benefits Declaration.

Galileo Services is a perfect example of a collaboration that failed because the consortium and EU had divergent views on how to finance the satellite constellation. The case demonstrates the vitality of establishing a clear business model early in the development of a project.

It is also important to realize that majority of the countries have their own export control regulations governing dual-use trade. Dual-use items are goods, software, and technology that can be utilized for both civil and military purposes.[543] The United States and EU have strict regulations, namely the United States International Traffic in Arms

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[541] L. Jones, Karen, *Public-Private Partnerships: Stimulating Innovation in the Space Sector*, The Aerospace Corporation, p. 10, available at: https://csps.aerospace.org/sites/default/files/2021-08/Partnerships_Rev_5-4-18.pdf (last accessed 11 November 2021).

[542] Nardon/ Venet, *supra* note 350, p. 5.

[543] European Commission, *Dual-Use Trade Controls*, available at: https://ec.europa.eu/trade/import-and-export-rules/export-from-eu/dual-use-controls/ (last accessed 11 November 2021).

Regulations (ITAR)[544] and Regulation (EU) 2021/821.[545] The regulations are to prevent the spread of sensitive technologies to foreign actors that could threaten their interests, while allowing their companies to conduct legitimate commercial activity.[546] However, the broad mandate, extraterritorial reach, and complex and unpredictable procedure of the ITAR and Regulation (EU) 2021/821 have almost paradoxically fueled the emergence of non-United States and/ or EU space enterprises creating their own technologies and pushing the boundaries of space in new directions.[547] Because these restrictions apply to commercial spacecrafts and components as well as cyber-surveillance technology, commercial space enterprises and developing countries should be aware of appropriate actions, such as licensing, to ensure legality of their operations.

Effective international funding, particularly international project finance necessitates beforehand familiarity to the export control regulations in each country. Hence, a clause regarding export control regulations should be incorporated into a new legal framework for international project finance.

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[544] International Traffic in Arms Regulations, 22 CFR § 120-130.

[545] Regulation (EU) 2021/821 of the European Parliament and of the Council of 20 May 2021 Setting Up a Union Regime for the Control of Exports, Brokering, Technical Assistance, Transit and Transfer of Dual-Use Items, OJ L 206, published on 11 June 2021, enter into force on 9 September 2021.

[546] U.S. Department of Commerce's Office of Space Commerce/ Federal Aviation Administration's Office of Commercial Space Transportation, *Introduction to U.S. Export Controls for the Commercial Space Industry* (Second Edition, 2017), available at: https://www.faa.gov/about/office_org/headquarters_offices/ast/media/export_controls_guidebook_for_commercial_space_industry_doc_faa_nov_508.pdf (last accessed 11 November 2021); *see also* von der Dunk, Frans, *A European "Equivalent" to United States Export Controls: European Law on the Control of International Trade in Dual-Use Space Technologies*, Astropolitics, Vol. 7, No. 2 (2009).

[547] Bockel, *supra* note 31, p.4.

III. An International Organization as the Cornerstone of the New Legal Framework

Space activities are regulated and controlled by a variety of international organizations and national laws. UNCOPUOS, in particular, is a central international organization that reviews and fosters international cooperation in the peaceful uses of outer space, and considers legal concerns that arise from the exploration of outer space.

ITU is another international organization specialized in information and communication technologies, allocating global radio spectrum and satellite orbits along with developing the technical standards.[548] It is a significant organization that, in the near future, may become the Supervisory Authority for the International Registry for space assets established under the Space Protocol.[549]

UNIDROIT is an international organization that enacts and administers the Cape Town Convention and the Space Protocol, and solicits each States' participation. Lastly, the World Bank Group is obviously predominant in international investment partnering with governments as well as private sector to provide financing, policy advice, and technical assistance.

It is important to identify the ideal candidate to lead and control if the Space Protocol is amended or new guidelines are developed. It is possible that a separate international organization to serve as the cornerstone of a new legal framework, regardless of whether the Space Protocol is revised or a new guideline for the space industry is formed.

On one hand, if the Space Protocol is amended to incorporate project finance, UNIDROIT that legislated the Space Protocol would be the

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[548] See, ITU, *About International Telecommunication Union (ITU)*, available at: https://www.itu.int/en/about/Pages/default.aspx (last accessed 22 June 2021).

[549] See, ITU, *supra* note 273; Tâiatu, *supra* note 273, p. 508.

most appropriate international organization to oversee financing regulations governing the space industry. Nevertheless, the UNCOPUOS, ITU, and the World Bank may need to collaborate on advising and enforcing regulations and practices that are consistent with current space laws.

Ever since the Space Protocol was enacted, the question of whether it is appropriate to establish space-related laws in UNIDROIT has been raised. However, there is a limit to the extent to which the UNCOPUOS can coordinate on all space activities. Giving UNIDROIT the authority over space financing is a strategy comparable to the ITU that it manages satellite orbits instead the UNCOPUOS. Of course, it would not be a suitable method to exclude the UNCOPUOS from the space financing legal regime, on the contrary it is a matter of coexistence.

UNIDROIT is specialized in commercial law, and already has a successful legal system in place through the Aircraft Protocol. Furthermore, UNIDROIT and the UNOOSA signed a Memorandum of Understanding (MoU) to advance the mutual interests of the two organizations in international cooperation, economic development, and the use of uniform legal instruments and standards in the space sector in 2021.[550] This MoU was signed in response to the recent appointment of UNIDROIT as a Permanent Observer to the UNCOPUOS.[551]

On the other hand, if a new space industry guideline is established, the UNOOSA would be the most qualified international organization to oversee the space industry's project finance regulations in partnership with the World Bank and OECD.

The ICAO collaborated with the World Bank to develop the Manual on aviation economy and project finance based on the principles of the Chicago Convention. Like the aviation industry, the space industry also

[550] UNIDROIT, *Memorandum of Understanding Signed Between UNIDROIT and UNOOSA*, available at: https://www.unidroit.org/memorandum-of-understanding-signed-between-unidroit-and-unoosa/ (last accessed 06 November 2021).

[551] *Ibid*

has ownership and management issues with respect to satellites in orbit and other space object transfers to another country or private entity.

In 2020, the UNOOSA Space Economy, otherwise referred as Promoting Space Sustainability Project, is launched to capture the economic benefits of a dynamic space sector and the role space may play in flourishing socio-economic development.[552] As the majority of space economy activities originate in space-faring countries, the UNOOSA seeks to bring the international space community together in support of emerging space-faring nations' responsible and sustainable participation in the global space economy.[553] Needless to say, establishing the Space Economy and encouraging the flow of 'NewSpace' within the UNOOSA is a significant step forward for the space sector. The Space Economy intends to offer space economy capacity-building services for the Member States, albeit this process has not yet begun.[554]

The UNOOSA is an indispensable organization for successfully setting up a new harmonized international legal framework for project finance in the space sector, as the guideline should be based on the principles of the *corpus iuris spatialis*, which establishes jurisdiction and control over space objects. It is nearly impossible to develop a practical finance guideline without the World Bank and the OECD. Recently, the OECD Space Forum was established, which is a unique international group whose objective is to investigate the economic and innovative dimensions of the space sector in the context of the larger economy and society.[555] It conducts original economic research, creates indicators, and studies measurement and assess impact. In addition, it would be

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[552] UNOOSA, *The Space Economy Initiative*, available at: https://www.unoosa.org/oosa/en/ourwork/topics/space-economy/index.html (last accessed 15 November 2021).

[553] *Ibid*.

[554] *Ibid*.

[555] OECD, *OECD Space Forum*, available at: https://www.oecd.org/innovation/inno/space-forum/ (last accessed 16 March 2022).

irresponsible not to leverage the World Bank's know-hows and expertise in developing multiple cases across various industries. Hence, collaboration between the UNOOSA and the World Bank, the OECD is necessary for developing a new space financing guideline.

IV. Conclusion

Despite the era of 'NewSpace' or the emergence of non-traditional space actors such as the private spaceflight industry, outer space projects remain extremely expensive and complex. To achieve clarity and predictability, this Chapter proposed two ideal legal frameworks for space industry project financing with numerous examples of other industries using project finance as a method of investment.

This Chapter proposed a revision to the Space Protocol that includes a new opt-in clause that considers the project as an asset and allows it to be subject to both the Cape Town Convention and the Space Protocol. The modification eliminates the need for a new regulation of project finance. In addition, amendments through an opt-in clause are easier to implement than common provisions since Contracting States can choose whether or not to be bound by the new clause. If project finance is incorporated into the Cape Town Convention system, long-term investors can evaluate infrastructure as an attractive asset class, allowing them to optimize risk and return profiles of their portfolios over a longer duration.[556] It enables investors to quickly assess and make investment decisions on a wide range of projects.

This Chapter also proposed to establish a standard for space-specific project financing comparable to those developed by the World Bank for

[556] See generally, Kudtarkar, Sandeep, *Policy Reforms and Financial Product innovations in Indian Infrastructure Finance*, IBS Mumbai 2017 Conference (2017).

other industries. It is notable that the World Bank established Guidelines and Toolkits for each industry including road and energy sector, along with the shipping industry. Even though the core of international maritime law, UNCLOS, does not include financing provisions, the privatization of port facilities is accelerating in the absence of globally consistent legal instruments. Hence, UNCTAD with no connection to maritime law has established UNCTAD Guidelines for leases, concessions, and BOT arrangements as well as tendering procedures and the contents of bidding documents, and performance measures for determining the true financial value of bids and specific operational performance measures for port infrastructure.[557]

The World Bank and PPIAF produced the Port Reform Toolkit, which is similar to the Toolkit for PPPs in Roads and Highways. The Port Reform Toolkit intends to assist policymakers and practitioners in developing countries in implementing sustainable and well-considered reforms of public institutions that offer, direct, and regulate port services.[558]

Under the telecommunications infrastructure industry, there are almost 20 countries that have their own telecommunications services regulations including licensing, competition policy, quality service, or universal service. However, these regulations vary from country to country depending on whether a country has matured its telecommunications markets as a result of a priority shift to infrastructure maintenance. Hence, the WTO includes the Annex to the GATS and the GBT Agreement. The Annex to the GATS demands coordination with the ITU to ensure reasonable access to and use of

[557] The World Bank, *supra* note 400.

[558] See generally, PPIAF, *supra* note 403.

public telecommunications in a given market by suppliers of all services covered by the member's commitments.[559]

Among the cases of several industries, the aviation industry stands out. Since the privatization of the British Airports Authority, long-term concessions by private firms to manage all or a portion of an airport's operations and projects on terminal and/ or runway facility constructions have been the dominant model, in which governments take a lower risk and maintain a minority stake in the enterprise.[560]

The aviation industry and the telecommunications sector have proved that the entry of private capital imposes time management discipline and leads to remarkable results even in the short term.[561] There has been a recent movement for increased liberalization of ownership through the involvement of the private sector in airport operations and air navigation services. This is part of a broader process of globalization and liberalization of the world's economy as well as a trend toward privatization of infrastructure industries that were formerly managed by governments or state-owned corporations.[562]

The most impressive point in the aviation industry is that the ICAO has already established a Manual for Privatization of Airports and Air Navigation Services as well as two project finance programmes. They assist States to obtain financing from external institutions by designing and implementing strategies and materials for submitting grant applications and funding proposals to financial institutions.

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[559] Section 6 of the Annex on Telecommunication; See generally, WTO, *supra* note 525.

[560] See, PPIAF, *supra* note 435.

[561] Rastogi, Anupam, *The Infrastructure Sector in India, 2007*, in: Rastogi, AnuPam/ Kalra, Prem/ Pandey, Ajay (eds.), *India Infrastructure Report 2008 Business Models of the Future*, Oxford University Press, India (2008) p. 1.

[562] See generally, Manual on Privatization in the Provision of Airports and Air Navigation Services.

In the space industry, satellite remote sensing, navigation, and space transportation may become types of services, which are included in the GATS system in the future as compared to the telecommunication sector.[563] However, the new guideline should take peculiarities of the space industry into account in order to facilitate adaptation and bridge the gap between the legal framework and regulation in practice. The harmonized international legal framework can provide opportunities for developing countries and start-ups with limited human, financial, or political capability, as it helps to establish enhanced and cultivated national regulations.[564] By developing a transparent, predictable, and uniform legal procedure, all stakeholders can understand the rationale for regulatory decisions.[565] Moreover, clear performance standards and benchmarks help consumers understand the expected level of service and contribute to the resolution of information asymmetry.[566]

Finally, this Chapter discussed which international organization would be suited to organize and control an amendment to the Space Protocol and a new guideline for space sector project financing. Inappropriate organization might create doubts and struggle to convince why the new legal framework is supportive, and the regime would fail. Even for the Space Protocol, one of primary concerns has been whether the Cape Town Convention and the Space Protocol are within the remit of the UNIDROIT.

Since the UNIDROIT Statute[567] contains no authority to devise independent solutions and laws creating new rights or to establish

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[563] Hobe, *supra* note 102, p.121

[564] See generally, *Recommendation of the Council on Principles for Public Governance of Public-Private Partnerships*, OECD/LEGAL/0392 (2012).

[565] Sundararajan, Satheesh/ Ahmed, Sara, *Infrastructure Regulation: Developing Countries*, Public-Private Infrastructure Advisory Facility (PPIAF), Washington D.C. (2015) p. 4.

[566] *Ibid*.

[567] UNIDROIT Statute, Official Translation Approved by the General Assembly at its 45th Session on 26 November 1991.

entities such as the Supervisory Authority, some scholars argue that its role should be limited to harmonizing the rules of national law on a given subject to promote international commercial interaction, and not to establish new rights or entities. However, there is no doubt that the UNIDROIT holds expertise in commercial law and already operates the Cape Town Convention system successfully through the Aircraft Protocol. Hence, the UNIDROIT is considered the most appropriate international organization to oversee the financing regulations governing the space industry, if the Space Protocol is amended to include the opt-in clause involves a project as an international interest under the Space Protocol. However, if a new legal framework is established, the UNOOSA is regarded as the most qualified international organization to oversee the space industry's project finance regulations in collaboration with the World Bank and the OECD because of their experience and expertise in project finance based on the principles of the *corpus iuris spatialis*.

Conclusions and Way Forward

The current study assumes that the space industry is completely globalized so that cross-border project finance transactions are possible. The needs of a uniform international standard for project finance have grown in a number of industries. There are numerous global efforts underway to develop a harmonized international standard to avoid confusion and reduce transaction costs, and it discourages the use of project finance.[568] Hence, the thesis discussed the *Corpus Iuris Spatialis* along with the Cape Town Convention and the Space Protocol to understand the current circumstances of the international space law.

The *Corpus Iuris Spatialis* did not address conventional commercial and private law issues such as international financing schemes for space activities. And the Space Protocol is not yet in force despite the fact that the Cape Town Convention and the Space Protocol have been established to address the private law aspects of asset-based financing. Amongst a variety of reasons for the Space Protocol's limited signatories, the primary reason is that the current space industry is still in its infancy to leverage asset-based finance in the same way as the aviation industry. As an effort to remedy this, this study concentrated on project finance, as it fits the contemporary space sector more than asset-based financing.

This however, does not mean that the Cape Town Convention and the Space Protocol are superfluous. Once the space sector is ready to embrace asset-based financing after a period of development through project finance, the Convention and the Protocol will be useful and serve as the Aircraft Protocol in the current aviation industry.

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[568] Son, *supra* note 81, p. 5.

The thesis also examined the current industry-specific international legal framework for international project finance from a comparative legal perspective. It specifically addressed maritime, aviation, and three distinct infrastructure industries including telecommunications by comparing these sector-specific industries to their respective special legal guidelines. The guidelines showed that with a constant influx of private investment, infrastructure industries in all sectors have gradually transitioned to the PPP model in developing countries and also in developed countries.

The aviation industry is significant because the ICAO plays a main role in public law as well as private law, specifically the economic and financial sectors, while other industries are governed by the World Bank. In a short time, the aviation and telecommunications sectors have successfully been privatized and globalized. Unlike the space sector, these industries already have their own uniform project finance guidelines, developed in collaboration with the ICAO and the World Bank or in collaboration with the ITU and the WTO to eliminate confusion and cut transaction costs. Predictable, uniform legal framework reduces unnecessary negotiation, enforcement costs, and risks.[569]

According to the 2019 Annual Report by the World Bank, private investment pledges in transport, telecommunication facilities, energy, and municipal solid waste infrastructure in low- and middle-income countries totaled 96.7 billion USD across 409 projects in 62 countries.[570] These figures are monumental since they represent the largest number in the last decade, and also 40 percent of the 409 projects

[569] Frankel, Tamar, *Cross-border Securitization: Without Law, but not Lawless*, Duke Journal of Comparative & International Law, Vol. 8 (1998) p. 273.

[570] The World Bank, *Private Participation in Infrastructure (PPI) 2019 Annual Report* (2019) p. 1.

had a majority of their equity sponsored by international entities, indicating that project finance is becoming increasingly globalized.[571]

With this shift in finance, the space industry is considered as a manifestation of the 'NewSpace' trend. Traditionally, investors have viewed the commercial opportunities of space as 'high risk, high cost, and lengthy payment periods' with high entrance barriers.[572] Though the commercial sector of space remains risky and expensive in comparison to other infrastructure sectors, several significant changes such as gradual improvements in managerial practices and the cost have dramatically reduced entry barriers and increased private interest in space.[573]

Increased private investor participation accelerates the space industry's commercialization, privatization, and globalization. It brings more emerging countries and entrepreneurs into the space sector, and they agree to a contract for an international project. For instance, Japanese space parties including JAXA and private actors are trying to strengthen ties with the African Space Industry, and there have been numerous achievements including a small satellite built by Rwanda in collaboration with the University of Tokyo that will provide valuable agricultural data as well as the BIRDS and KiboCUBE projects.[574]

In addition, there are already a few cases using project finance, notably PPP, in the space industry. The change has already sparked various legal issues and may face more future challenges that require a

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[571] *Ibid*., p. 2.

[572] Bockel, *supra* note 31, p.2.

[573] *Ibid*.

[574] Space in Africa, *Japan Poised To Strengthen Ties With The African Space Industry*, available at: https://africanews.space/japan-poised-to-strengthen-ties-with-the-african-space-industry/ (last accessed 15 November 2021); *see also* JAXA, *The University of Nairobi Hands the First KiboCUBE CubeSate over to JAXA Under UNOOSA-JAXA KiboCUBE Programme*, available at: https://global.jaxa.jp/press/2018/01/20180119_kibocube.html (last accessed 15 November 2021).

harmonized space law regulation.[575] That is why this study examined the international legal regimes of other industries in order to advocate for the development of a more stable and efficient project finance framework for the space industry. This thesis discovered that each infrastructure industry has its own unique international legal regime along with multiple successful instances. Because there were only fundamental policies unrelated to finance at the beginning of the fundraising from private and/ or new participants, each industry organized its own legal framework. Numerous successful cases have arisen as a result of having individual legal frameworks that contain each distinctive characteristic based on necessary provisions for trustworthy project financing. A new uniform legal framework for the space industry can be envisioned from comparisons to other legal regimes for project financing. When an industry has clear and comprehensive provisions and provides broad legal guidance on the industry-specific hot issues, project finance can be easily achieved.[576]

This study presented two ideal legal frameworks for space industry project financing and the optimal international organization for establishing and organizing a new harmonized international legal regime. One is a revision of the Space Protocol to include a new opt-in provision that would treat the project as an asset, and the other is to develop criteria for space-specific project financing similar to those established by the World Bank for other industries. Whichever of the two is formed, it will certainly benefit all participants in the space industry for those who employ project financing schemes. The new uniform legal framework is to promote international cooperation,

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[575] Yuzbashyan, Mariam, *Potential Uniform International Legal Framework for Regulation of Private Space Activities, New Perspectives on Space Law*, in Proceedings of the 53rd IISL Colloquium of the International Institute of Space Law (2011) p. 70.

[576] European Investment Bank, *Facility for Euro-Mediterranean Investment and Partnership (FEMIP) Study on PPP Legal & Financial Frameworks in the Mediterranean Partner Countries, Volume 1 – A Regional Approach*, p. 22, available at: https://www.eib.org/attachments/med/ppp-study-volume-1.pdf (last accessed 15 November 2021).

encourage developing countries to develop their own infrastructures, and ensure equitable access by all participants in outer space activities.

Bibliography

1. Treaties

Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, 1363 UNTS 3, adopted on 18 December 1979, entered into force on 11 July 1984 (the 'Moon Agreement').

Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space, 672 UNTS 119, adopted on 22 April 1968, entered into force on 3 December 1968 (the 'Rescue Agreement').

Convention for the Establishment of a European Organization for the Development and Construction of Space Vehicle Launchers, 507 U.N.T.S. 177, adopted on 29 March 1962, entered into force on 29 February 1964.

Convention for the Establishment of a European Space Agency, 14 I.L.M. 864, adopted on 30 May 1975, entered into force on 30 October 1980.

Convention for the Establishment of a European Space Research Organization, 158 U.N.T.S. 35, adopted on 14 June 1962, entered into force on 20 March 1964.

Convention on International Civil Aviation, 15 UNTS 295, adopted on 7 December 1944, entered into force on 4 April 1947 (the 'Chicago Convention').

Convention on International Interests in Mobile Equipment, 2307 UNTS 285, adopted on 16 November 2001, entered into force on 1 March 2006 (the, 'Cape Town Convention').

Convention on International Liability for Damage Caused by Space Objects, 961 UNTS 187, adopted on 29 March 1972, entered into force on 1 September 1972 (the 'Liability Convention').

Convention on Registration of Objects Launched into Outer Space, 1023 UNTS 15, adopted on 14 January 1975, entered into force on 15 September 1976 (the 'Registration Convention').

Convention on the International Recognition of Rights in Aircraft, 310 UNTS 151, adopted on 19 June 1948, entered into force on 17 September 1953 (the, 'Geneva Convention').

Protocol to the Convention on International Interests in Mobile Equipment on Matters Specific to Aircraft Equipment, adopted on 16 November 2001, entered into force on 1 March 2006 (the, 'Aircraft Protocol').

Protocol to the Convention on International Interests in Mobile Equipment on Matters Specific to Space Assets, adopted on 9 March 2012 (the, 'Space Protocol').

Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, 610 UNTS 205, adopted on 27 January 1967, entered into force on 10 October 1967 (the 'Outer Space Treaty').

United Nations Convention on the Law of the Sea, 1833 UNTS 3, adopted on 10 December 1982, entered into force on 16 November 1994 (the 'UNCLOS').

Vienna Convention on the Law of Treaties, 1155 UNTS 331, adopted on 23 May 1969, entered into force on 27 January 1980.

2. UN General Assembly Resolutions

UNGA Res. 1721 (XVI) (B), International Co-operation in the Peaceful Uses of Outer Space, 20 December 1961.

UNGA Res. 1962 (XVIII), Declaration of Legal Principles Governing the Activities of States in the Exploration and Uses of Outer Space, 13 December 1963

UNGA Res. 37/92, The Principles Governing the Use by States of Artificial Earth Satellites for International Direct Television Broadcast, 10 December 1982

UNGA Res. 41/65, The Principles Relating to Remote Sensing of the Earth from Outer Space, 3 December 1986

UNGA Res. 47/68, The Principles Relevant to the Use of Nuclear Power Sources in Outer Space, 14 December 1992

UNGA Res. 51/122, Declaration on International Cooperation in the Exploration and Use of Outer Space for the Benefit in the Interest of All Sates, Taking into Particular Account the Needs of Developing Countries, 13 December 1996 ('Space Benefits Declarations').

3. Other UN Documents

General Agreement on Trade in Services, Annex 1B, 1869 U.N.T.S. 183, 33 I.L.M. 1167, adopted on 15 April 1994, entered into force on 1 January 1995 ('GATS').

Guidelines for Port Authorities and Governments on the privatization of port facilities, UNCTAD/SDTE/TIB/1, adopted on 23 September 1998 (the 'UNCTAD Guidelines').

ICAO, *Airport Economics Manual*, Doc 9562 (2013).

ICAO, *ICAO's Policies on Charges for Airports and Air Navigation Services*, Doc 9082 (2009).

ICAO, *Manual on Air Navigation Services Economics*, Doc 9161 (2013).

ICAO, *Manual on Privatization in the Provision of Airports and Air Navigation Services*, Doc 9980 (2012).

ICAO, *Regulations and Procedures for the International Registry*, Doc 9864 (2010) available at: https://www.icao.int/publications/Documents/9864_4ed.pdf

ICAO, *SARPs – Standards and Recommended Practices*, available at: https://www.icao.int/safety/safetymanagement/pages/sarps.aspx

International Law Commission (ILC), *Draft Articles on Responsibility of States for Internationally Wrongful Acts*, Supplement No. 10, UN Doc. A/56/10 (2001)

UNCITRAL, UNCITRAL Legislative Guide on Privately Financed Infrastructure Projects, adopted on 29 June 2000.

UNCOPUOS – Legal Subcommittee (Vienna 3-13 April 2006), *Registration of Space Objects: Harmonization of Practices, Non-registration of Space Objects, Transfer of Ownership and Registration/ Non-registration of "Foreign" Space Objects*, UN Doc. A/AC.105/867.

UNCOPUOS, *Status of International Agreements relating to activities in outer space as at 1 January 2021*, UN Doc. A/AC.105/C.2/2021/CRP.10 (2021).

4. Documents of Other International Organizations

International Organization for Standardization (ISO), *ISO/TC 20 Business Plan*, available at: https://isotc.iso.org/livelink/livelink/fetch/2000/2122/687806/ISO_TC_020_Aircraft_and_space_vehicles_pdf?nodeid=1195698&vernum=-2

OECD, *Arrangement on Officially Supported Export Credits*, TAD/PG(2018)8 (2018).

OECD, *OECD Sector Understanding on Export Credits for Civil Aircraft*, TAD/PG (2019)1, 2 January 2019.

Preparatory Commission for the Establishment of the International Registry for Space Assets Pursuant to the Space Protocol, Prep. Comm. Space/5/Doc.2 (2017).

Public-Private Infrastructure Advisory Facility (PPIAF), *Port Reform Toolkit Second Edition*, available at: https://ppiaf.org/sites/ppiaf.org/files/documents/toolkits/Portoolkit/Toolkit/index.html

Recommendation of the Council on Principles for Public Governance of Public-Private Partnerships, OECD/LEGAL/0392 (2012).

Space Registry Regulations, Prep. Comm. Space/4/Doc. 6 rev. 2 (2015).

The World Bank, *Private Participation in Infrastructure (PPI) 2019 Annual Report* (2019).

The World Bank, *United Nations Conference on Trade and Development (UNCTAD) Guidelines for Port Authorities and Governments on the privatization of port facilities*, available at: https://ppp.worldbank.org/public-private-partnership/library/united-nations-conference-trade-and-development-unctad-guidelines-port-authorities-and-governments-privatization-port-facilities

The World Bank, World Bank Disbursement Guidelines for Projects (English), available at: https://documents.worldbank.org/en/publication/documents-reports/documentdetail/410851468161639013/world-bank-disbursement-guidelines-for-projects

UNIDROIT 1989 - Study LXXII - Doc.3, Analysis of the Replies to the Questionnaire on an International Regulation of Aspects of Security Interests in Mobile Equipment (April 1991)

UNIDROIT 1989 – Study LXXII – Doc. 2, International Regulation of Aspects of Security Interests in Mobile Equipment: Questionnaire (December 1989)

UNIDROIT 1998 - Study LXXII - W.P. 4, Revised Draft Articles of a Future UNIDROIT Convention on International Interests in Mobile Equipment: Preliminary Comments on the Application of the Revised Draft Articles to Space Property (July 1997).

UNIDROIT Statute, Official Translation Approved by the General Assembly at its 45th Session on 26 November 1991.

UNIDROIT, *Annual Report – 2009*, II. Legislative Activities, A. Work in Progress. 1. International Interests in Mobile Equipment a. Preliminary draft Space Protocol, Rome (2009).

World Bank/ PPIAF, *Toolkit for Public-Private Partnerships in Roads and Highways*, available at: https://ppiaf.org/sites/ppiaf.org/files/documents/toolkits/highwaystoolkit/index.html

WTO, *Annex on Telecommunication*, available at: https://www.wto.org/english/tratop_e/serv_e/12-tel_e.htm

5. Cases

Blue Sky One Ltd and Others v Mahan Air and Another – the case was heard in two phases, (2009) EWHC 3314 (Comm) and (2010) EWHC 631 (Comm).

Mexico-Measures Affecting Telecommunications Services (United States v. Mexico) WT/DS204/R, Report of panel of 2 April 2004, Adopted on 1 June 2004.

6. Municipal Laws and ESA Regulations

European Electronic Communications Code, Directive (EU) 2018/1972, L 321/36 (2018).

International Traffic in Arms Regulations,22 CFR § 120-130.

Private Capital Inducement Act for the Expansion of Social Overhead Capital and the Presidential Decree ('The Private Capital Inducement Act').

Regulation (EU) 2021/821 of the European Parliament and of the Council of 20 May 2021 Setting Up a Union Regime for the Control of Exports, Brokering, Technical Assistance, Transit and Transfer of Dual-Use Items, OJ L 206, published on 11 June 2021, enter into force on 9 September 2021.

The Act on Private Participation in Infrastructure, Act No. 5624, adpted on 31 December 1998, lately revised 31 March 2020.

7. Books

Bhattacharyay, Biswa Nath, *Infrastructure Development for ASEAN Economic Integration*, ADBI Working Paper Series, No. 138 (2009).

Bockel, Jean-Marie, *The Future of the Space Industry*, General Report, Economic and Security Committee (ESC) of the NATO Parliamentary Assembly, 173 ESC 18 E fin (2018.

Brown, Ashley C./ Stern, Jon/ Tenenbaum, Bernard/ Gencer, Defne, *Handbook for Evaluating Infrastructure Regulatory Systems*, The World Bank, Washington, D.C. (2016).

Brownlie, Ian, *Principles of Public International Law*, Oxford University Press, Oxford (9th ed. 2019).

Childers, Troy/ Marin, Marc J., *Asset-Based Lending: A Training Guide to Secured Financing*, The Commercial Finance Institute (2005).

Dewar, John, *International Project Finance -Law and Practice*, Oxford University Press, London (2011).

European Investment Bank, *Facility for Euro-Mediterranean Investment and Partnership (FEMIP) Study on PPP Legal & Financial Frameworks in the Mediterranean Partner Countries, Volume 1 – A Regional Approach*, available at: https://www.eib.org/attachments/med/ppp-study-volume-1.pdf

Finnerty, John D., *Project Financing: Asset-Based Financial Engineering*, John Wiley & Sons, New York (1996).

Goode, Roy, *Official Commentary on the Convention on International Interests in Mobile Equipment and Protocol Thereto on Matters Specific to Aircraft Equipment*, International Institute for the Unification of Private Law, Rome (3rd ed., 2013).

Goode, Roy, *Official Commentary on the Convention on International Interests in Mobile Equipment and Protocol Thereto on Matters Specific to Space Asset*, International Institute for the Unification of Private Law, Rome (3rd ed., 2013).

Hobe, Stephan, *Space Law*, Nomos; C.H. Beck; Hart Publishing, Germany (First Edition, 2019).

Hobe, Stephan/Schmidt-Tedd, Bernhard/Schrogl, Kai-Uwe (eds.), *Cologne Commentary on Space Law*, Vol. I, Carl Heymanns, Cologne (2009).

Hobe, Stephan/Schmidt-Tedd, Bernhard/Schrogl, Kai-Uwe (eds.), *Cologne Commentary on Space Law*, Vol. II, Carl Heymanns, Cologne (2009).

Hobe, Stephan/Schmidt-Tedd, Bernhard/Schrogl, Kai-Uwe (eds.), *Cologne Commentary on Space Law*, Vol. III, Carl Heymanns, Cologne (2009).

Hoffman, Scott L., *The Law and Business of International Project Finance*, Transnational Publishers, Ardsley, NY, (2nd ed. 2001).

Izaguirre, Ada Karina, *Private Participation in Energy*, World Bank, Washington D.C. (2000).

Khan, M. Fouzul Kabir/ Parra, Robert J., *Financing Large Projects - Using Project Finance Techniques and Practices*, Prentice Hall, New Jersey (2003).

Kim, Jay-Hyung/ Kim, Jungwook/ Choi, Seok Joon, *Public-Private Partnership Infrastructure Projects: Case Studies from the Republic of Korea, Attachment: Global Country Comparison of Public-Private Partnership Frameworks and Projects*, Asian Development Bank, Philippines (2011).

Kim, Jay-Hyung/ Kim, Jungwook/ Choi, Seok Joon, *Public-Private Partnership Infrastructure Projects: Case Studies from the Republic of Korea, Volume 2: Cases of Build-Transfer-Operate Projects for Ports and Build-Transfer-Lease Projects for Education Facilities*, Asian Development Bank, Philippines (2011).

Nevitt, P.K./ Fabozzi, F.J., *Project Financing*, Euromoney, London (2000).

OECD, *Transport Infrastructure Investment: Options for Efficiency*, International Transport Forum (2008).

Queiroz, Cesar, *Launching Public Private Partnerships for Highways in Transition Economies, Transport Papers*, The World Bank Group, Washington, D.C. (2005).

Rastogi, Anupam, *The Infrastructure Sector in India, 2007*, in: Rastogi, AnuPam/ Kalra, Prem/ Pandey, Ajay (eds.), *India Infrastructure Report 2008 Business Models of the Future*, Oxford University Press, India (2008).

Scott L., Hoffman, *The Law and Business of International Project Finance*, Kluwer Law International, The Netherlands (Second Edition, 2001).

Silva, Gisele F., *Private Participation in the Airport Sector: Recent Trends*, World Bank, Washington, D.C. (1999).

Sundahl, Mark J., *The Cape Town Convention: Its Application to Space Assets and Relation to the Law of Outer Space*, Brill/Nijhoff, Leiden/Boston (2013).

U.S. Department of Commerce's Office of Space Commerce/ Federal Aviation Administration's Office of Commercial Space Transportation, *Introduction to U.S. Export Controls for the Commercial Space Industry* (Second Edition, 2017), available at: https://www.faa.gov/about/office_org/headquarters_offices/ast/media/export_controls_guidebook_for_commercial_space_industry_doc_faa_nov_508.pdf

World Bank, *World Development Report 1994: Infrastructure for Development*, Oxford University Press, New York (1994).

8. Book Chapters

Cheng, Bin, *International Responsibility for National Activities in Outer Space*, in: Bernhard, R./ Bindschedler, R. (eds.), Encyclopedia of Public International Law, Instalment XI, North Holland, Amsterdam (1989).

Degrange, Valentin, *Active Debris Removal: A Joint Task and Obligation to Cooperate for the Benefit of Mankind*, in: Froehlich, Annette (ed.), Space Security and Legal Aspects of Active Debris Removal, Studies in Space Policy, Volume 16, Springer Nature Switzerland AG (2019).

Hobe, Stephan, *International Space Law in its First Half Century*, in: Proceedings of the 49th Colloquium of the International Institute of Space Law (2006).

Kensinger, John W./ Martin, John D., *Project Finance: Raising Money the Old-Fashioned Way*, in: D.H. Chew jr., The New Corporate Finance: Where Theory Meets Practice, McGraw-Hill, New York (1993).

Kozuka, Souichirou/ Taniguchi, Fuki, *The Economic Assessment of the Space Assets Protocol to the Cape Town Convention*, in Proceedings of the 52nd Colloquium of the International Institute of Space Law (2012).

Sánchez Aranzamendi, Matxalen, *Space and Lisbon. A New Type of Competence to Shape the Regulatory Framework for Commercial Space Activities*, in Proceedings of the 53rd Colloquium of the International Institute of Space Law (2011).

van Fenema, Peter, *Legal Aspects of Launch Services and Space Transportation*, in: von der Dunk/ Tronchetti (eds.), Handbook of Space Law, Edward Elgar Publishing, Cheltenham (2015).

von der Dunk, Frans, Liability Versus Responsibility in Space Law: Misconception or Misconstruction?, in: Proceedings of the 34th Colloquium of the International Institute of Space Law (1991).

Yuzbashyan, Mariam, *Potential Uniform International Legal Framework for Regulation of Private Space Activities, New Perspectives on Space Law*, in Proceedings of the 53rd IISL Colloquium of the International Institute of Space Law (2011).

9. Scholarly Journal Articles

Alexandridis, George/ Kavussanos, Manolis G./ Kim, Chi Y./ Tsouknidis, Dimitris A./ Visvikis, Iias D., *A survey of Shipping Finance Research: Setting the Future Research Agenda*,

Transportation Research Part E: Logistics and Transportation Review, Vol. 115 (2018).

Alfen, Hans Wilhelm et al., *Public-Private Partnership in infrastructure development: Case studies from Asia and Europe*, Schriftenreihe der Professur Betriebswirtschaftslehre im Bauwesen, Bauhaus-Universität Weimar, No. 7 (2009).

Ametova, Lutfiie, *International Interest in Space Assets under the Cape Town Convention*, Acta Astronautica, Vol. 92, Issue. 2 (2013).

Arani, Mojtaba Eshraghi, *The Legal Impediments to the Accession of Iran to the Cape Town Convention on International Interests in Mobile Equipment and the Aircraft Protocol*, Uniform Law Review, Vol. 24 (2019).

Azaino, Efe Uzezi, *Project Finance Protection System: Can This Shield Effectively Cover Lenders' Exposure in Time of Default?*, Centre for Energy, Petroleum and Mineral Law and Policy (CEPMLP) Annual Review (CAR), Vol. 16 (2013).

Bank of America, *A Guide to Asset-Based Lending*, Bank of America Merrill Lynch Article (2014).

Beidleman, Carl R./ Fletcher, Donna/ Veshosky, David, *On Allocating Risk: The Essence of Project Finance*, Sloan Management Review, Vol. 31, No. 3 (1990).

Böger, Ole, *A possible Protocol to the Cape Town Convention on renewable energy equipment*, Uniform Law Review, Vol. 23, Issue. 2 (2018).

Böger, Ole, *The Case for a New Protocol to the Cape Town Convention Covering Security over Ships*, Cape Town Convention Journal, Vol. 5, No. 1 (2016).

Brady, Gordon, *Public Private Partnerships: Rome's EPrix, Auto Industry Mergers and Repercussions, Turnlikes and Toll Roads*,

Journal of Infrastructure Policy and Development, Vol. 3, No. 2 (2019).

Burger, Philippe/ Hawkesworth, Ian, *How to Attain Value for Money: Comparing PPP and Traditional Infrastructure Public Procurement*, OECD Journal on Budgeting, Vol. 1 (2011).

Cahan, Bruce/ Marboe, Irmgard/ Roedel, Henning, *Outer Frontiers of Banking: Financing Space Explorers and Safeguarding Terrestrial Finance*, New Space, Vol. 4 (2016).

Chen, Qian, *Legal Aspects of Aircraft Financing and New Challenges for China*, Thesis submitted to Institute of Air and Space Law, McGill University, Montreal (2008).

Crans, Berend, *How Many Engines on a Boeing 737? An Analysis of Accession Rules in Relation to Aircraft Engines*, Air & Space Law, Vol. 38, Issue. 3 (2013).

Cuming, Ronald C.C., *International Regulation of Aspects of Security Interests in Mobile Equipment*, Uniform Law Review, Vol. os-18, Issue. 1 (1990).

Eberg, Artur/ Weber, Ludwig, *The Cape Town Convention and Its Implementation in the Commonwealth of Independent States (CIS)*, Air and Space Law, Vol. 39, No. 1 (2014).

Eng Teong, *Commercialization of Space Activities- The Laws and Implications*, Journal of Air Law and Commerce, Vol. 82, Issue. 1 (2017).

Eras-Almeida, A.A./ Fernández, M.; Eisman, J./ Martín, J.G./ Caamaño, E./ Egido-Aguilera, M.A, *Lessons Learned from Rural Electrification Experiences with Third Generation Solar Home Systems in Latin America: Case Studies in Peru, Mexico, and Bolivia*, Sustainability, Vol. 11, No. 24 (2019).

Farrell, Michael, *Principal-Agency Risk in Project Finance*, International Journal of Project Management, Vol. 21 (2003).

Frankel, Tamar, *Cross-border Securitization: Without Law, but not Lawless*, Duke Journal of Comparative & International Law, Vol. 8 (1998).

Galbraith, Jean, *Treaty Options: Towards a Behavioral Understanding of Treaty Design*, Virginia Journal of International Law, Vol. 53 (2013).

Glaister, William J/ Murphy, Robert/ Chan, Marisa/ Dunne, Ellie/ Acratopulo, Julian, *Lex Situs after Blue Sky: is the Cape Town Convention the Solution?*, Cape Town Convention Journal, Vol. 1, No. 1 (2012).

Goode, Roy, *The Priority Rules under the Cape Town Convention and Protocols*, Cape Town Convention Journal, Vol. 1, No. 1 (2012).

Gopalan, Sandeep, *Harmonization of Commercial Law: Lessons from the Cape Town Convention on International Interests in Mobile Equipment*, Law and Business Review of the Americas, Vol. 9, No. 2 (2003).

Hobe, Stephan, *The Impact of New Developments on International Space Law (New Actors, Commercialisation, Privatisation, Increase in the Number of "Space-faring Nations")*, Uniform Law Review, Vol. 15, Issue. 3-4 (2010).

Hoffman, Scott L., *A Practical Guide to Transactional Project Finance: Basic Concepts, Risk Identification, and Contractual Considerations*, The Business Lawyer, Vol. 45, No. 1 (1989).

Imburgia, Joseph S., *Space Debris and Its Threat to National Security: A Proposal for a Binding International Agreement to Clean Up the Junk*, Vanderbilt Journal of Transnational Law, Vol. 44 (2011).

Ismail, Mohamed A.M., *International Infrastructure Agreements and PPPs in Developing Countries: Substantive Principles -With Special Reference to Arab and Latin American Countries*, European Procurement & Public Private Partnership Law Review, Vol. 6, Issue. 3 (2011).

Johnson, Christopher Daniel, *Financing for Commercial Space: Asset-backed Financing, International Space Law and the UNIDROIT Draft Protocol on Space Assets*, Thesis submitted to Institute of Air and Space Law, Leiden University, Leiden (2010).

Kerrest, Armel, *Space Debris, Remarks on Current Legal Issues*, in Proceeding of the Third European Conference on Space Debris, Vol. 2, ESOC, Darmstadt/ Germany (2001).

Kozuka, Souichirou/ Taniguchi, Fuki, *An Economic Assessment of the Space Assets Protocol to the Cape Town Convention*, Uniform Law Review, Vol. 16 (2011).

Kudtarkar, Sandeep, *Policy Reforms and Financial Product innovations in Indian Infrastructure Finance*, IBS Mumbai 2017 Conference (2017).

L. Jones, Karen, *Public-Private Partnerships: Stimulating Innovation in the Space Sector*, The Aerospace Corporation, available at: https://csps.aerospace.org/sites/default/files/2021-08/Partnerships_Rev_5-4-18.pdf

Larsen, Paul B., *Future Protocol on Security Interests in Space Assets*, Journal of Air Law and Commerce, Vol. 67, Issue. 4 (2002).

Linetsky, Vadim, *Accession to the Cape Town Convention by the UK: An Economic Impact Assessment Study*, available at: https://ctcap.org/wp-content/uploads/2020/02/Acession-to-the-CTC-by-the-UK-Economic-Impact-Study-Linetseky-2010.pdf

Linetsky, Vadim, Economic Benefits of the Cape Town Treaty, available at: https://ctcap.org/wp-content/uploads/2020/02/Economic-Benefits-of-the-CTC-Vadim-Linetsky-2009.pdf

McPhillips, Rory/ Rosen, Howard/ Kozuka, Souichirou/ Kennedy, Stuart, *Comparative analysis of aircraft, rail and space international registries and their regulatory provisions*, Cape Town Convention Journal, Vol. 5, No. 1 (2016).

Nardon, Laurence/ Venet, Christophe, *The Development of Public-Private Partnerships in the European Satcom Sector*, Actuelles de I'Ifri, The Europe & Space Series, No. 4 (2011).

Oduntan, Gbenga, *Geospatial Sciences and Space Law: Legal Aspects of Earth Observation, Remote Sensing and Geoscientific Ground Investigations in Africa*, Geosciences, Vol. 9, No. 4 (2019).

Pak, Igor, *Finance Architecture of Hydro-Energy Projects: Case Study of Rogun Dam Project in Tajikistan*, Graduate Lawyers at Tulane Law Review, Vol. 1 (2015).

Pinto, João M./ Alves, Paulo P., *The Choice between Project Financing and Corporate Financing: Evidence from the Corporate Syndicated Loan Market*, ERN: Other Microeconomics: Intertemporal Firm Choice & Growth (2020).

Pomeroy, Caleb/ Calzada-Diaz, Abigail/ Bielicki, Damian, *Fund Me to the Moon: Crowdfunding and the New Space Economy*, Space Policy, Vol. 47 (2019).

Rauner, Stewart E., *Project Finance: A Risk Spreading Approach to the Commercial Financing of Economic Development*, Harvard International Law Journal, Vol. 24 (1983).

Reiche, Kilian/ Tenenbaum, Bernard/ Torres de Mästle, Clemencia, *Electrification and Regulation: Principles and a Model Law*, Energy and Mining Sector Board Discussion Paper, No. 18, World Bank, Washington D.C. (2016).

Ribbelink, Olivier M., *The Protocol on Matters Specific to Space Assets*, European Reviews of Private Law, Vol. 12, Issue. 1 (2004).

Rodríguez de las Heras Ballell, Teresa, *Complexities arising from the expansion of the Cape Town Convention to other sectors: the MAC Protocol's challenges and innovative solutions*, Uniform Law Review, Vol. 23, Issue. 2 (2018).

Sarro, Douglas, *Do Lenders Make Effective Regulators: An Assessment of the Equator Principles on Project Finance*, German Law Journal, Vol. 13, No. 12 (2012).

Sîrghi, Petru, *Public Private Partnership Case of Poland*, Thesis submitted to Warsaw School of Economics, Warsaw (2015).

Son, Seungwoo, *Legal Analysis on Public-Private Partnerships regarding Model PPP Rules*, Korean Journal of International Trade and Business Law, Vol. 22, No. 2 (2013).

Spector, Phillip L., *The World Trade Organization Agreement on Telecommunication*, The International Lawyer, Vol. 32, No. 2 (1998).

Stewart-Smith, Martin, *Private Financing and Infrastructure Provision in Emerging Markets*, Law and Policy in International Business, Vol. 26, No. 4 (1995).

Sundahl, Mark J., *The Space Assets Protocol One Year Later: An Update and Reassessment*, The Air & Space Lawyer, Vol. 26, No. 1 (2013).

Sundararajan, Satheesh/ Ahmed, Sara, *Infrastructure Regulation: Developing Countries*, Public-Private Infrastructure Advisory Facility (PPIAF), Washington D.C. (2015).

Tâiatu, Claudiu Mihai, *The International Telecommunication Union (ITU) as the Proposed Supervisory Authority of the Future International Registry for Space Assets*, Uniform Law Review, Vol. 23 (2018).

Tenev, Jovi, *Some Observations on Dr Ole Böger's 'The Case for a New Shipping Protocol to the Cape Town Convention Covering Security over Ships' – a Modest Proposal*, Cape Town Convention Journal, Vol. 5, No. 1 (2016).

Traschler, Thomas, *The Significance of the Qualifying Declarations Under the Cape Town Convention*, Uniform Law Review, Vol. 24 (2019).

van Fenema, Peter, *The UNIDROIT Space Protocol, the Concept of 'Launching State', Space Traffic Management and the Delimitation of Outer Space*: The 41st session of the UNCOPUOS Legal Subcommittee, Vienna, 2-12 April 2002, Air & Space Law, Vol. 27 (2002).

von der Dunk, Frans, *A European "Equivalent" to United States Export Controls: European Law on the Control of International Trade in Dual-Use Space Technologies*, Astropolitics, Vol. 7, No. 2 (2009).

von der Dunk, Frans, *Billion-dollar questions? Legal aspects of commercial space activities*, Uniform Law Review, Vol. 23 (2018).

von der Dunk, Frans, *European Satellite Earth Observation: Law, Regulations, Policies, Projects, and Programmes*, Creighton Law Review, No. 42 (2009).

von der Dunk, Frans, *Sovereignty Versus Space - Public Law and Private Launch in the Asian Context*, Singapore Journal of International & Comparative Law, Vol. 5 (2001).

von Planta, Niclas, *The Aircraft Protocol to the Cape Town Convention on Aircraft Financing: A Civil Lawyer's Perspective*, Thesis submitted to Institute of Air and Space Law, McGill University, Montreal (2009).

Weber, Ludwig, *Public and private features of the Cape Town Convention*, Cape Town Convention Journal, Vol. 4, No. 1 (2015).

Wilson, F. Scott, *Reflections on Two Cape Town Convention Innovations*, The Air & Space Lawyer, Vol. 31, No. 1 (2018).

Yun, Zhao, *Revisiting Selected Issues in the Draft Protocol to the Cape Town Convention on Matters Specific to Space Assets*, Journal of Air Law and Commerce, Vol. 76, Issue. 4 (2011).

10. News Articles

AP NEWS, *Hurricane Luis Devastates St. Maarten, Death Toll Overall At 19*, available at: https://apnews.com/article/178be85e40e1e07789fa004e78e3674f

APA News, *Africa Joins Space Race*, available at: http://apanews.net/en/news/africa-joins-space-race

Business Insider, *SpaceX made 4 vital changes to its Crew Dragon Spaceship, and a Promise for the Landing, after Analyzing its First Astronaut Mission*, available at: https://www.businessinsider.com/spacex-upgraded-crew-dragon-spaceship-for-next-nasa-astronaut-mission-2020-9?r=DE&IR=T

Research and Markets, India Space Industry Report 2020: *An Evolving Ecosystem – New Commercial Participants Such as Agnikul Cosmos, Skyroot Aerospace, and Vesta Space Technology Enter the Landscape*, available at: https://www.globenewswire.com/news-release/2020/09/30/2101199/0/en/India-Space-Industry-Report-2020-An-Evolving-Ecosystem-New-Commercial-Participants-Such-as-Agnikul-Cosmos-Skyroot-Aerospace-and-Vesta-Space-Technology-Enter-the-Landscape.html

Space in Africa, *Japan Poised To Strengthen Ties With The African Space Industry*, available at: https://africanews.space/japan-poised-to-strengthen-ties-with-the-african-space-industry/

Space in Africa, *Rwandan Government Cabinet Approves Draft Law Establishing Rwandan Space Agency*, available at: https://africanews.space/rwandan-government-cabinet-approves-draft-law-establishing-rwanda-space-agency/

Spacenews, *SpaceX has busy manifest of Dragon missions*, available at: https://spacenews.com/spacex-has-busy-manifest-of-dragon-missions/

Spacewatch.global, *Scottish Space Industry Eager to Double Growth by 2030, Study Says*, available at: https://spacewatch.global/2020/10/space-scotland-spire/

The Conversation, *Private Companies are Launching New Space Race – Here's What to Expect*, available at: https://theconversation.com/private-companies-are-launching-a-new-space-race-heres-what-to-expect-80697

The Guardian, *Space Oddity: Australia Launches 35kg Commercial Rocket into Atmosphere*, available at: https://www.theguardian.com/australia-news/2020/sep/19/space-oddity-australia-launches-35kg-commercial-rocket-into-atmosphere

The Washington Post, *Virginia Has a Rocket Launch Site, and it's About to Grow with the Most Successful Startup since SpaceX*, available at: https://www.washingtonpost.com/technology/2020/10/02/virginia-has-rocket-launch-site-its-about-grow-with-most-successful-startup-since-spacex/

11. Internet Pages

ADB, *About ADB*, available at: https://www.adb.org/who-we-are/about

AEROSPACE, *Public-Private Partnerships in Space*, available at: https://csps.aerospace.org/papers/public-private-partnerships-space

African Development Bank Group, *African Development Bank (AfDB)*, available at: https://www.afdb.org/en/about/corporate-information/african-development-bank-afdb

Asian Development Bank, *Developing Best Practices for Promoting Private Sector Investment in Infrastructure: Ports*, available at: https://www.adb.org/publications/developing-best-practices-promoting-private-sector-investment-infrastructure-ports

Aviareto, *International Registry of Interests in Aircraft Equipment: Thirteenth Annual Statistical Report 1 January 2018 – 31 December 2018*, available at: https://www.aviareto.aero/wp-content/uploads/2020/07/13th-Annual-Statistical-Report-of-the-Registrar-2018_.pdf

Bank of America, *Understanding Asset-Based Lending*, available at: https://www.bofaml.com/en-us/content/what-is-asset-based-lending-how-it-works.html

Boeing, *Commercial Market Outlook 2020-2039*, available at: http://www.boeing.com/commercial/market/commercial-market-outlook/

Energetica Photovoltaic Industries, *About Us*, available at: https://www.energetica-pv.com/en/company/about-energetica/

European Commission, *Dual-Use Trade Controls*, available at: https://ec.europa.eu/trade/import-and-export-rules/export-from-eu/dual-use-controls/

Gordon Brothers, *Aircraft Manufacturing & Inventory Trends*, available at: https://www.gordonbrothers.com/insights/industry-insights/commercial-and-industrial-aircraft-engine-and-parts

Hameed, Hamza, *Asset-based Financing in the Space Sector: the Space Protocol of the Cape Town Convention*, available at: https://prezi.com/p/ueedmqetgnb2/space-protocol-of-the-cape-town-convention/

IATA, *Losses Reduce but Challenges Continue – Cumulative $201 Billion Losses for 2020-2022*, available at: https://www.iata.org/en/pressroom/2021-releases/2021-10-04-01/

ICAO, *Financing Aviation Infrastructure*, available at: https://www.icao.int/MID/Documents/2017/Aviation%20Data%20and%20Analysis%20Seminar/PPT6%20-%20Financing%20Aviation%20Infrastructure.pdf

ICAO, *Project Financing and Development*, available at: https://www.icao.int/secretariat/TechnicalCooperation/Pages/pfd.aspx

ICAO, *Public Private Partnership (PPP) – Case study*, available at: https://www.icao.int/sustainability/PPP%20Case%20Studies/PPP_ANSP_United%20States.pdf

ICAO, *Public Private Partnership (PPP) – Case study*, available at: https://www.icao.int/sustainability/PPP%20Case%20Studies/PPP_Airport_Jordan.pdf

ICAO, *Public Private Partnerships – Financing Environmentally Friendly Investments*, available at: https://www.icao.int/Meetings/acli/Documents/NEXA_24October-am.pdf

ICAO, *Public-Private Partnership (PPP)*, available at: https://www.icao.int/sustainability/Pages/im-ppp.aspx

Industrial Organization and Business Resources, Science, and Industry Division, *Telecommunications Services Trade and the WTO Agreement*, available at: https://www.everycrsreport.com/files/20021223_RS20319_b06e42584b84044c493fca8223cc7b7ad2f9a3f3.pdf

International Finance Corporation (IFC), *Lessons of Experience No. 7: Project Finance in Developing Countries*, available at: https://www.ifc.org/wps/wcm/connect/publications_ext_content/ifc_external_publication_site/publications_listing_page/lessonsofexperienceno7

ISS National Laboratory, *Public-Private Partnerships in Space*, available at: https://www.issnationallab.org/research-on-the-iss/public-private-partnerships-in-space/

ITU, *About International Telecommunication Union (ITU)*, available at: https://www.itu.int/en/about/Pages/default.aspx

ITU, *Supervisory Authority of the Future International Registration System for Space Assets*, available at: https://www.itu.int/en/ITU-R/space/Pages/spaceAssets.aspx

JAXA, *Introduction of JAXA*, available at: https://global.jaxa.jp/about/jaxa/index.html

JAXA, *The University of Nairobi Hands the First KiboCUBE CubeSate over to JAXA Under UNOOSA-JAXA KiboCUBE Programme*, available at: https://global.jaxa.jp/press/2018/01/20180119_kibocube.html

Meseko, Alfred Ayodele, *Corporate Finance Versus Project Finance*, available at: https://www.academia.edu/15087234/CORPORATE_FINANCE_VERSUS_PROJECT_FINANCE

Morgan, Daniel, *Commercial Space: Federal Regulation, Oversight, and Utilization, Congressional Research Service*, available at: https://crsreports.congress.gov/product/pdf/R/R45416

NASA, *Space Tech Public-Private Partnerships*, available at: https://www.nasa.gov/directorates/spacetech/solicitations/tipping_points

OECD, *Aircraft Specific Rules*, available at: http://www.oecd.org/trade/topics/export-credits/arrangement-and-sector-understandings/aircraft-specific-rules/

OECD, *OECD Space Forum*, available at: https://www.oecd.org/innovation/inno/space-forum/

Office of Evaluation and Oversight (OVE), *Evaluation of Public-Private Partnerships in Infrastructure* (2017), available at: https://publications.iadb.org/publications/english/document/Evaluation-of-Public-Private-Partnerships-in-Infrastructure.pdf

PPIAF, *About Us*, available at: https://ppiaf.org/about-us

PPIAF, *Airport*, available at: https://ppiaf.org/sectors/airports

PPIAF, *Overview*, available at: https://ppiaf.org/sites/ppiaf.org/files/documents/toolkits/Portoolkit/Toolkit/overview.html

PPP Knowledge Lab, *Airports*, available at: https://pppknowledgelab.org/node/9

Reiche, Kilian/ Rysankova, Dana/ Goldmark, Susan, *Output-Based Aid in Bolivia: Balanced Tender Design for Sustainable Energy Access in Difficult Markets*, available at: https://openknowledge.worldbank.org/bitstream/handle/10986/11032/396070BO0OBApproaches1201PUBLIC1.pdf?sequence=1

SIA, *State of the Satellite Industry Report*, available at: https://sia.org/news-resources/state-of-the-satellite-industry-report/

SIEMENS, *Asset Based Lending from Siemens*, available at: https://assets.new.siemens.com/siemens/assets/api/uuid:396bb600d24ec26408161b3431d324b31d1b83e1/sfs-asset-based-lending-brochure.pdf

SITA, *About us*, available at: https://www.sita.aero/about-us/

Space Foundation, *Global Space Economy Grows in 2019 to $423.8 Billion, The Space Report 2020 Q2 Analysis Shows*, available at: https://www.spacefoundation.org/2020/07/30/global-space-economy-grows-in-2019-to-423-8-billion-the-space-report-2020-q2-analysis-shows/

Standard & Poor's Ratings Services, *Standard & Poor's Project Finance Ratings Criteria -Reference Guide*, available at: https://www.spratings.com/documents/20184/86990/SPRS_Project%2BFinance%2BRatings%2BCriteria%2BReference%2BGuide_FINAL/cdfde690-57d1-4ff4-a87f-986527603c22

The European Space Agency, *TerraSAR-X and TanDEM-X*, available at: https://earth.esa.int/eogateway/missions/terrasar-x-and-tandem-x

The World Bank, *General Telecommunications Framework (by Country)*, available at: https://ppp.worldbank.org/public-private-partnership/sector/telecom/laws-regulations/telecommunications-frameworks

The World Bank, *Overview*, available at: https://www.worldbank.org/en/topic/publicprivatepartnerships/overview#1

The World Bank, *Telecommunications / Information & Communication Technology PPPs*, available at: https://ppp.worldbank.org/public-private-partnership/sector/telecom

The World Bank, *Telecommunications Universal Access / Universal Service*, available at: https://ppp.worldbank.org/public-private-partnership/sector/telecom/laws-regulations/universal-access

The World Bank, *Who We Are*, available at: https://www.worldbank.org/en/who-we-are

The World Bank, *WTO Reference Paper: Negotiating Group on Basic Telecommunications*, available at: https://ppp.worldbank.org/public-private-partnership/library/wto-reference-paper-negotiating-group-basic-telecommunications

UNIDROIT, *Convention on International Interests in Mobile Equipment (Cape Town, 2001) – Status*, available at: https://www.unidroit.org/status-2001capetown

UNIDROIT, *History and Overview*, available at: https://www.unidroit.org/about-unidroit/overview

UNIDROIT, *Memorandum of Understanding Signed Between UNIDROIT and UNOOSA*, available at: https://www.unidroit.org/memorandum-of-understanding-signed-between-unidroit-and-unoosa/

UNIDROIT, *Overview Space Protocol*, available at: https://www.unidroit.org/overview-2012-space-assets

UNIDROIT, *Protocol to the Convention on International Interests in Mobile Equipment on Matters Specific to Aircraft Equipment – Status*, available at: https://www.unidroit.org/status-2001capetown-aircraft

UNIDROIT, *Status – UNIDROIT Protocol to the Convention on International Interests in Mobile Equipment on Matters Specific to Space Assets (Berlin, 2012)*, available at: https://www.unidroit.org/status-2012-space

UNIDROIT, *UNIDROIT Space Protocol Workshop Summary*, available at:https://www.space-institute.org/wp-content/uploads/2011/01/UNIDROIT-Space-Protocol-Workshop-Summary-final.pdf

UNOOSA, *The Space Economy Initiative*, available at: https://www.unoosa.org/oosa/en/ourwork/topics/space-economy/index.html

World Bank Group, *Public-Private Partnerships Briefs Jordan: Queen Alia Airport*, available at: https://library.pppknowledgelab.org/documents/1990/download

World Bank/ PPIAF, *Airport BOTs/ Concessions Checklist of Legal and Regulatory Issues*, available at: https://ppp.worldbank.org/public-private-partnership/sites/ppp.worldbank.org/files/ppp_testdumb/documents/Airportconcessionschecklist_0.pdf

WTO, *Explanation of the Annex on Telecommunications*, available at: https://www.wto.org/english/tratop_e/serv_e/telecom_e/telecom_annex_expl_e.htm

WTO, *The WTO and ITU*, available at: https://www.wto.org/english/thewto_e/coher_e/wto_itu_e.htm

WTO, *The WTO*, available at: https://www.wto.org/english/thewto_e/thewto_e.htm