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Regulatory Regime for Tomorrow's Suborbital Space Flights: Point-to-Point International Flights

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Regulations on commercial human space flights are evolving capriciously in certain jurisdiction, despite some efforts of international discussions. Regulating these activities under the national air space means that international flights are not considered at this time. Nevertheless, the commercial human space flight industry is the industry to assume the next generation of *global* logistics. Guided by the belief that the role of regulation can contain the promotion of industries, this paper will try to illustrate a possible harmonized rules for future point-to-point international commercial space flights by stating the governmental requirements for allowing private sectors to enter into business in this area of operations. By doing so, this paper will also try to highlight for regulators the need of harmonizing domestic regulation with existing international regulations as well as regulations of air law and space law.

1 Introduction

Regulations on suborbital spaceflights are evolving capriciously in certain jurisdictions, despite the efforts of international discussions. The United States (US), as the most advanced regulator, is already issuing licences and permits for suborbital spaceflights as experimental flights within national airspace.[1] The European Union (EU) is expressing its own possibility for regulating the activities, but still remains at an unofficial level. Conceptually, both are positioning their regulatory principles as being under national airspace without consideration of international flights by suborbital spacecrafts. Nevertheless,

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The views expressed in this paper are solely those of the author in his personal capacity, and do not in any way represent those of the organization to which the author belongs or any other entity of the Japanese Government.

[1] Federal Aviation Administration (FAA), *Commercial Space Transportation 2013 Year in Review* (Washington D. C.: 2014) at 11 [*FAA 2013 Review*].

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the commercial human spaceflight industry is the one to assume the next generation of global logistics, and should foresee the fulfillment of international point-to-point (P2P) suborbital spaceflight in the near future.
The purpose of this paper is to illustrate necessary internationally harmonized rules for future international P2P suborbital spaceflights by stating the governmental requirements for allowing private sectors to enter into business in this area of operations.[2] By doing so, this paper will try to highlight the specific areas that need to be internationally harmonized for the regulators' sake. Those areas would be extracted both from air law and space law, since international P2P suborbital spaceflight should be regulated by both sides.
Based on brief descriptions of the current national and international regulatory circumstances, this paper will firstly determine the untenable dimensions to regulate within national air space of international P2P flights, including traffic control over or within international air space and mutual certification of spacecraft and crew. It will then identify the necessary regulatory areas to implement these harmonized regulations into an effective legal regime. One of the possible solutions is to include the rules that must be internationally harmonized into the Annexes of the Chicago Convention of 1944.[3] An interim alternative measures, however, can be bilateral agreements until international consensus can be garnered.

2 Current Regulatory Circumstances

No international or national entity fully regulates suborbital spacecrafts to date. The US is the only State which already retains legislation applicable to suborbital spaceflight, and Europe would be the next one. The secretariat of International Civil Aviation Organization (ICAO) expressed its position in 2010,[4] but no official study has been started yet. This section will brief the current national and international regulatory circumstances and illuminate further necessary legislation for international P2P suborbital flights.

A US Regulations

The first regulator for suborbital spaceflight was the Office of Commercial Space Transportation (AST) of the Federal Aviation Administration (FAA) of the US, since 2004 at the amendment of the Commercial Space Launch Act (CSLA).[5] CSLA currently regulates the commercial space launch by requiring a license or permit before conducting, and the license for suborbital

2 Derek Webber, "Point-to-point sub-orbital space tourism: Some initial considerations" (2010) 66:11–12 Acta Astronautica 1645.
3 *Convention on International Civil Aviation,* 7 December 1944, 15 UNTS 295, ICAO Doc 7300/6 (entered into force 4 April 1947) [*Chicago Convention*].
4 ICAO Secretariat, *Concept of Suborbital Flights: Information from the International Civil Aviation Organization (ICAO)*, UNCOPUOS Legal Subcommittee, 49th Sess, UN Doc A/AC.105/C.2/2010/CRP.9 (2010) [*Concept of ICAO*].
5 51 USC §50905 (b)(4)-(6),(c) (1984).

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spacecrafts is limited to an experimental permit.[6] FAA is considering developing further regulation for the permission of suborbital spaceflight that is currently being discussed in US Congress.[7]

To date, CSLA allows the industries to conduct suborbital spaceflights carrying crew and spaceflight participants, subject to a license or experimental permit for launch and reentry.[8] An informed consent procedure is required as pre-notification to the spaceflight participants.[9] Paid flights are basically suspended as regulatory moratorium until 2015.[10] Only experimental flights are being conducted to date.[11]

The FAA's regulatory procedure will be triggered by the operator's input of launch and reentry operation information to AST. AST serves as the direct interface between the operator and the Air Traffic Organization (ATO), which covers the air traffic control (ATC) of the US National Airspace System (NAS). AST computes the aircraft hazard areas[12] based on the information provided by the operator and the ATO interfaces directly with th e other users of NAS, as well as the air traffic managers and controllers.[13] This process will result in the measures of selecting strategy among the ATC facilities, providing updated notification to the other NAS users, and issuing Notices to Airmen (NOTAMs) to ensure that the aircraft hazard areas are remained secured for the suborbital flight.[14]

Effectively, the regulatory measure of FAA-AST is to allow suborbital flight within a restricted national airspace. This measure is reasonable since suborbital spaceflight is still in an experimental phase, but not applicable for potential international P2P flight because restricted airspace is unlikely to be established in international airspace, where no sovereignty is recognized over on.[15]

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6 51 USC §50906 (1984).

7 US House of Representatives, Committee on Science, Space and Technology, Press Release, "Subcommittee Considers Updates to Commercial Space Launch Act" (4 February 2014) online: <http://science.house.gov>.

8 51 USC §50902 (6),(14), §50904 (1984).

9 51 USC §50905 (b)(5).

10 51 USC §50905 (c); US House of Representatives Committee on Science, Space, and Technology, *Hearing on Necessary Changes to the Commercial Space Launch Act*, Statement by Steven Palazzo (4 February 2014).

11 Few numbers are conducting in yearly basis (*FAA 2013 Review*, *supra* note 1 at 11.).

12 Restricted area for other users for certain duration of time: Daniel P. Murray, "The FAA's Current Approach to Integrating Commercial Space Operations into the National Airspace System" in Ram S. Jakhu & Kuan-Wei (David) Chen, eds., *Regulation of Emerging Modes of Aerospace Transportation* (Montreal: McGill University Center for Research in Air and Space Law, 2014) 169-184 at 170.

13 *Ibid*.

14 *Ibid* at 174.

15 *Chicago Convention*, art 1.

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B European Regulations

Europe, on the other hand, also has interest in suborbital spaceflight regulation, since some development concepts are emerging along with the operation of spaceport services.[16] However, the regulatory development seems to facing the difficulty of regulating scope. The European Space Agency (ESA) and European Union (EU) do not hold themselves as feasible institutions for the regulation of suborbital spaceflight, since suborbital spaceflight is a commercial activity being substantially conducted in airspace.[17] The European Aviation Safety Agency (EASA), on the other hand, can be seen an optimistic organization, since the regulatory body and several governments are expressing their hopes to the EASA regulation.[18] However, this may pose another issue on the regulating criteria - that EASA may require full airworthiness certification as strict as that of the aircraft.[19] Those are the personal views of many EASA officials as well as academia, though EASA has not pronounced any official position for suborbital spaceflight regulation so far.[20] National regulation by individual Member States is also possible as far as it is for experimental purposes within national airspace, since experimental permission remains out of the EASA mandate.[21]

It seems reasonable that the EU Member States currently wait and see for legislation apart from experimental regulations, until EASA can reach a conclusion.

C International Regulations

Air Law

The ICAO secretariat analyzes that suborbital spaceflights should be regulated by the international air law constituted by the Chicago Convention and its Annexes, since they will fly in air space at least during the ascending and descending phases and these vehicles fit the Convention's definition of

16 Tanja Masson-Zwaan & Rafael Moro-Aguilar, "Regulating Private Human Suborbital Flight at the International and European Level: Tendencies and Suggestions" (2013) 92:2 Acta Astronautica 243 [Masson-Zwaan & Moro-Aguilar, "International and European Regulation"]; "Spaceport Sweden", online: <http://www.spaceportsweden.com>; United Kingdom, *Consultation on Criteria to Determine the Location of a UK Spaceport*, 15 July 2014 ed. (London: Crown for UK Department for Transport, 2014). [*UK Spaceport Criteria*]

17 Masson-Zwaan & Moro-Aguilar, "International and European Regulation", *supra* note 16 at 250-251.

18 United Kingdom, *UK Government review of commercial spaceplane certification and operations: Summary and conclusions* (London: UK Civil Aviation Authority, 2014) at 39-40. [*UK Spaceplane Review*]

19 Axelle Cartier, "Symposium on the Regulation of Sub-orbital Flights in the European Context" (2011) 36:1 Air and Space Law 87 at 90; Tanja Masson-Zwaan, Rafael Moro-Aguilar & Aron Lentsch, "The Future Regulation of Suborbital Flight in Europe" (2014) 30:1 Space Policy 1 at 2-3.

20 Masson-Zwaan & Moro-Aguilar, "International and European Regulation", *supra* note 16 at 251.

21 *Ibid* at 250; "*UK Spaceplane Review*", *supra* note 18 at 39.

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"aircraft".[22] ICAO's concern is the safety of aviation in an era in which the suborbital spacecraft is developing in order to start operating in international air space. As long as the activities are limited to the national air space of the respective States, it is solely those States that control those activities.[23] ICAO consistently uses its role to harmonize the regulations among the States to facilitate international civil aviation. Thus, ICAO's concern addresses the near future's expansion of the suborbital spaceflight towards the international P2P suborbital flight. Spacecrafts for this purpose are already under development by several players in the world. Moreover, the concept itself is already considered as one of the business targets, which signifies that the age of transportation using suborbital spaceflight is not just science fiction.[24]

In terms of regulation, no internationally unified rule directly addresses suborbital spaceflights to date. Rather, the current discussion for their regulations is still at the starting point: namely, the discussion of whether the applicable law should be air law or space law.[25] Since the type of operation of suborbital spaceflight falls under the category of both "aircraft" in air law[26] and "space object" in space law,[27] the answer for this discussion should be both. Therefore, a near-future international P2P suborbital flight must meet the regulations under the Chicago Convention and the UN space treaties. Since international P2P suborbital flights may fly in international airspace, the International Standards and Recommended Practices (SARPs) adopted by the ICAO Council govern internationally unified rules, especially for flight safety, and will certainly need to be revised to establish new standards dedicated to those flights.[28] Civil aircrafts flying to a foreign State are categorized as either

22 *Concept of ICAO*, *supra* note 4.

23 *Chicago Convention*, art 1.

24 Webber, *supra* note 2; Walter Peeters, "From Suborbital Space Tourism to Commercial Personal Spaceflight" (2010) 66:11–12 Acta Astronautica 1625; Hideyuki Taguchi *et al.*, "Research on Hypersonic Aircraft Using Pre-cooled Turbojet Engines" (2012) 73 Acta Astronautica 164.

25 Melanie Walker, "Suborbital Space Tourism Flights: An Overview of Some Regulatory Issues at the Interface of Air and Space Law" (2007) 33 Journal of Space Law 375; Steven Freeland, "Up, up and ... Back: The Emergence of Space Tourism and Its Impact on the International Law of Outer Space" (2005-2006) 6:1 Chicago Journal of International Law 1; Yun Zhao, "Legal Regime for Space Tourism: Creating Legal Certainty in Outer Space" (2009) 74 Journal of Air Law and Commerce 959.

26 *Chicago Convention,* annex 7 chapter 1.

27 *Convention on the International Liability for Damage Caused by Space Objects,* 29 March 1972, 961 UNTS 187, 24 UST 2389, 10 ILM 965 (entered into force 1 September 1972), art 1 (d) [*Liability Convention*].

28 *Chicago Convention*, art 37 and annexes. At least, Personnel Licensing (Annex 1), Aeronautical Charts (Annex 2), Operation of Aircraft (Annex 6), Airworthiness (Annex 8), Aeronautical Telecommunication (Annex 10), Air Traffic Services (Annex 11), Aerodromes (Annex 14), and Aeronautical Information Services (Annex 15) would be required revision for including the rules for suborbital spaceflight.

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scheduled or non-scheduled flights for the sake of facilitating the permission of the arriving States.[29] The route, pricing, capacity, and frequency are determined by bilateral air transport agreements, since international air transport is part of market opening policies.[30] Air Navigation will be provided by each State based on the principle of sovereignty of national airspace,[31] in accordance with the divisions of Flight Information Region, which covers the entire globe.[32]

Space Law

Space law could be applicable for the part of the suborbital flight that will not come under the jurisdiction of air law. Admittedly, since there is no clear definition of "space object" in the UN space treaties, its official interpretation will rely on each State's parties, and no common understanding has been reached yet. Therefore, taking the typical operation sequence of suborbital spacecraft as an example,[33] it may be considered to fall away from "aircraft" and become "space object" at the moment of injection to its rocket propulsion: hence, it loses its "aircraft" status. This is because the spacecraft breaks off support from "the reaction of the air"[34] and relies on rocket propulsion from that moment onwards. In the stage of space law, the issues confronting suborbital spaceflight would be space object registration and international liability.[35] Space objects must be registered to a State party's registry of one of the launching States and notify the UN Secretary-General of the registration information for international Register.[36] Damage caused by a space object will be held absolutely liable to the launching States if it happened on the ground, and will be liable in orbit if it happened due to the fault of the launching States.[37] Application of space law to suborbital spacecraft means to be governed by registration obligation and absolute liability. There is no regulation for traffic management or integrated safety standards as for aviation. This is the reason that the need for space traffic management is called.[38]

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29 *Chicago Convention*, arts 5, 6.

30 Paul Stephen Dempsey, *Public International Air Law* (Montreal: McGill University, 2008) at 517-660.

31 *Chicago Convention*, art 1.

32 *Ibid*, arts 22, 28, annex 11, 15.

33 *Concept of ICAO*, *supra* note 4, s 1.

34 *Chicago Convention*, annex 7 chapter 1.

35 *Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies,* 27 January 1967, 610 UNTS 205, 18 UST 2410, TIAS No 6347, 6 ILM 386 (entered into force 10 October 1967), arts VI, VII, and VIII [*Outer Space Treaty*]; *Convention on Registration of Objects Launched into Outer Space,* 6 June 1975, 1023 UNTS 15, 1628 UST 695 (entered into force 15 September 1976) [*Registration Convention*]; *Liability Convention.*

36 *Registration Convention*, arts III,IV.

37 *Liability Convention*, art II,III.

38 Kai-Uwe Schrogl, Petr Lála & Corinne Contant-Jorgenson, *Cosmic Study on Space*

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3 Regulatory Demarcation for International Point-to-point Suborbital Spacelight

When applying either air law, space law, or both to international P2P suborbital spaceflight, it is notable that there are, on one hand, regulations that must be internationally unified or harmonized. On the other hand, however, they could be handled only by national legislation as is the US' current practice. This section will elucidate the necessary areas of internationally harmonized regulations for the realization of international P2P suborbital flight and the areas more sufficient to remain in national legislation. This classification will not only encourage the international community to initiate international legislation for international suborbital spaceflight, but it will also benefit the suborbital spaceflight industry. This is because regulation may promote the industries by posing transparent regulation so that the industries can avoid guesswork to conduct their activities. [39] Hence, the regulations for suborbital spaceflight will also facilitate industry development if they have been implemented before the business expansion of international operations.

A International Regulatory Harmonization

Whether the international P2P suborbital spaceflight is a scheduled or non-scheduled flight,[40] it is crucial to receive permission from the State planning to land prior to the departure.[41] At this point, the landing State would consider the safety of landing on and departing from a spaceport. Hence, the landing State would require qualified navigation equipment[42] and vehicle safety,[43] a certified crew,[44] and to follow the designated flying route.[45] Therefore, the criteria for navigation equipment, spacecraft safety, and crew certification need to be agreed upon between the departing and arriving States, at least before the flight. The flying route can be designated by the State, since it is a subject of national airspace. However, the measures and

Traffic Management (Paris: International Academy of Astronautics (IAA), 2006); Yu Takeuchi, "Challenges of International Space Law for Managing Space Traffic" (in Japanese) (2014) 55 Kuho (Journal of Air Law) 1; Frank Morring Jr., "Space Traffic Control An Issue For NextGen", *Aviation Week* (10 February 2014) online: Aviation Week <http://aviationweek.com>.

39 Japan, Special Committee on Space Policy, Strategic Headquarters for Space Policy, Cabinet Secretariat, *Report of the Working Group for Legislation on Space Activities* (in Japanese), (31 March 2010), online: Cabinet Secretariat of Japan <http://www.kantei.go.jp/jp/singi/utyuu/katudo/houkokusho.pdf>, s I.3.

40 *Chicago Convention*, arts 5,6.

41 *Ibid*, art 6.

42 C.f. *ibid*, arts 28, 30, annex 10 and 11.

43 C.f. *ibid*, arts 31, 33 and annex 8.

44 C.f. *ibid*, arts 32, 33 and annex 1.

45 C.f. *ibid*, art 12.

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technical premises to follow the designated routes must be unified, otherwise the spacecraft could become technically unable to follow the route.

Navigation

Navigation measures would also be an issue for international harmonized regulation, since an international P2P flight will certainly pass through (or above) international airspace in between the departing and arriving national airspaces. It is obviously crucial to establish a means of communication between the suborbital spacecraft and the air traffic controller, but it should not be a higher priority than the safety of spacecrafts, including airworthiness. Furthermore, it should be noted that a suborbital spacecraft might cruise at the altitude above that of an ordinary aircraft. This is only a prediction since all of the suborbital spaceflights are conducted within the national restricted airspace to date. However, considering the fact that all of them conclude their flights within national airspace,[46] it is reasonable to predict that suborbital spacecrafts will easily ascend to the altitude around 100km while flying in national airspace, at least departing from the US. Logically, the spacecraft continues its flight outside of national airspace with the same altitude until it approaches the arrival point. It will also be possible to prevent the descending point from being within the national airspace of the arriving State. Consequently, international P2P suborbital spacecraft will almost certainly fly approximately 100km of altitude in between the national airspaces.[47] Thus, the problem is that this trajectory should be regulated as a passage both through international air space and outer space. This double regulation seems needless at a glance, but it will begin to exert its effect at the time when the international P2P suborbital spacecraft starts to develop. If this trajectory were regulated only by space law, space object registration and liability against damage would be the only legal systems to be applied. Hence, it would lapse into *lacunae* of law for traffic control, which includes the traffic of international P2P suborbital spacecrafts. On the other hand, if this trajectory were regulated only by air law, traffic control regulations development would be expected, but the gap with space traffic would appear.[48] Since suborbital spaceflights will affect space traffic as a similar activity characteristic of the launch vehicle, it is foreseeable to have operational conflicts between suborbital spaceflight and space traffic. Moreover, space debris randomly reentering into the atmosphere may pose a risk to suborbital spacecrafts while traversing the same altitude.[49] Space

[46] *FAA 2013 Review*, *supra* note 1 at 11.

[47] *Concept of ICAO*, *supra* note 4.

[48] Space traffic is defined as "the set of technical and regulatory provisions for promoting safe access into outer space, operations in outer space and return from outer space to Earth free from physical and radiofrequency interference.": Schrogl, Lála & Contant-Jorgenson, *supra* note 38 at 10.

[49] Carmen Pardini & Luciano Anselmo, "Reentry predictions of three massive

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traffic at that time would not only involve launch vehicles, but also the removed space debris[50] or low-altitude satellites[51] that would also traverse that altitude. It is necessary to avoid collisions against these objects, so suborbital spacecrafts must also be treated as space traffic.

Consequently, for the sake of traffic control both of air and space, international P2P suborbital spaceflights need to be regulated both by air law and space law, unless a consolidated legal regime dedicated to the suborbital spacecraft's journey appears.[52] As a matter of fact, since it is possible to secure the space where the suborbital spacecraft intends to travel from the other traverse of spacecrafts, apart from some random reentry of space debris, it should not be critical if international regulations for suborbital spacecraft navigation develop slowly. The crucial point is that those regulations should be established as internationally harmonized regulations to facilitate the initial international P2P suborbital spaceflights.

Flight Safety

The most urgent legislation is that of safety certification for the spacecraft and crew, in which the FAA is ahead of the other States.[53] Not all the certification requirements that currently apply to aviation would be necessary for the initial stage of suborbital spaceflight, but the minimum requirements should be those necessary for flight safety and spaceport safety. In aviation, following the international criteria designated by Chicago Convention is mandatory. [54] These safety criteria must be the main topic for the international regulation of P2P suborbital spaceflight as discussing mainly the revision of Annex 1, 2, 6, 8, and 14 of the Chicago Convention.

Space Law does not retain internationally binding regulations for flight and ground safety, but two emerging "soft laws" [55] trying to address that maneuver or malfunction notifications for the sake of safety are necessary for the maintenance of sustainable space activities.[56]

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uncontrolled spacecraft", (Paper presented at the 23rd International Symposium on Space Flight Dynamics, Pasadena, 2012).

50 Brian Weeden, "Overview of the Legal and Policy Challenges of Orbital Debris Removal" (2011) 27:1 Space Policy 38.

51 Keizo Nakagawa, "R&D of JAXA Satellite Application Mission", (Presentation delivered at the 26th Microelectronics Workshop, Tsukuba, 2013).

52 Freeland, *supra* note 25 at 9.

53 *FAA 2013 Review*, *supra* note 1 at 11; Murray, *supra* note 12.

54 *Chicago Convention*, arts 29-42.

55 Soft Law is the "instruments that might purport to specify standards of conduct, but do not emanate from the traditional 'sources' of public international law": Steven Freeland, "The Role of 'Soft Law' in Public International Law and its Relevance to the International Legal Regulation of Outer Space" in Irmgard Marboe, ed, *Soft Law in Outer Space* (Vienna: Heribert, 2012) 9 at 19.

56 *Draft International Code of Conduct for Outer Space Activities*, 31 March 2014, s 5; Chair of the Working Group, *Proposal by the Chair of the Working Group on the*

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Liability for damage caused by a suborbital spacecraft to the third party, since it should be categorized as space object, would be imposed on the launching States. There is no need in space law to establish a new internationally harmonized rule, but the national implementation of the above existing international rules is required. Otherwise, the State would oblige compensation for damage inflicted by private entities' space activities without reimbursement from the caused entity.[57]

Technical Correspondence

Smooth and safe operations of aerospace activities are always based on the common technical basis. It is the ICAO standardization of all necessary equipment for flight safety that allows the worldwide operational safety of civil aviation.[58] Without the unified compatibility of the method of operations, neither standardized take-off and landing operations, traffic control, nor navigation could be possible. In order to realize international P2P suborbital spaceflights, internationally harmonized technologies and measures for flight safety are essential. They may be established as the amendment of the Annexes of the Chicago Convention since they would be applicable to P2P suborbital spacecraft.

B Domestic Regulations

Aside from the harmonized international regulations, there are several regulations that require national legislation to initiate international P2P suborbital spaceflights, but do not necessarily need international regulations. It should not be interpreted that there is no need of internationally harmonization for those regulations, but they could be primarily initiated by domestic regulations in pioneer days of the international P2P suborbital spaceflight's industry. This is because the interests protected by those regulations are primarily under respective State sovereignty. The regulations that could be started as domestic ones are; the spaceport safety solely related to the peripheral range of spaceports, license for suborbital spacecrafts (including liability issues to passengers), and spaceport entry regulations for capacity reasons.

Spaceport Ground Safety

Ground peripheral safety will mainly be conducted by establishing a safety restraining zone and safety shield against hazardous substances. In aviation, the air field and other equipment for the safety of landing and take-off are

Long-term Sustainability of Outer Space Activities for the consolidation of the set of draft guidelines on the long-term sustainability of outer space activities, UNCOPUOSOR, 57th Sess, UNDoc A/AC.105/2014/CRP.5 (2014), s 21-26.

57 Zhao, *supra* note 25 at 966.

58 *Chicago Convention*, arts 28, 30, 31, 33, annex 8, 10, and 11.

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internationally regulated by SARPs,[59] but this is not the case for the range safety of the ground. Namely, there is a distinction between flight safety and ground safety. For the launch vehicle to outer space as well, the range safety will be conducted by setting a safety zone and shield based on the risk analysis from the amount of explosive substances. NOTAMs are issuing for flight safety but ground safety is secured solely by the launch site authority.[60] Thus it is reasonable for spaceports to leave the regulation primarily to each State. Nonetheless, the premise is that the safety shield of suborbital spacecraft is predictable by the aforementioned internationally harmonized regulations. Governments intending to promote suborbital spaceflights are required to determine their own safety regulations concerning ground safety, such as the United Kingdom's authority conducted in 2014.[61] Admittedly, however, ground safety for international frequent activities such as international aviation, an internationally harmonized rule develops. A good example of this is that several Manuals developed by ICAO including international standards for ground safety.[62]

Liability to Passengers

Although third-party liability should be considered an international matter because of its tight relation to flight safety issues, liability to the passengers could be treated as a national regulatory matter for the initial development phase of the industry. This vision is aligned with the US regulations, which require only informed consent with the spaceflight participants. At this stage, suborbital spaceflights should not be recognized as low-risk activity like aviation. Thus, it must put more responsibility on the passengers themselves. It should be reminded that the passenger safety has not been recognized by any governmental authority. The CSLA simply declares the own risk principle of the passenger for participating into a governmentally uncertified activity in terms of safety.[63] Each State can solely decide whether pursuing the similar model of the US or not.

In space law, the Liability Convention states that it does not apply to the persons participating in the launch activity, and the passengers may fall under this definition.[64]

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59 *Ibid*, art 37(b), annex 14.

60 Japan Aerospace Exploration Agency (JAXA), *Launch / Tracking and Control Plan of Advanced Land Observing Satellite (ALOS) / H-IIA Launch Vehicle No. 8 (H-IIA F8),* November 2005, online: JAXA <http://global.jaxa.jp> at 5-7, 20-21.

61 *UK Spaceport Criteria*, *supra* note 16.

62 ICAO, *Manual on Certification of Aerodromes*, ICAO Doc 9774 AN/969 (2001); ICAO, *Safety Management Manual (SMM)*, ICAO Doc 9859 AN/474 (2013).

63 51 USC §50905(b)(4)(B), (5), (6).

64 *Liability Convention*, art 7.

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In aviation, the liability against passenger damages is channeled to the licensed carrier as the ceiling amount of compensation by the Montreal Convention.[65] Therefore, it is reasonable to consider a parallel international liability system for passenger damages for suborbital spaceflights, but only in the future when the activity will have matured enough as infrastructure.[66]

Spaceport Entry Regulations

Spaceport entry regulation, while it becomes reality, signifies the early development of economic regulation on suborbital activities, since restrictions on airport entries are posed based on economic regulatory purposes in the aviation domain. This was negotiated as one of the major points in the bilateral air transport agreements from the beginning of modern aviation after the World War II.[67] However, the airport/spaceport entry regulations also have the role to maintain the economic efficiency of the airport/spaceport by controlling the number of its users aligned with its capacity.[68] The point of initiation of this type of regulations can be seen as a turning point of the industry to step up to the next matured stage.

4 Potentials of Bilateral Agreements

Bilateral agreements can be pursued as alternative measures by the States initially conducting international P2P suborbital flights. It is reasonable for pioneers not to seek multilateral treaties but individual bilateral agreement considering the costs associating multilateral negotiation.[69] The use of diplomatic resources for establishing multilateral treaties can be drastically reduced by choosing bilateral agreement. However, demerits of bilateral agreements have already been provided a lesson in the area of aviation. Namely, the number of bilateral agreements counts up to 2,500 to date and provide complexity to pursue common interest of international community as a whole.[70] Considering that international P2P suborbital flight will become real earlier or later, it is efficient to rely on multilateral agreements rather depending on the series of bilateral agreements. Especially, it is unbeneficial for anyone to remain capricious safety standards as bilateral agreement, since safety of international flight cannot be secured solely as bilateral issue.

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65 *Montreal Convention for the Unification of Certain Rules for International Carriage by Air,* 28 May 1999, 2242 UNTS 309, S. Treaty Doc. No. 106-45 (entry into force 4 November 2003), arts 17, 21-22 [*Montreal Convention*].

66 Zhao, *supra* note 25 at 967-968. Zhao discusses based on the Warsaw Convention, the predecessor convention of the Montreal Convention.

67 Dempsey, *supra* note 30 at 522-528.

68 *Ibid*.

69 Peeters, *supra* note 24 at 1630.

70 Dempsey, *supra* note 30 at 528.

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5 Conclusion and Proposal

The discussion of applicable regulation to international P2P suborbital spaceflight in the near future has just begun. It is ideal to establish "[a] comprehensive and uniform legal regime that specifically envisages the complete launch and return journey"[71], but it seems that no sign is showing in the international community. On the other hand, looking into the contents of necessary regulation with a concrete examination of the possible international P2P suborbital spaceflight, one may notice that there are few topics that should be regulated as harmonized international regulations at this stage. Although even a single regulation may be a tough and daunting task for international legislation, we can consider that there is no overwhelming task waiting ahead. It can be said, at this point, that the issues regarding the safety of flights need to be established as internationally harmonized regulations. On the other hand, regulations regarding territorial safety or economic effects may solely rely on national legislations.

The organizational matter of international regulations for suborbital spaceflight could also become an issue in the international sphere. As far as the initial stages of international P2P suborbital flights would be between certain States, it is also effective to have their initial internationally harmonized regulations as bilateral agreements with parallel thought of air transportation. For the first several flights may be conducted under this alternative measures among the departing State and the arriving State. It is foreseeable that these pioneer bilateral agreements will become model agreements when the activity expands worldwide. Although, if we rely on bilateral agreements for all necessary regulations, it may cause another problem of entangling one issue of a pair of States affecting another apparently-unrelated pair of States by chain reaction. Admittedly, unifying necessary regulations as an international treaty is always the most ideal measure to reduce risks from haphazard treatments and enhance and facilitate the industry to grow further.

[71] Freeland, *supra* note 25 at 9.

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