# The Proposed Public Procurement for Projects to Enhance Industrial Capabilities through Japanese Lessons Learned

*Mizuki Tani-Hatakenaka**

**Abstract**

This paper discusses a framework for governmental projects to enhance industrial capabilities through the lessons learned from the Japanese contractual practice of H3 launch vehicle, comparing with the NASA's Commercial Orbit Transportation Service (COTS). In 1995, the research and development (R&D) of the H-IIA was started by a former body of JAXA, and each manufacturer was responsible for delivery as required. After twelve-times launches, the operation was privatized to Mitsubishi Heavy Industry, Ltd. (MHI). Concerning H3, MHI was selected as a R&D contractor and a launch provider. MHI established the H3 rocket system specification and responsible for delivering the first vehicle to JAXA in 2020, and JAXA is responsible for the total system including its launch base and the H3 flight demonstration. Such a framework gives MHI more creative freedom, but there can be a room for further clarification of the responsibilities. Coincidentally, such a framework between public and private entities is similar to that of the European new flagship launch vehicle, Ariane 6.

Meanwhile in NASA's COTS, partners are responsible for all of the development and operation but they are not required to deliver their vehicles to NASA, contrary to H3. It allows clear role allocation and companies' maximum creativity. A series of contracts of the Commercial Resupply Services (CRS) after COTS is also remarkable to promote private investment, for example, around half of the total R&D cost is borne by private sectors. Also, cost accounting method does not seem to be applied for the price setting.

The framework like H-2A is still necessary for high-risk R&D conducted by governmental agencies. It will be, however, necessary for projects, which aims at enhancing industrial capabilities through transferring the operations to the private sectors and encouraging innovation, to be taken different measures in relation to selection of prime contractor, delivery and payment in the development phase and to procurement of launch services in the operating phase.

* *Adv. LL.M Student of Air and Space Law, Law School, Leiden University, Steenschuur 25, Leiden, 2311 ES, the Netherlands*, tani.mizuki@jaxa.jp.

**Keywords:** H-IIA, H3, Ariane 6, COTS, public private partnership, procurement

## Introduction

In 2013, the development of the H3 launch vehicle was approved, [1] and its concept and the issues relating to H3 including role allocation between the public and private sector were organized.[2] H3 is Japan's new flagship rocket aiming at achieving high flexibility, high reliability, and high cost performance to gain international competitiveness conducted by Japan Aerospace Exploration Agency (JAXA) and Mitsubishi Heavy Industry, Ltd. (MHI). H3 is currently under development to be a successor to H-IIA and H-IIB, renovating the whole system and its flight demonstration is set for 2020. In H3, international competitiveness is the key objective, comparing with the previous H-II series which aims at maintaining Japanese autonomous access to space. Such an objective therefore affected the framework for the research and development (R&D) of H3, which transfers role and risks to the private sector. Coincidentally, the framework looks similar to European new flagship rocket, Ariane 6, the development of which was decided in 2014 and ESA has fixed 16 July 2020 as a deadline for the first flight.[3]

In the meantime, the Commercial Orbital Transportation Services (COTS) program established by the National Aeronautics and Space Administration (NASA) in 2005, which is said to play a key role to lead Space X to success, has some similar points to the framework for the H3 R&D, but other points are obviously different due to the difference of the objectives relating to involving new entrants.

In this paper, Section 1 describes typical characteristics of the public procurement in Japanese space field, through illustrating the framework for the development of H-IIA launch vehicle. Then, in Section 2, the frameworks for development of H3 launch vehicle and the European Ariane 6 are addressed as models which increase responsibilities of the private sector. After that, Section 3 compares between the frameworks of H3/Ariane 6 and NASA's COTS, which aims at enhancing industrial capabilities, involving with new entrants. Lastly, this paper discusses necessary items of the framework for projects which aims at enhancing industrial capability by transferring the operations to the private sectors and involving companies' innovative ideas.

1 Cabinet Office, Strategic budget allocation policy concerning space development and utilization [Uchu-kaihatsu-riyo ni kakaru senryakuteki-yosan-haibun-hoshin](04-06-2013)

2 Cabinet Office, Aratana kikan roketto kaihatu-chakushu ni atari seiri subeki jiko ni kansuru torimatome [Summary of issues to be solved at the beginning of development of a new flagship rocket] (25-10-2013)

3 J. Amos, Full thrust on Europe's new rocket, BBC News (22-06-2017).

## 1. *H-IIA development*- typical space procurement

### 1.1 Background and key objectives

The development of H-IIA was approved by the government in 1995 and started in 1996. The first launch was in 2001. The H-IIA was developed as an evolved version of the former H-II rocket relating to operability, launch capability, and cost efficiency for the purpose of making the former H-II more suitable as the national launch system which will support Japan's future space activities under limited resources.[4]

### 1.2 Selection of launch provider

In 2002, it was set out that the government-initiated technology should be transferred to the private sector in the Japanese space policy including H-IIA program, based on the policy that what the private sector can do should be facilitated by the private sector under the Koizumi administration.[5] After open discussion among public and private stakeholders and step-by-step transition, [6] H-IIA was privatized concluding a basic agreement between a former National Space Development Agency of Japan (NASDA) (currently Japan Aerospace Exploration Agency [JAXA]) and MHI as a launch provider since Flight No. 13 of H-IIA.[7] In this paper, the timing of selecting launch provider is important in relation to a comparison with the other frameworks as described later.[8]

### 1.3 Role allocation, design authority, deliverables and payment

Due to the aspect of the national project conducted by the space agency, the framework of the development of H-IIA launch vehicle was concluded in a typical manner in order to fulfill requirement of reducing risks to involve with the private sector in high-risky R&D activities, cost efficiency and accountability. When it comes to role allocation, NASDA was responsible for

4 K. Noda, et.al., H-IIA rocket program, Acta Astronautica, Vol. 45, Issue 10, Nov. 1999 at 640 and 645

5 Cabinet Office, Council for Science, Technology and Policy (CSTP), Fundamental principles of future efforts on space development and utilization [Kongono uchu-kaihatu-riyo ni kansuru torikumi no kihon ni tsuite](19-06-2002) at 6 and 9.

6 S. Asada, H-2A Launch Services for Commercial Satellites, Journal of the Japan Society for Precision Engineering, Vol. 75 No.4 at 461 (2009)

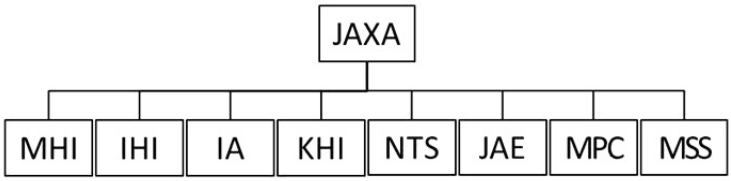
7 NASDA and MHI, H-IIA Hyojungata wo mochiita uchiage-sabis-jigyo no jissi ni kakakru kihon-kyotei [Basic Agreement relating to H-IIA launch services] (07-02-2003)

8 This paper focuses on the framework for the development phase of H-IIA, not for operation phase after privatization. For the framework for the privatization and operation of H-IIA, see S. Morikawa, Comparative Analysisy on the Legal Framework of the Privatization of Space Transportation, Trans. JSASS Aerospace Tech. Japan, Vol. 10, No. ists28, at. Tv_7-8 (2012)

the development of total system of H-IIA, including its rocket design and the facilities including launch base at NASDA Tanegashima Space Center.

NASDA therefore organized the main eight contactors including MHI and conclude a lot of contracts with them in accordance with the research and development phase set out as part of project management. Consequently, the results of development such as reports and the launch vehicles for flight demonstrations were delivered. As such "phase gates" with in the contract provide agencies objective standards to evaluate a project's propensity for success[9], such a contractual framework for each phase allows contractors to predict risk easier and NASDA to involve commercial partners in high risk R&D and to reduce costs for potential risks.

**Fig. 1 Contract structure in the H-IIA development**




### 1.4 Calculation of contract amount

Generally, calculation of contract amount in public procurement should be carried out with clear reasons that can fulfil accountability to taxpayers. JAXA Contract Regulations[10] provide also such two methods: the market price method[11] and the cost accounting method, which consists of direct costs such as labor, material, etc. and indirect costs such as general and administration costs, interest and profit.[12] The market price method, based on the market price of goods and services, is used in principle especially in procurement of commercial products in a large market. However, it is impossible to form market prices in few competitions among companies, for instance, in the case of procurement that requires advanced and complicated R&D due to the limited number of companies with enough capabilities.[13] With regard to such procurement, the cost accounting method is important.

9 B. J. Balter, Toward a More Agile Government: The Case for Rebooting Federal IT Procurement, 41 Pub. Cont. L.J. 149 (2011) at 156

10 Tit. 3 of the Uchu Koku Kenkyu Kaihatsu Kiko Keiyaku Jimu Jissi Yoryo [JAXA Contract Regulations] referenced by K. Shimizu, Procurement system of the Japanese Space Agency: A comparative Assessment, Public Contract Law, Vol. 44 at 65(2014)

11 Ibid.

12 Ibid at Art. 90.

13 K. Morimitsu, Nihon no Boei Chotatsu ni okeru Genka Joho no Kyoyu ni kansuru Kenkyu [Research on the Sharing of Cost Information in Defense Procurement in Japan], Melco Journal of Management Account Research, Vol.9 issue 1 at 57 (2016)

In the development of the H-IIA, it is not obvious but it is considered that the cost calculation method is applied since the market price would not exist, and the method is used in the development of the next launch vehicle, H3.[14] The cost accounting method has a merit for the space agency in relation to fulfilment of accountability that the contract amount is reasonable with no excess profit of the private sector.

### 1.5 Launch service procurement

In 1990's, the Rocket System Corporation (RSC) established by the 73 space related entities in 1990 as a launch provider using the rockets developed by NASDA in the step-by-step privatization,[15] had collectively procured H-IIA launch vehicles in response to 30 orders of H-IIA launch services made by Hughes Space and Communications and Space Systems Loral. [16]Mainly due to two failures of H-II, RSC finally closed its business in March 2006.[17] After that, such bulk purchases has not been made, and the only way to predict the governmental demand is thus looking at the launch schedule published in the Basic Policy on Space.

The launch schedule was provided in Basic Policy on Space given that it is vital that the government identifies the projects necessary for the nation and shows it to the industry, from the long-term perspective, not a project plan for each fiscal year, in order to increase the predictability of industry investment.[18] This is a non-legally binding document, and the necessity for a bulk purchase of launch services is indicated in the government.[19]

### 1.6 Issues relating to commercialization

The framework like H-IIA can be said necessary for a national project to conduct high risky R&D activities striking balance between reduce of risks through secure project management and fulfilment of accountability. H-IIA was a national project and the framework for it can be assessed properly.

However, there are issues in view of commercialization of launch services. Namely, it is difficult for contractors to undertake their R&D activities in consideration of business operation since a launch provider in the operation phase is selected after their R&D. Besides, expense by space agency can be

14 MEXT, Heisei 28 nend gyosei jigyo rebyu kokai prosesu no ronten oyobi taisho ni tsuite [Issues and Objectives in Public Process of JFY28 Review of Administrative Projects] (20-06-2016)

15 RSC, The Overview of Rocket System Corporation and the Agenda for the Commercial Satellite Launch. at 2.22 (2004)

16 Cabinet Office, Wagakuni ga uchu-yuso-sisutemu wo kentosuru shiten [The viewpoint that Japan considers space transportation system] at 31 and 37 (03-2013)

17 S. Yamada, Commercial Satellite Launch in a Corner, The Nikkei (03-06-2006)

18 Cabinet Office, Draft of the new Basic Policy on Space at 7 (11-2014)

19 Cabinet Office, Chotatsu seido no arikata no kento ni tsuite [Consideration of procurement system] at 5 (10-03-2018)

still caused even after privatization due to rocket design authority attributed to JAXA and limited period of contractors' warranty.
Regarding cost calculation and launch service procurement, they are described later, comparing with the COTS program.

## 2. H3 and Ariane 6 development - Increased responsibility of private sectors

### 2.1 Background and key objectives

The development of H3 was decided to enhance international competitiveness through high flexibility, reliability and cost performance as described in the Introduction of this paper. The role and responsibility of the private launch provider was therefore expanded.[20]
Meanwhile, the development of the new European flagship rocket, Arian 6 was approved in 2014 aiming at the 1st launch in 2020. The key objectives for Arian 6 is similar to H3: autonomous access to space for Europe, no more public support to commercial exploitation, respecting time to market, maximizing commonalities within the European launcher family and transferring risks to the private sectors. Such objectives of Ariane 6 greatly influenced their framework for the development cooperating between the public and private entities as that of H3 did.

### 2.2 Selection of launch provider

Concerning H3,[21]a launch provider, MHI, was selected by JAXA at the beginning of the R&D, not at the end of the R&D like H-IIA. It enables MHI to undertake its R&D activities not only as a prime contractor to integrate the system of the launch vehicle in the R&D phase but also as a commercial launch provider in the operation phase. By incorporating ideas from the business perspectives of the private sector from the initial stage, it is expected that the development will meet customer needs.[22]
When it comes to Ariane 6, it has also already decided at the beginning of the development that Arianespace is the launch service provider, responsible for operating and commercializing systems. Arianespace and Airbus Safran Launchers (ASL), which is the industrial prime contractor for the system of launch vehicle, are different entities but ASL, which became ArianeGroup on July 1, 2017, is the majority shareholder in Arianespace, with 74% of its

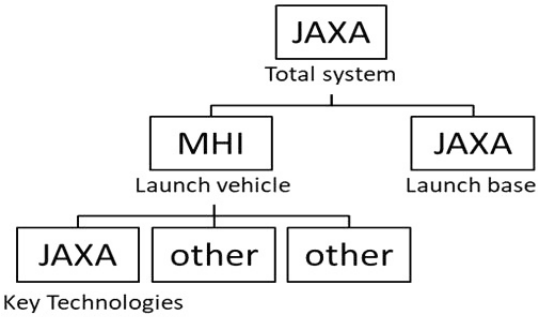
20 Cabinet Office, supra 2 at 3-4
21 JAXA, Shingata-Kikan-Rokketo no Kaihatsu-Jokyo ni tsuite, [Development Status of the New Flagship Rocket] (16-06-2014)
22 Development Bank of Japan, Enhancement of the Competitiveness of the Space Industry in Japan, at 11(05-2017)

share capital.[23] Such a capital-based link can allow the companies to smoothly carry out from the development to commercial exploitation.

### 2.3 Role allocation[24]

Regarding H3, JAXA is responsible for the total system to integrate launch vehicle and launch base. MHI is responsible for the H3 launch vehicle system as a single prime contractor. In addition, JAXA is responsible for the development of the launch base as an owner of Tanegashima Space Center and other facilities, and is responsible for the Key Technologies[25] which are parts of the H3 launch vehicle. The Key Technologies mean the rocket specific technologies to conduct autonomous space activities that cannot be diverted from other industrial technologies and that is necessary to maintain domestically not to be affected by other States. Therefore, JAXA is responsible for it as the technologies where the public agency should be responsible.

**Fig. 2: Contract structure in the H3 development**




* made by the author based on the JAXA, supra 22.

Such a role allocation except the Key Technologies is similar to Ariane 6 where a new organizational approach has been put in place for the development and future exploitation.[26] Responding to the objective of

23 Arianespace, Governance of Arianespace: Airbus Safran Launchers becomes the majority shareholder, Press Release, (30-11-2016)

24 For the framework for the development of H3, see JAXA, supra 22. For Ariane 6, see ESA, ARIANE 6 -The new Governance in Ariane world (01-2015)

25 The Key Technologies are liquid rocket engine technology including gas jet, solid rocket motor technology including pyrotechnics related technology, guidance control technology including inertial sensor and guidance software, and flight safety related technology including safety analysis technology and pyrotechnics related technology. See JAXA, Shingata kikan roketto no kaihatsu ni tsuite [About the development of the new flagship rocket] at 4 (24-12-2013)

26 ESA, Ariane 6 & Vega-C New Generation of European Launchers at 3 (2017)

transferring risks to the private sector and increasing industrial responsibilities, ASL bears the responsibility for launch vehicle as a single industrial prime contractor, and Centre national d'études spatiales (CNES) is responsible for launch base in French Guiana as a prime contractor. Regarding ESA, it has the responsibility for the total system including development procuring entity, the architect of the launch system, and validation test of the launch system. During development, ESA oversees procurement of the launch vehicle and launch base segments.

### 2.4 Design authority of launch vehicle[27]

In H3, the design authority of launch vehicle was attributed to MHI and also the development plan including the development costs are decided by MHI, responding to the MHI's responsibility for the development of H3. MHI will be thus liable for defects within launch vehicle caused by its development throughout the operation phase in principle. In addition, the Key Technologies where JAXA is responsible are parts of the H3 launch vehicle, and therefore MHI bears the responsibility for integrating the Key Technologies into H3 launch vehicle. In other words, MHI should define requirements against the Key Technologies, adjust interface among them, and be liable for defects caused by the interface between launch vehicle system and the Key Technologies.

In terms of Ariane 6, the design authority of the launch vehicle is entrusted to ASL as well that delivers related warranties. In detail, ASL defines the high level requirements specific to commercial missions, and ESA do that specific to institutional missions, but ASL has a role as a design authority. The increased autonomy for ASL is a counterpart to the transfer of risk, with associated financial consequences linked to the launcher system development contract with increased liability compared to Ariane 5, where ESA is responsible as design authority, owning all the assets produced and ESA entrusts technical direction and financial management to CNES, which writes the program specifications and places the industrial contracts on its behalf.[28]

### 2.5 Deliverables and payment[29]

Concerning H3, a deliverable from MHI to JAXA is limited to the completed H3 launch vehicle for the 1st flight, which is facilitated by JAXA as the validation test for the total system including the launch vehicle and JAXA's launch base. In principle, MHI is therefore liable for defects caused during the R&D phase unless JAXA's requirements are changed. The payment from JAXA to MHI responds to the deliverable, and performance-based and fixed price milestones are adopted.

---

27 See supra 25.

28 ESA, Ariane-5, available at https://www.esa.int/esapub/achievements/Sc72s6.pdf (last visited, 28-08-2018)

29 See supra 25.

When it comes to Ariane 6, it does not seem clear what the deliverables are in the contracts, but the milestones of the launch vehicle development are associated with a limited number of deliverables, reviews and payment. However, the payment scheme includes an incentive and penalty scheme according to the two sets of criteria: development schedule and performance of launch vehicle.

### 2.6 Calculation of contract amount

In H3, the cost accounting method is applied as it was done in H-IIA.[30] Regarding Ariane 6, the author cannot find a document about contract amount calculation.

### 2.7 Launch service procurement

In H3, there is no announcement about procurement of launch services and the previous way as described in 1.5 of the paper will continue.
Concerning Ariane 6, Arianespace has already procured two launches for four satellites[31] and ESA signed a frame contract with Arianespace defining procedures for the procurement of launch services by ESA, especially for its own missions.[32] In Ariane 5, bulk purchases are witnessed and such a trend will not seem to change.[33]

### 2.8 Conclusion

The frameworks for the development of H3 and Ariane 6 can be considered as an example for transferring responsibility and risks to the private sector in relation to the timing of launch provider selection, role allocation, deliverables, payment, and so forth, while the space agencies are still responsible for the total system including flight demonstration.
The next section addresses a comparison with NASA's COTS program to enhance industrial capabilities involving new entrants with innovative ideas.

## 3. A Comparative analysis between H3/Ariane 6 and NASA's COTS

### 3.1 Background and key objectives of NASA's COTS

Responding to the Vision for Space Exploration[34] announced by the President G. W. Bush in 2004, NASA had executed the Commercial Crew & Cargo

30 MEXT, supra 15 at 5
31 Arianespace, First Ariane 6 contract: Arianespace to orbit four Galileo satellites on two Ariane 62 launches, Press Release (27-09-2017)
32 Arianespace, Arianespace signs frame contract with ESA for the procurement of launch services for European Space Agency missions, Press Release (26-04-2018)
33 For example, Arianespace, Arianespace announces a new contract, bringing its order book to 53 launches: 17 for Ariane 5, 27 with Soyuz and nine utilizing Vega/Vega C, Press Release (11-09-2017)
34 The White House, The President's Vision for Space Exploration, (01-2004) NASA, Commercial Orbital Transportation Services Demonstrations Announcement, COTS-

Program since 2005 to transfer Low-Earth-Orbit (LEO) operations to the private sector. The objectives of this program are to implement U.S. Space Exploration policy, to stimulate the commercial space industry, to facilitate U.S. private industry demonstration of space transportation capabilities and to create a market environment in which commercial launch services are available to the government and private sector customers.[35] In 1925, the U.S. Government incentivized commercial aviation by allowing the U.S. Post Office to contract with private companies for mail delivery by the Contract Air mail Act.[36] Such an example served as a demonstration of the positive benefits of public-private partnerships in the U.S.

In the COTS program, Space Act Agreements (SAAs) are used under the "other transaction" authority.[37] The authority is allowed to enhance the government's ability to acquire cutting edge science and technology, in part through attracting companies that typically have not pursued government contracts because of the cost and impact of complying with government procurement requirements.[38] Using SAAs are not subject to the Federal Acquisition Regulations (FAR) which contain accounting standards, reporting requirements, and other procurement rules designed to prevent fraud, waste and abuse. [39] This is a relatively new development, and the government has limited ability to influence the agreement partners.[40] In the meantime, JAXA has flexibility relating to make a contract because the Public Accounting Act (Act No. 35 of 1947) which applies to the government, not the agency.

### 3.2 Comparison between H3/Ariane 6 and COTS

#### 3.2.1 Commonalities

The objectives relating to increase the responsibility borne by the private sector is common and thus such objectives similarly affect the legal frameworks for the development of the H3 and the Ariane launch vehicle, and the COTS program.

---

01-05, (18-01-2006)

35 D. Stone, et.al., NASA's approach to commercial cargo and crew transportation, Acta Astronautica, Vol. 63 (2008) at 192.

36 Ibid at 197. See also COTS Final Report at 2

37 Section 203(c)(5) of the National Aeronautics and Space Act of 1958, 42 U.S.C. §§ 2451-2484 (Space Act) (2000)

38 NASA's Commercial Cargo Providers: Are They Ready to Supply the Space Station in the Post-Shuttle Era?: Hearing Before the H. Comm. on Science, Space & Tech. & Subcomm. on Space & Aeronautics 112th Cong. 2 (statement of W. H. Gerstenmaier, Assoc. Adm'r for Space Operations) [hereinafter NASA's Commercial Cargo Providers] at 5 (2011)

39 Ibid.

40 Ibid.

First, all of the launch providers were selected at the beginning of the R&D, which allows the private entities to conduct their development in consideration of their business operation. Second, the design authorities and the role of the development of the launch vehicles are attributed to the private sector. Third, the payment scheme is done in accordance with the limited milestone with limited deliverables.

### 3.2.2 Differences

#### 3.2.2.1 *Role allocation*

The role allocation between private and public entities in the framework of H3/Ariane 6 and the Space Act Agreement in the COTS program is different. In the COTS, NASA is not any more responsible for the total system of the launch system. The private sector should therefore conduct the R&D activities including a flight demonstration as well as the development of the launch vehicle.[41]

In the framework for H3 and Ariane, JAXA and ESA are still responsible for total system including a flight demonstration as integration between launch vehicle and launch base. The issue in that framework is accordingly how to balance between increased responsibility of the private sector and the way of inspection by JAXA and ESA, that is, less inspection will fit increased responsibilities of the private sectors, but detailed inspection will be necessary for secure development to fulfil the JAXA/ESA's responsibility for its total system. It can be assessed that the COTS program makes it easier for NASA to allow the private sector's challenge with a certain risks.

#### 3.2.2.2 *Deliverables*

Responding to the above role allocation, a launch vehicle for the flight demonstration is not a deliverable from the private sector to NASA in the COTS program. "Buy a ticket, not a vehicle is the key concept in the COTS program, following the concept of the Launch services Purchase Act, which requires NASA to purchase launch services for tis primary payloads from commercial providers whenever such services are required in the course of its activities.[42]

JAXA and ESA also buy H-IIA or Ariane 6 space transportation services after its completion of the R&D and privatization, but in the R&D phase of the H3 and Ariane 6, the delivery of the launch vehicle is still necessary due to the responsibilities of the space agencies for the total system including flight demonstration. Then, JAXA and ESA have to inspect to some extent against the private sector as a receiver of the launch vehicle.

---

41 Article 3 and Annex 2 of the SAA between NASA and Space X.

42 National Aeronautics and Space Administration Authorization Act, FY1991, Public Law 101–611, 101st Cong.,2d. sess. (16-11-1990), Title II—Launch Services Purchase, §204.See also COTS Final Report at 12

#### 3.2.2.3 *Calculation of contract amount*

The cost accounting method, applied to H3, does not seem to be adopted in the COTS program as the below table, which shows the contract amount of "3333" , etc.

**Table 1. Milestone and contract amount in COTS (Appendix 2 of the SAA between NASA and Space X)**

| | Milestone | Amount | Date |
|---|---|---|---|
| 1 | Project Management Plan Review | $23,133,333 | Sep. 2006 |
| 2 | Demo 1 System Requirements Review | $5,000,00 | Nov. 2006 |
| 3 | Demo 1 Preliminary Design Review (PDR) | $18,133,333 | Jan. 2007 |
| 4 | Financing Round 1 | $10,000,000 | Mar.2007 |
| 5 | Demo 2 System Requirements Review | $31,133,333 | Mar.2007 |
| … | … | … | … |
| 19 | Demo 3 Mission | $7,333,333 | Sep. 2009 |

It cannot be said that the cost accounting method is adequate for involving new entrants. The cost accounting method is based on the validity of the costs estimated by the private sector,[43] and therefore JAXA conducts an audit, called a system investigation, to verify the adequacy of the quotations and the contracts by investigating the contractor's accounting system on site.[44] There are thus limited companies that can cope with adopting the cost calculation system and an investigation by the space agency. In addition, since new entrants aiming at commercial customers would like to make a contract in the same way as contracts between private sectors with a contract amount on a gross basis and market price method, not in a specialized way for governmental customer to save administrative costs.[45] In terms of the cost calculation, the COTS program adopts proper way for involving new entrants.

Also, the cost accounting method causes the same profit level regardless of the results of contract and then tends to demotivate contractors to do more efficient work as they are guaranteed as a minimum profit.[46]

43 Morimitsu op.cit., at 57

44 Art. 184 of JAXA Contract Regulations referenced by Shimizu op.cit., at 67

45 Cabinet Office, Chotatsu seido no arikata no kento ni tsuite [Consideration of procurement system] (10-03-2018) at 8

46 S. Matsuura, Kokusan roketto ha naze ochiru no ka [Why do domestic rockets fall?] at 212-215 (2004).

#### 3.2.2.4 *Launch service procurement*

In the U.S., NASA's commercial initiative was executed in two consecutive phases: Phase 1, COTS, the commercial partners would develop and demonstrate their transportation systems and Phase 2, CRS, the purchase of these fully-developed services.[47] Unlike SAAs in the COTS, CRS was subject to the Federal Acquisition Regulations (FAR).[48] The CRS contracts are firm-fixed price and Indefinite Delivery Indefinite Quantity (IDIQ) procurements[49] The IDIQ is a framework that facilitates multiple orders over a period of time under a single umbrella contract, which in turn reduces the time and expense associated with the preparation of multiple competitive bid solicitations.[50] In contrast to definite quantity and requirement contracts, the IDIQ provides the government with flexibility because the IDIQ "provide, for an indefinite quantity, within stated limits, of supplies or services to be furnished during a fixed period, with deliveries or performance to be scheduled by placing orders with the contractor".[51] The IDIQ is thus typically used when the government cannot predetermine the precise quantity or supplies or services and those will be required during the contract period.[52] The maximum and minimum quantity or price is stated, and the government bears obligation of order the minimum amount.[53]

Such a framework for a bulk purchase has been assessed that it enhances predictability of launch providers for the governmental minimum demand of launch services and furthermore, it can encourage private investment in the development phase.[54] In author's view, it can be also the key to eliminate cost accounting method, which is not adequate for new entrants. If there is a private investment to the development of launch vehicle, the space agency will fulfill its accountability that the contract amount is reasonable and adequate, not relying on the cost accounting method since the payment amount from the space agency to the private sector will be reduced. In view of the multiple orders of launch services, it has been concluded in Ariane series launch services as mentioned above.

---

47 NASA, Commercial Orbital Transportation Services: A New Era in Spaceflight, NASA/SP-2014-617 (2014) [hereinafter COTS Final Report] at 81

48 Ibid at 82

49 FAR 116.504. See also NASA's Commercial Cargo Providers at 5 and 26, referenced by R. Locke Bell, Intellectual Property in an Emerging Commercial Spaceflight Market: Taking Advantage of Other Transaction Authority to Keep Pace with Changing Commercial Practices, Journal of Public Contract Law , Vol. 43 at 726 (2014)

50 D. Farris, Checking Your Indefinite Delivery/Indefinite Quantity (IDIQ) IQ, The Construction Lawyer, Vol.22-4, at 24 (2002)

51 FAR 16.504

52 FAR 16.504 (b). See also D.Farris op.cit. at 24.

53 FAR 16.504 (a)(1)

54 Cabinet Office, Chotatsu seido no arikata no kento ni tsuite [Consideration of procurement system] (10-03-2018) at **

In Japan, such multiple orders are not conducted by the government and the Schedule provided by the Basic Policy on Space is the only way for the private sector to predict the number of launch services that government will be necessary as mentioned above. In that sense, the Japanese private sector can be put in a weaker position relating to less predictability through non-legally binding governmental plan. However, the Japanese government has a multi-year budget system and can make a "unit price contract" [Tanka Keiyaku],[55] that the government specifies a unit price for items and pays a price based on the unit price and the amount supplied within a certain period when the government cannot determine the amount in advance. In addition, joint procurement by multiple ministries and agencies has already conducted regarding procurement of general-purpose goods and services, for the purpose of utilizing scale merit and labor saving. It therefore seems possible for a ministry such as Cabinet Office to conclude an umbrella framework with a launch provider on collective orders or a bulk purchase, and each ministry can order a launch services based on the umbrella framework agreement.

## 4. Conclusions – Towards a contract to enhance industrial capabilities by encouraging innovation

The framework like H-2A is still necessary for high-risk R&D conducted by governmental agencies.
In the meantime, the following items will be necessary for a project, which aims at enhancing industrial capabilities by transferring the operation to the private sector and encouraging innovation, learned from the Japanese contract practice and a comparative analysis with the other jurisdiction.

1. Selecting an operator such as launch provider at the beginning of the R&D in order to make it possible to carry its R&D activities out from the business perspective,
2. Setting out privately owned system. Deliverable is not a spacecraft but a service in order to promote contractor's idea in the R&D phase, reducing governmental influence.
3. Adopting market prices method, not cost accounting method to involve new entrants, and
4. Making a bulk purchase to promote private investment and to eliminate cost accounting method.

In addition, pursuit of dual sources will have significant implications in terms of not only securing redundant systems and correcting the industrial structure

55 Art. 80 of the Cabinet Order on Budgets, the Settlement of Accounts, and Accounting (Imperial Ordinance No.165 of 1947)

of monopoly but also involving innovative ideas of new entrants. NASA selected more than 2 companies in the COTS and CRS contracts for redundancy. Besides, Europe adopts the principles of pursuit of dual source related to procurement of positioning satellite system Galileo.[56] Securing dual sources is not easy given the constraints of governmental budget and the market. However, there is a dilemma that existing operators are hard to challenge because they are too knowledgeable, but new entrants may have a totally different approach.

The barriers and obstacles are still high for continuous service developing and using large spacecrafts. However, since the cost is steadily decreasing and new entrants are emerging in the field of small satellite business, a framework discussed above can be thus applied to such a field to further promote new entrants and to enhance industrial space capabilities. In such a project, the role of the R&D space agency will be controversial since the R&D activities in the project are not conducted by the space agency but the private sector. However, the promotion and cooperation by the space agency will serves as branding new entrants, which would attract additional outside investors. To the end such a project will move the space agency away from day-to-day operations and allow the space agency to procure more cost-efficient services.

56 Art. 7 of the Regulation (EC) No 683/2008 of the European Parliament and of the Council of 9 July 2008 on the further implementation of the European satellite navigation programmes (EGNOS and Galileo)