

# JAPANESE PERSPECTIVE ON LEGAL ISSUES OF COMMERCIAL HUMAN SPACEFLIGHT

## -REGULATORY ASPECTS AND POTENTIALS-

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### 1. Introduction

This paper examines the challenges and potentials to conduct commercial human spaceflight in Japan from the legal perspective. For this purpose, this paper firstly sheds light on the regulatory environment of the United States, which is ahead in regulating commercial human spaceflight. Then it sees how the Europe is trying to achieve consensus in its regulatory regime. Finally, this paper will focus on Japan: the possible regulatory regime, several challenges and solutions. The final goal of this paper is to serve as the starting point of the discussion on the legal aspects of commercial human space flight in Japan.

In legal point of view, we assume that the most complicated case is the sub-orbital flight with horizontal take-off and landing, and thus this paper mainly focus on this type of flight.<sup>6</sup>

### 2. Domestic Legal Implications

#### (1) The United States

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<sup>6</sup> For the vertical take-off and landing type, since it is the same type of that of the ordinary launch vehicles launched by the space agencies, it must be regulated by the traditional space regulations.

It is well known that the commercial human space flight activities are developing, especially among the private sector of the United States, and it will likely become a realistic space activity in the near future. . After the success of Space Ship One awarded by the Ansari X Prize, more than 10 companies are challenging to develop spacecrafts for space tourism<sup>7</sup>. Most of them are based in the US, and thus the US government was the first to seriously consider the regulation of these activities. In 2004, the Commercial Space Launch Act (CSLA) was amended to establish a new category of “Crew”<sup>8</sup> and “Space Flight Participant”<sup>9</sup>. The amendment also established “Experimental permits”<sup>10</sup> as a new category of permission. These changes made the Federal Aviation Agency (FAA) to consider regulations for sub-orbital spaceflight for space tourism. In 2006, FAA concluded “Human Space Flight Requirements for Crew and Space Flight Participants”<sup>11</sup>, for operating the new CSLA and issuing licenses to sub-orbital flights. There have not been any vehicle flight with passengers but this regulatory system is seen as the most advanced one .

The CSLA set a precise informed consent system for crew and space flight participants about the risk and possible result of the flight It requires to provide these information by documents.<sup>12</sup> Then CSLA requires the waiver of claims among the crew/spaceflight participant and the government/operator<sup>13</sup>. This approach is so called “At-Your-Own-Risk” regime and make the US the most attractive country to conduct the sub-orbital flight for space tourism.

## (2) Europe

The European situation regarding the commercial human spaceflight is not as active as that of the US. There are several companies such as EADS or Copenhagen Suborbitals, which conduct research and development for sub-orbital flight, but they are still in the R&D level. EADS declared, at the Paris Air Show this June, to launch a concept study for high-speed transport system, consisting of sub-orbital point to point flight system that links Tokyo-Paris in 2.5 hours<sup>14</sup>. This is not the first study by EADS. In 2007,

<sup>7</sup> See FAA Commercial Spaceflight brochet...

<sup>8</sup> CSLA Article 70102 (2).

<sup>9</sup> CSLA Article 70102 (17).

<sup>10</sup> CSLA Article 70105a.

<sup>11</sup> Federal Register, Vol. 71, No. 241, 14 CFR Parts 401, 415, 431,435, 440 and 460.

<sup>12</sup> Ibid II C. 2. pp. 75624-75626.

<sup>13</sup> Ibid II B. 12, pp.75621-75622, Ibid II D. pp. 75627-75628.

<sup>14</sup> EADS press release, “EADS presents high-speed transport concept study at Le Bourget”, 21

the company also announced its plans to develop a suborbital vehicle for space tourism markets<sup>15</sup>, but its results have not been disclosed. In spite of this situation, the authorities in Europe made several studies and expressed their views that they are ready to address the issues of commercial human spaceflight<sup>16</sup>. The European Aviation Safety Agency (EASA) will be the primary agency to treat this issue, but the complexity of the European authority regarding the aviation remains the decision for the liability issue to the member states.

The EASA approach is to apply the legal system of aviation to the sub-orbital flight, because the vehicle contains airfoils and fly by a lift resulting from the aerodynamic reaction forces. The most recommended way is to apply the Restricted Type of Certificate (RTF) stipulated by the Essential Requirements for airworthiness<sup>17</sup>. It also suggests using the Permit to Fly (PtF) regime for flight testing. Technical issues and the requirements seem not so different from the ordinary airplanes<sup>18</sup> and especially the requirements for the rocket boosters/engines are also stipulated to maintain safety but with reasonable requirements<sup>19</sup>.

On the other hand, regarding the passenger and third party liability, the problem will be left to each member states and no good solution has been found<sup>20</sup>. This seems to be disappointing to the players of sub-orbital flight, and several negative views are expressed by the experts<sup>21</sup>.

### (3) Japan

There are fewer activities to achieve the commercial sub-orbital human space

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<sup>15</sup> “More on EADS’ suborbital vehicle plans”, News Space Journal, June 15, 2007. (<http://www.newspacejournal.com/2007/06/15/more-on-eads-suborbital-vehicle-plans/>)

<sup>16</sup> Jean-Bruno Marciacq et al., “Accommodating Sub-Orbital Flights into the EASA Regulatory System”, Third IAASS Conference, 10 November, 2008.

<sup>17</sup> Basic Regulation (EC) No. 216/2008. CS-23 for below 5,700kg maximum take-off mass and CS-25 for above 5,700kg maximum take-off mass. Marciacq, supra note, section 3.1.

<sup>18</sup> Supra note, section 3.2.

<sup>19</sup> Supra note, section 3.2.3.2.

<sup>20</sup> Supra note, 7.1.1 and 7.1.2.

<sup>21</sup> For example, Prof. Stephan Hobe, Cologne University, Germany, is responding to the interview of a study group of the European industries that “Europe is a zone where considerations concerning suborbital flight legislation and other consequences (...) are missing.” J. Starke et. al., “Some Considerations on Suborbital Flight in Europe”, American Institute of Aeronautics and Astronautics, 15<sup>th</sup> session, 2008.

flight in Japan compared to Europe or the US. As such, the new regulation for the activities have never been officially considered. However, since it is also true that there are few companies challenging to start this activity<sup>22</sup>, this section will study which existing law can be applied to the commercial human space flight and how.

The sub-orbital flight in Japan will firstly be regulated by the Civil Aeronautics Act (CAA)<sup>23</sup>, because the vehicle will be corresponded to the following definition of this Act.

*The term "aircraft" as used in this Act means any aeroplane, rotorcraft, glider and airship which can be used for air navigation with a person on board and any other apparatus used for air navigation as may be specified by Cabinet Order.*<sup>24</sup>

The term "aeroplane" is defined much more in detail in Japanese Standard Airworthiness Certification Checklist as "Heavy aircraft with a power unit, and fly primarily by a lift resulting from the aerodynamic reaction forces on the surface of each fixed-wing". Since the "heavy aircraft" defined as "aircraft fly primarily by the aerodynamic reaction forces from the ground"<sup>25</sup>, the sub-orbital aircraft will be categorized as "aeroplane" to be applied the CAA.

For operating aeroplane, CAA requires an airworthiness certification<sup>26</sup>. However there are special exemptions for this requirement.

The airworthiness certification is divided into 5 types for airplane;

Type N (Normal): qualified for normal flight (less than 60 degree bank and stall (exclude hip-stall)) and under 5,700kg of maximum takeoff weight.

Type A (Acrobat): qualified as type N for flight or acrobatic flight, but under 5700kg of maximum takeoff weight.

Type U (Utilization): qualified as type N and acrobatic flight such as turning more than 60 degrees, spin, lazy eight, chandelle etc. (exclude sudden maneuver and inverted flight).

Type T (Transport): qualified for air transport business.

Type C (Carry): qualified for air transport business for less than 8,618kg of

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<sup>22</sup> Mitsubishi Heavy Industry and IHI are already conducted feasibility study for vehicle. (<http://www.sorae.jp/0250/3450.html>) PD Aerospace LTD is also a Japanese company conducts development of sub-orbital spacecraft.

<sup>23</sup> Act No. 231 of July 15, 1952.

<sup>24</sup> Article 2 of Civil Aeronautics Act.

<sup>25</sup> Japanese Standard Airworthiness Certification Checklist.

<sup>26</sup> Article 11, CAA.

maximum takeoff weight with multi-propellant plane.<sup>27</sup>

Originally, the aeroplane for sub-orbital flight might be qualified as Type T or C because it aims to conduct transport business. However, during the experimental period, it can be qualified as a different category which is “type X”. Type X is a specialized type for experimental flight and its certification will be authorized as case by case basis only in case that the Minister for Land, Infrastructure, Transport and Tourism allows. Type X will not be applied the requirements defined in Japanese Standard Airworthiness Certification Checklist but it only requires being able to operate safely in the expected flight condition<sup>28</sup>. Applying the type X certificate, sub-orbital aircraft can be authorized at least as an experimental flight, although the process must be harder than that of the other type.

At this point, it is clear that the Japanese legal system does not assume the activities such as sub-orbital flight inter alia for space tourism. The authors have to be honest to say that most of the stipulations referred to in this section are “basket” clauses for temporary treatment. Though conducting sub-orbital spaceflight in Japan will open many legal issues to be discussed, it is safe to say that the solution for conducting this activity in Japan might be found. In the next section, the character of authorization in Japan and the potential for a new legislation are studied. The following table is a comparison of the regulatory regime of the 3 countries/region analyzed in this section.

		USA	Europe	Japan	
Authority		FAA (DOT)	EASA/Member States	CAB (MLIT)	
Third Party Liability	Launch Pad (spaceport) safety	Commercial Space Launch Act (49 USC Chapter 701, esp. art. 70102 (2),	Essential Requirements for airworthiness, Annex 1, Basic Regulation (EC) No 216/2008.	Airport Act (Act No.80 of April 20, 1956) + Act for Explosive Materials (Act No.149 of May 4, 1950)	Space Activities Law (under legislation )
	Ground (surroundings) safety				

<sup>27</sup> Ministry of Land, Infrastructure, Transport and Tourism (MLIT), “Standard of intensity, framework and qualification for ensuring safety of aircraft and component”, Annex 1 for the Ordinance for Enforcement of the Civil Aeronautics Act (Ordinance of the Ministry of Transport No. 56 of July 31, 1952).

<sup>28</sup> Japanese Standard Airworthiness Certification Checklist 9.1.

	Aircraft (traffic) safety	(17), (20), art. 70105 and art. 70105a.)	1702/2003. (TC, RTC or PtF just for test flights)	
On board personnel	Crew		N/A	Civil Aeronautics Act (Act No. 231 of July 15, 1952), Ordinance for Enforcement of the Civil Aeronautics Act
	Passengers			

[Table] Comparison of the 3 countries/region.

### 3. Japanese Potentials

#### (1) Authorities

The authority for aircraft in Japan is the Civil Aviation Bureau of the Ministry of Land, Infrastructure, Transport and Tourism (MLIT). This section regulates and controls the Japanese air traffic and network. Since its responsibility is to regulate the air traffic in the Japanese territory, it might not happen that this Bureau come up with an idea to make a new regulation, taking into account the recent developments of the sub-orbital spaceflight in other countries. Furthermore, since the responsibility of this Bureau is to maintain the safety of the traffic of Japanese airspace, it will require the regulation standing on a safety side. The most likely issue might be whether the air traffic control organized by MLIT will be applied to the sub-orbital flight. Since the sub-orbital vehicle will pass through the ordinary air traffic, it must be controlled by the traffic control officer to avoid confusion and accidents with other aircrafts.

The authority for industry promotion belongs to the Ministry of Economic, Trade and Industry (METI). METI already conducts a few research related to sub-orbital flight and its responsibility is to maintain and promote Japanese industries. Thus this Ministry can be the authority to promote the commercial sub-orbital flight in Japan. .

Since the sub-orbital flight is mainly the issue among the industry rather than research and development, these industrial authorities will be much more enrolled.

#### (2) Legislation on Space Activities

Basic Space Law established in 2008 requires to the government to legislate on necessary matters in order to implement international regulations in its Article 35;

*(1) The Government shall carry out the enactment of legislation on necessary matters comprehensively, systematically and promptly, in order to implement treaties and other international agreements with regard to regulations on space activities as well as other Space Development and Use.*

*(2) The enactment of legislation prescribed in the preceding paragraph shall be carried out in order to advance the national interests of Japan in international society and to contribute to the promotion of Space Development and Use by the private sector.*

In order to achieve this requirement, the government continuously prepares the legislation of space activities and its interim report of the expert panel was published in March 2010.<sup>29</sup> The Report recommends establishing a license system for conducting space operations and the human space flight is included in the recommendation<sup>30</sup>. The Report described that the license system for human space flight under and subject to the establishment of the necessary technical standard for issuing licenses for human spaceflight. It means that the only threshold for establishing license system for human spaceflight is to develop the technical standard, which is purely technical.

When this legislation realize another issue will occur regarding the authorities. Since the Report tentatively descript that the authority for licensing space activities would be the Cabinet Office, the authority to issue the licenses for sub-orbital activities might be CAB/MLIT AND the Cabinet Office if the demarcation of these two authority do not precisely established. At this point the authors view is better to put the sub-orbital flight among the space activities to be licensed by the Cabinet Office under the upcoming Space Activities Law, because the activity aims to achieve the outer space and most of the vehicle actually uses the rocket propulsion which is unfamiliar with the aircrafts. However, there are still remains a series of issues among the international space law; whether the strict liability will be applied, whether passengers will be protected by the Rescue Convention or whether the sub-orbital vehicle have to be registered.

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<sup>29</sup> Working Group for Legislation, Expert Panel on Space Exploration, Strategic Headquarters for Space Development, "Interim Report of the Working Group for Legislation", <http://www.kantei.go.jp/jp/singi/utyuu/katudo/houkokusho.pdf>

<sup>30</sup> Supra note, p.8.

### **(3) Import foreign vehicle**

There is also another way to carry commercial sub-orbital flight in Japan. That is to import foreign vehicle and operate it by Japanese enterprise. Since the type certification is commonly based on the Convention on International Civil Aviation and its related standards, which are called “ICAO standard”, it is often said that the type certified in the US or Europe which are the region which have the most experience to certify, facilitate the certification in the other countries. If some Japanese enterprises purchase a vehicle from abroad and intent to operate it in Japan, the type certification will rely on the certification which was given in the original country, much more than that developed in Japan. Actually, the XCOR Company announced its wet lease business for the space tourism market including Japan. This approach might bring the incentive to the Japanese authority to push forward the regulatory situation.

### **4. Conclusion**

Since sub-orbital spaceflight activities are in the early stage of promotion, the discussion of legal issues are not yet matured, especially in Japan. However, seeing the active and rapid development in the US, it is foreseeable that these activities will open next new market. It means that fifty years from now, a point-to-point sub-orbital transportation will become a normal activity. The purpose of the law might be to provide fair rules in the society, but furthermore, the importance of creating future legal system that meets the envisaged change, is increasing.