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The Sky is not the Limit

An Analysis of the Articulation of Japan's Space Ambitions Since 2000

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Abstract

This thesis investigated the ambitions of Japan in the space sector through the development of the country's space programme. Drawing on content and discourse analysis of policy, law, strategy documents, the Japan Aerospace Exploration Agency website and documents about the ISS, this thesis explored how Japan has been articulating their space ambitions since 2000. It aimed at analysing the ambitions in theory and in practice as well as comparing them to frame the gap between text and reality.

The thesis argued that Japan aims at developing their space industry and enhancing the uses of space through improving efficiency and autonomy of the country's space activities. They do so by ameliorating research and development and human resources, by enhancing the security, civil and commercial uses of space, by improving infrastructures and budget allocation, and by taking part in space international cooperation, including in global law and policy formulation. The main assumption was that Japan is hoping to strengthen their space power to gain relevance to secure an important role on the international space arena.

Keywords: Japan, Space, Space ambition, Space Power, Space strategy, Japan's space programme.

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Abbreviations

ASEAN	Association of Southeast Asian Nations
BSL	Basic Space Law
BPSP	Basic Plan on Space Policy
COPUOS	Committee for the Peaceful Uses of Outer Space
CNSP	Committee on National Space Policy
CSTP	Council for Science and Technology Policy
EU	European Union
GPS	Global Positioning System
IAF	International Astronautical Federation
ISAS	Institute of Space and Aeronautical/Astronomical Science
ISS	International Space Station
ISSPSF	International Space Station Program Science Forum
JAXA	Japan Aerospace Exploration Agency
JEM	Japanese Experiment Module (Kibo)
JEMUC&HSTD Directorate	JEM “Kibo” Utilization Center & Human Spaceflight Technology
LCJAXA	Law Concerning Japan Aerospace Agency
LDP	Liberal Democratic Party
METI	Ministry of Economy, Trade and Industry
MEXT	Ministry of Education, Culture, Sports, Science and Technology
NAL	National Aerospace Laboratory
NASA	National Aeronautics and Space Administration
NASDA	National Space Development Agency
NSAC	National Space Activities Council
NSSPG	National Space Strategy Planning Group
ONSP	Office of National Space Policy
OST	Outer Space Treaty
QZSS	Quasi-Zenith Satellite System

R&D	Research and Development
SAC	Space Activities Commissions
SDF	Self-Defence Forces
SHNSP	Strategic Headquarters for National Space Policy
SIV	Space Industry Vision 2030
SSA	Space Situational Awareness
US	United States

1. Introduction

November 1999, Tanegashima launch centre. The first “made in Japan” space launcher ‘H-2’, failed at sending a satellite into orbit for the second time. The country’s reputation in launching capabilities is tarnished, and they prematurely ended its activities (Berner, 2005, p.10). The Japanese space story started in the 1950s, at the same time space international cooperation began, when scientists concluded it was necessary to understand Earth as a whole and focused on weather, magnetism and auroras (Lai, 2021, p.1). Gradually transforming into a space race, the Soviet Union became the first country which developed a space asset successfully remaining in space, the ionosphere analytical satellite Sputnik, in 1957 (Lai, 2021, p.7). As Berner (2020) notes, Japan had similar aims and became the fourth country with such an achievement in 1970 (after notable failures).

While global militarised use of space started increasing during the Cold War through the use of intelligence satellites (Lai, 2021, p.9&12), Japan’s defence has still been restricted by the Japanese Constitution (1947) due to Article 9 prohibiting waging war. Between the country’s dependence on US technology (Vijayakumar, 2020) and a general lack of public and governmental support (Berner, 2005), Japan had to adapt and evolve its needs and objectives to elevate the quality of the space programme. The early 2000s were a turning point for the Japanese space strategy when they decided to take matters into their own hands. They reorganised their space activities and programme, increased the space budget, and the Japan Aerospace Exploration Agency (JAXA) was founded in 2003 (Nagai, 2015, p.5). The restructuring going on for two decades now shows determination to develop the country’s space activities to another level. When evaluating Japan’s current space capabilities, scholars have been in agreement defining Japan as a medium space power (Klein, 2019, p.96) considering the space capabilities of the country, especially technology and robotics (Akimoto, 2020). A main research question therefore emerged:

How has Japan been articulating their space ambitions since 2000?

The thesis is aiming to understand the space ambitions of Japan by analysing their space programme, with the use of policy, law, strategy documents, the JAXA website and documents about the International Space Station (ISS). Starting from 2000, when Japan began introducing drastic changes in organisation and policy-making, this thesis

assesses the reality gap between Japan's space aspirations and the efforts to actualise their ambitions as a medium space power. It allows understanding to what extent Japan is hoping to become such a power, but also what is at stake in space, and how Japan behaves in the space arena. The research question's focus on "articulating" Japan's space ambitions is split up into questions: (1) how Japan is framing their space ambitions "on paper" through policy and law documents (ambitions in theory), and (2) how Japan is realising such ambitions through current space programmes and investments (ambitions in practice). A third sub-question is preoccupied with (3) the reality gap between theory and practice.

The space ambitions refer to the country's main goals, strategies and aspirations concerning the space programme. In order to frame them, I use content and discourse analysis to analyse key policy and law documents, such as the Basic Plans on Space Policy, while categorising the different ambitions as thematic codes. Then, I draw on examples of practical actions of Japan with a focus on two realisations of the said-ambitions: the activities of the Japan Aerospace Exploration Agency (JAXA) and Japan's activities within the ISS as investigated through content and discourse analysis of respective websites and documents. It illustrates how Japan's space ambitions are articulated in theory and in practice, and it allows me to assess the reality gap between that theory and practice to understand to what extent Japan's will and means to realise their space aspirations are coherent.

Japan is a spacefaring nation, which is in this thesis "having business in space", such as having satellites and the ability to launch in space (Space Policy Online, 2020). Considering that Japan does not possess normal military ("hard") power, the starting assumption is that Japan is trying to find new fields to gain global relevance, and they have potential to succeed with their space activities. Currently, Japan achieved success after success: the Hayabusa-2 mission returned samples from an asteroid, Japan is part of the ISS, and more generally has a great reputation in robotics (Vijayakumar, 2020). The space budget increased every year to reach 449.6 billion yen in 2021 (Park, 2021). Japan came back from the ashes and this shaped the country's ambitions. Moreover, when North Korea launched a missile above the country in 1998, space security became an unavoidable topic. Intelligence relies on the use of satellites, therefore Japan began to include security as a core of their space strategy. However,

they struggled to break free from the US space support. Japan needs to work on many issues in its space programme, which have influenced the country's ambitions.

In what follows, I show that Japan has as main ambition to develop its space industry and expand the use of space, involving different fields of focus such as civil use, national security or international cooperation. The different ambitions indicate that through the enhancement of their space activities, they hope to become autonomous, competitive and attractive to reinforce their international role and overall space power. Finally, a close analysis of the gap between the ambitions in theory and in practice demonstrates that Japan is coherent in the implementation of its ambitions.

Thus far, scholarship concerning Japan's presence in space (see, for example, Berner 2005, Vijaykumar 2020) have focused on the historical and factual details on Japan's space story and programme. While some have offered some policy analyses, as well as more descriptive and explanatory articles about space policies in Japan (Fatton, 2020), most literature offer either general overviews of the programme, or in-depth discussion of specific policy (Nagai et al., 2015). This thesis aims at contributing to literature linking together different sources of information and providing an analysis of the reality gap between the policies and strategy plans, combining strategy narrative and practices. The thesis hopes to grasp Japan's ambitions, or space programme through a triple focus on the framed ambitions, the practical ambitions (or space activities), and how these practical activities reflect the textual ambitions in a potential reality gap. Framing the ambitions goes beyond understanding Japan's space strategy as it encompasses the image Japan is hoping to get. The main purpose is to understand what the aspirations beyond practicalities are, it is not only analysing the concrete achievements of the country.

2. Literature review

In order to understand the thesis and the origin of the research question, this literature review goes through relevant concepts used in the thesis such as space itself, unfolds the history of the space development of Japan to contextualise the ambitions that Japan began transforming since 2000, and addresses relevant discussions that are framing the findings including the normalisation debate. All authors have similar thoughts, making information reliable.

2.1 Definition of space and uses of space

Space in this thesis refers to “outer space”, defined as “the space lying beyond the atmosphere surrounding the Earth”, above “airspace” (Diederiks-Verschoor and Kopal, 2008, pp.3-4&15). There are different possible uses of space, and Japan has the ambition to enhance each of them. Civil space activities are related to research, sometimes by governments through agencies, the ISS for instance. Space can also be used commercially, where profit is expected to be made by accessing or using space, television or radio satellites are a good example. Intelligence missions (especially satellites) and military use of space (defensive and offensive activities) (Klein, 2019, pp.7-8) are combined in this thesis as security use.

2.2 Historical overview

As the space ambitions are reflected in a country’s space programme, they emerged in Japan when the country’s space story started. Firstly constrained to develop aviation and aerospace technology until 1969 by the post-war Alliance with the US (Vijayakumar, 2020), the Japanese space programme started in 1955 at the University of Tokyo with a small rocket development project initiated by Professor Hideo Itokawa, engineer in aeronautics (Nagai, 2015, p.2). It was then updated when the Institute of Space and Aeronautical (now Astronomical) Science (ISAS) was set up in 1964. (Berner, 2020). The first ambitions emerged when Japan realised that space was important for society: communication, weather, and broadcasting mostly (Nagai, 2015, p.2), for which satellites are needed. Four launches failed until 1969, when the National Space Development Agency of Japan (NASDA) was founded, whose purpose was developing the country’s space capabilities with a strong focus on satellites. Japan also signed an agreement with the US to use American firms’ technology for launching vehicles. Newly equipped, their first successful launch of the Ohsumi satellite was in 1970 (Berner, 2020), becoming the fourth country to achieve this (Vijayakumar, 2020). Helped by US technology, the first NASDA-made N-1 launcher had its first launch in 1975.

Japan has also displayed the ambition of extending their space activities through their institutionalisation. The National Space Activities Council (NSAC) was founded in 1960, and eight years later replaced by Space Activities Commissions (SAC) (Nagai et al., 2015, p.2). They also worked on reducing American dependency in the 1980s

by improving their launchers and satellites. However, from 1994 started a period in which Japan experienced many satellites and launch failures (Berner, 2005). Moreover, because of American criticism, Japan had to open its formerly exclusive satellite-related market, even if it was not competitive enough at the time, forcing them to acquire US satellites again (Nagai, 2015, p.3). Competitiveness of the launching and satellite market therefore will become a strong ambition, as I show in the analysis section.

As Berner notes (2005, p.20-21), Japan was behind other space powers like the US. Between the 1970s and 2005 the allocated percentage of GDP for space was between 0.025% and 0.04%, and the real expenses between 0.033% and 0.053%, compared to 0.14% in the US and 0.095% in France (Berner 2005, p.20-21). Many factors explain this, the economic recession in the 1990s for example, but also the science budget was given priority to life science, information technology, environmental technology, and nanotechnology. The defence budget being limited, defence-allocated space funding was as well (Berner, 2005, p.24&31). Same goes for workers in the field: it was very understaffed (Berner, 2005, p.31). Furthermore, there was also little vision for the future of the space programme, beside relying first on the US then gradually building knowledge and technical capacities to construct their own products. Having a space programme is "what great powers do", but they did not have a specific strategy (Berner, 2005, p.25). Finally, the public support was not enormous, space was an unpopular science field, and the multiple failures of the programme were not of great help (Berner, 2005, p.30). It is therefore important to understand how Japan is striving to solve existing problems in their space programme, this is developed in the analysis section.

The turning point of Japanese space ambitions, preparing the ground to transform Japan as a medium space power, started in 2000 when Japan reorganised its ministries. In 2001 was implemented the Council for Science and Technology Policy (CSTP) inside the Cabinet Office of the Prime Minister (Prime Minister of Japan and His Cabinet Website, n.d.). In 2003, NASDA, ISAS and the National Aerospace Laboratory (NAL) merged into the Japan Aerospace Exploration Agency (JAXA), because the Ministry of finance wanted to improve the efficiency of the space programme (Berner, 2005, p.14). SAC became under the Ministry of Education, Culture, Sports, Science and Technology (MEXT) as JAXA's supervisor (Nagai, 2015, p.5).

Japan's successes are important because ambitions are also formulated drawing on what Japan is already good at, which can improve the industry and Japan's overall reputation. The first big success of Japan was the Hayabusa spacecraft which landed on an asteroid, took samples, and came back in 2003. Hayabusa-2 was launched in 2014 with similar purposes than its predecessor, and returned samples in 2020 (Vijayakumar, 2020). Japan's biggest international contribution is probably the conceptualisation and docking of an ISS component: a lab module. The Japanese Experiment Module (JEM, also named Kibo) is the core of scientific experiments in the space station. Japan also has cargo-ships to supply the ISS (Vijayakumar, 2020). JAXA and other actors are currently developing robotics technology to take care of the space debris issue, taking part in one of the current biggest global challenges, affirming once again their international role. They are also funding a considerable part of a GPS programme for East Asia called the Quasi-Zenith Satellite System (QZSS), showing a strong leadership in the region, another ambition (Moltz, 2011, p.62). Finally, the Kaguya mission was sent to collect many sorts of data (NASA, 2019), and they signed an agreement to contribute to NASA's Artemis mission, including by providing the core module to the Gateway, an asset created to house a crew and orbit around the satellite (Witt & Kraft 2021). These key examples show that Japan wants to show its scientific and technological competences and get recognition by setting up their own missions and participating in major international cooperation projects, which led me to consider technological capacities building and international cooperation as space ambitions, mapped out in the analysis section.

2.3 Space law

One of Japan's means to affirm their role is to contribute to the core aspect of space international cooperation, space law. Moreover, following the international legal basis such as the Outer Space Treaty (OST) is important for them. Space law is a complex and vague field as unlike sea or air, you cannot allocate a piece of space to each country (de Gouyon Matignon, 2019).

Japan has ambitions to contribute in the amelioration of a stronger legal framework in space because it is an important still vague field, I therefore consider in section 6.7 this specific ambition. Indeed, a key purpose of Space Law is to articulate international cooperation in space. But the cooperation itself requires creating more laws (Lachs,

2010, p.27-28). Its abstractness makes the topic quite sensitive: it is currently based on customary international law (supposedly applied to all states) and international treaty law (between certain signatory countries) (Klein, 2019, p.8). It is an evolving field depending on specific areas and contextual changes, and that is reflected in Japan's specific goals for space law. For instance, JAXA and other Japanese space industries are members of the International Astronautical Federation (IAF) (IAD, 2022). This implies that the country is having a role in the space law community.

The main source is the Legal Subcommittee of the UN Committee for the Peaceful Uses of Outer Space (COPUOS), and five key treaties, including the UN Outer Space Treaty (1967) (Pekkanen and Kallender-Umezu, 2010, p.32). As Japan's ambitions fall into this legal framework, some key principles are to be noted. National appropriation of outer space is prohibited while all should enjoy equal rights of use, but also freedom of scientific investigation, among other measures (Diederiks-Verschoor and Kopal, 2008, pp.4-6). The basis of space law is important to understand how Japan is framing their ambition in this specific field, and even more for Japan to evolve in the space international scene, which I map out in section 6.4. and 6.7.

2.4 Japan and international cooperation in space

A core aspect to analysing what a country aspires to do in space is to look at the collaboration it has with different actors. Cooperation is important for furthering scientific research (Lachs, 2010, p.97), because it allows sharing the costs to reach sufficient funding (Patel, 2020), but also to design and manage global space governance (Nagai et al., 2015, p.2). Japan, as all space actors, does not ignore these facts. Therefore, it is important to understand how Japan uses international cooperation to frame and articulate their space ambitions.

As I show later in the theoretical framework, scholars often see diplomacy as one of Japan's core ideas in their quest to become a space power (Vijayakumar, 2020), which is a tool for medium powers according to Klein (2019). This made me consider international cooperation as central for the Japanese strategy. Japan started integrating the international space community in the 1960s, notably by joining COPUOS in 1962 (Moltz, 2011, p.49). Japan has many partnerships. The most important actor is the US with an increased cooperation on security matters (with the Japan-US Space Security Dialogue in 2012 for instance) with information sharing

(Yoshimatsu, 2021, p.156; Fatton, 2020, p.25). It indicates Japan's increasing space normalisation and focus on security. Japan has many other partners, such as the European Space Agency (Moltz, 2011, p.50), or India (Yoshimatsu, 2021, p.157), with who they focus more and more on the increased Chinese threat (Fatton, 2020, p.28)., Moreover, Japan's technological contribution to the ISS is significant, reinforcing Japan's international presence. At last, Japan aims at supporting non space-faring states by assisting satellites launches for them (Vijayakumar, 2020): the Joint Global Multi-Nation Birds Satellite Project, currently has helped Ghana, Mongolia, Nigeria and Bangladesh, mobilising students for those countries, who studied at the Kyushu Institute of Technology (Birds Project, 2022). I elaborate more on Japan's ambition as a leader for emerging countries in the analysis.

2.5 Japan's use of space and the Japanese security debate

Security in space is a global issue, this is also a reason why cooperation is needed. The UN resolution to establish COPUOS stressed on "the common interest of mankind as a whole in furthering the peaceful use of outer space". National and international security is fundamental, and Japan incorporated them in their space programme. Security in the realm of outer space (e.g. free access to space (OST Article 1), including for space assets, intercontinental ballistic missiles) is important to contextualise in the security debate of the country to understand the stake of this particular focus.

Article 9 from the Constitution of Japan removed the right for the country to wage war, not allowing it to maintain "land, sea and air forces, as well as other war potential". This restriction implemented after the Second World War by the US made Japan focus on economic recovery instead, transforming the country into an economic power (Yoshioka & Kawasaki, 2016). The outcome of the war and the new Constitution created a strong pacifism in the country (Maki, 1990, p.73), which also hindered the country's chance to get a normal defence, to normalise. Japan's security dilemma is either relying on their security alliance with the US, or normalising the country to become more independent.

This has an impact on the country's approach to security for space matters. First, the 1969 Peaceful Purposes Resolution and the 1978 Fundamental Policy of Japan's Space activities stated that outer space must be used for "peaceful purposes", aligning

themselves to the OST and limiting the sector to civilian use, strictly excluding military use, which explains the primary focus on creating launchers and satellites (Fatton, 2020, p12). But “peaceful” in the OST does not mean non-military, as Japan interpreted it first, but “non-aggressive” or “defensive” (Maeda, 2009, p.4). For Maeda (2009, p.2), military use of space infiltrated the programme in the mid-1980s when Japan accessed US satellite intelligence, and with the introduction of information gathering satellites used for both civilian and military purposes in 1988. Japan did not directly allocate a defence budget to the space programme until 1998, when the North Korean Taepodong missile created a security threat, it was an opportunity to assess the military use of space (Berner, 2005, p.32). The plan was the settlement of a domestic military and intelligence satellite reconnaissance system. In 2003, the Cabinet Satellite Intelligence Center was set up under the Cabinet Secretariat, with JAXA managing the technical parts (Berner, 2005, 17-18).

Pekkanen and Kallender-Umezu (2010, p.38) suggest dating the official shift later, in the late 2000s, when many actors benefiting of such an expansion of the use of space, like industries[1], but also the National Space Strategy Planning Group (NSSPG), pushed for it. Space as an important compound for national security in official documents, especially the need of satellites, dates from the 2001 Promotion Strategy Report from the CSTP (Pekkanen and Kallender-Umezu, 2010, p.35). Japan’s Basic Space Law (2008) officially re-interpreted “peaceful” from “non-military” to “non-aggressive” (Maeda, 2009, p.4). A more detailed military use of space, mostly defensive (Pekkanen and Kallender-Umezu, 2010, p.40), stands in the Basic Plan on Space Policy (2009), including development of reconnaissance satellites and sensor warning satellites to detect ballistic missiles (Maeda, 2009, p.4-5). The legal texts, which are used in the analysis, are central to understand the why and how Japan focuses on space for its national security. Another step changing Japan’s security ambitions is the re-interpretation of Article 9 in 2014, granting Japan the right to collective self-defence with the SDF, expanding the scope of action also in space (Fatton, 2020, p.9-10).

This is where space matters in national security: the new Japanese ballistic missile defence system (implemented, with the US, the same year) touches upon the realm of

[1] Notable actors are the Mitsubishi Group and Nippon Keidanren.

space (Fatton, 2020, p.11). This was the practical change of interpretation from "peaceful usage" to "non-offensive usage", truly militarising Japan's space security ambitions. The reliance on the US is still an issue however, the exchange of intelligence between the two countries created fears that the US might keep serious security information for themselves, to maintain a superior grasp on Japan (Fatton, 2020, p.13). Similarly to the general security dilemma, Japan is currently moving toward a more "offensive defence", as the Ministry of Defence asked to acquire striking capabilities (including F-35 fighters who can carry missiles), as part of the US push for Japan to increase capacities and block any direct attack to Japan (but not as preemptive strikes). This new programme relies on many space assets such as satellites, to coordinate attacks, pushing the space sector into offensive military actions (Fatton, 2020, p.33-34). Japan's security dilemma reflected in the interpretation of the use of space for security purposes, but it seems that space was a sector in which they managed to emancipate themselves from the constitutional limitations, as they acquired basic military capabilities. I show in section 6.1 how space security investments are visible in the space programme.

2.6 Japan's space ambitions

Scholars provided insights on the Japanese space programme. This section looks at what they concretely say about the aims of Japan in space, and not only their strategy, including before 2000 to understand the current ambitions.

The 1969 Diet resolution which stipulates the principle of peaceful use of space specifies four areas of said-use of space: "to advance science, to improve people's lives and promote the welfare of mankind, to contribute to the development of industrial technology, and to foster international cooperation" (Maeda, 2009, p.1). International cooperation and civil use of space are what Pekkanen and Kellander-Umezu (2010, p.34) considered as central in Japan's space development at first. Nowadays, ensuring space security, becoming a "normal space power", is part of Japan's strategy and ambitions, as it has been explained previously. This falls into the normalisation debate of the country in order to gain international relevance (Moltz, 2011, p.44). Hirotaka Watanabe (in Moltz, 2011, p.45) still considers international cooperation but also autonomy as central in Japanese space policies. Moltz (2011, p.45) argues that "Japan has ambitions to be at least a regional leader in space exploration, as evidenced by its establishment and sponsorship of the Asia-Pacific Regional Space Agency Forum".

Furthermore, Japan, through space diplomacy, is “pursuing a soft-power strategy in regard to space, hoping to use its accomplishments, unique technical capabilities, and outreach as a means of building respect and political influence within Asia and the world” (Moltz, 2011, p.66). Japan also has commercial ambitions: the Basic Space Law for example put the emphasis on expanding Japan’s space industry beyond its national market, according to Japan space expert Setsuko Aoki (in Moltz, 2011, p.61). Philosophy is mentioned, as exploring the cosmos both created a new understanding of the universe and displayed the nation as “intellectually mature” (Pekkanen and Kellander-Umezu, 2010, p.34). These different elements are considered in the theoretical framework, and in the analysis providing a baseline for coding the ambitions. Literature also led me to pick “ambition” over “strategy”, which I explain in the theoretical framework.

2.7 Conclusion

The literature provides an insight on Japan’s space ambitions, which are important elements of global space activities, such as space security, space law and international cooperation. The Japanese space programme’s past and present successes and flaws also fuel the ambitions and are considered in the analysis: elements to focus on, especially to improve the image of the country abroad (such as Japan’s good technology), or issues to solve (such as understaffing), to overall improve their space activities.

Finally, many authors labelled Japan as a space power and informed my thinking that that this concept provides a framework to understand Japan’s ambitions taking the assumption that the aims of Japan is to both strengthen the position of a medium space power, but also to increase said-power.

3. Theoretical framework

This section explains the choice of “ambition” as Japan’s great space aspiration, suggesting framing it through an analysis on the country’s aim for power, as “space power” came out in literature, and through the space reality gap.

3.1 Ambition and strategy

In order to understand the articulation of Japan's space ambitions, the thesis focuses on textual documents that outline the country's space programme and the literature analysing such texts, which provide an outlook of the space ambitions.

Ambition is chosen over *strategy* in this thesis's research question as it encompasses everything a country wants to achieve in space, it has a broader meaning than strategy. *Strategy* is about balancing ends and means, often money-related (Klein, 2019, p.27), representing what the country can achieve with its current resources. Space strategy is the key understanding of the ambitions of a country. Klein (2019, p.20) suggests that the theoretical framework for space strategy falls into the "general theory of warfare", but being "distinct from land, maritime, air and cyber strategies" while potentially overlapping with those areas. "The purpose of space strategy is to ensure access to and use of space" (Klein, 2006, in Klein, 2019, p.21), which allows a state to access "celestial lines of communication" being indispensable for a country's national security. Strategy in this thesis therefore refers to the concrete ways Japan is hoping to achieve their ambitions. The analysis goes beyond the strategy and aims at understanding how Japan is representing their goals, not only how they are hoping to reach them but also what are the inherent, aspirational goals of Japan. That is why representation of power is chosen as a framework.

3.2 Japan's space power

The position of this thesis suggests that a big ambition for Japan driving the aims of the country is to enhance its space industry and expand the uses of space, which would increase the relevance of the country on the international scene, the country's space power.

I suggest a realistic and constructivist definition of state power in order to frame space power, with the assumption that Japan is limited in hard power and would seek for new sources of power, including in space. State power relates first to the ability to impact the capacity of other actors to shape their own behaviour, including actions, interests and beliefs (Barnett and Duvall, 2005, p.42). The realistic stance explains Japan's ambitions through their space strategy. For Donnelly (2005, p.36), state power through realism relates to balance of power, allocating resources of power to national security

and creating alliances and agreements, in order to limit risks. Respectively, translated to space, it is becoming relevant by catching up with other countries, allocating resources to the space programme to enhance space power as a whole including security, and international space cooperation. But in order to understand the aspirations of Japan in space, the constructivist stance is framing power differently. It considers social interactions, norms, ideas and how identities are reflected in behaviours and actions, suggesting more interpretive and discursive analyses (Reus-Smit, 2005, p.188 & 195). It explains why Japan inspires their strategy from other countries, or how their ambitions are responses to contextual changes, for example the North Korean threat. It allows us to explore the space power identity of Japan at an aspirational level, how Japan paints their own power and aspires to develop it.

Moltz (2011, p.66) argues that Japan's strategy in space is soft power, which is defined by Nye as "the ability to affect others to obtain the outcomes one wants through attraction rather than coercion or payment" (hard power) (Nye, 2008, p.94), it is a more constructivist concept. With the assumption that Japan would lean towards different means of power because their hard power is restricted by the Constitution, space power as soft power is a theory used to understand why space matters for Japan. Similarly to "state power", the strategy, behaviours and therefore ambitions of countries depend on their resources and ability to allocate space resources into power. The literature depicts Japan as a space power, Vijayakumar (2020) for instance considers that showcasing their technological expertise to the world is one means, they do so by being willing to contribute to the global space community. I am therefore suggesting Paikowsky's (in Klein, 2019, p.96) typology of space power, which places Japan as a medium space power. It allows assessing if Japan's space programme in the documents used in the analysis is indeed typical of a medium space power, and what power the country aspires to become. This framework helps the understanding of the articulation of the ambitions. The typology classifies states in what Paikowsky called the "space club" as emerging, medium and great space powers. Emerging states are capable of developing and controlling satellites, but not launching them, while medium space powers can. Finally, great powers have or had the capacity to fly humans to space, like China, Russia and the US (Klein, 2019, pp.96-97). In Japan's first Basic Plan for Space Policy, manned missions were not mentioned (Maeda, 2009, p.5). Japan currently relies on other actors to send people into space. For instance, the

billionaire Yusaku Maezawa trained and was sent to the ISS through Russia's space tourism programme (AFP, 2021), and Japanese astronauts also journeyed to the ISS with the Crew Dragon SpaceX private spacecraft (Kyodo, 2021). There are talks about acquiring such capabilities, but the risks of losing astronauts can endanger the future of the space programme (Moltz, 2011, p.62), therefore reputation.

Different space capabilities mean different strategies for different sorts of powers, reflecting in the Japanese space programme. Countries considered to be medium space powers usually strategize to "ensure access to and use of celestial lines of communication to support national objectives" (Klein, 2019, p.124), but with more material and economical constraints than a great space power. Medium powers possess things, but not everything (Klein, 2019, pp.124-125), are using diplomacy and alliances, buying new power resources (to commercial space companies), establishing presence (by participating in international space activities to earn respect and recognition), and taking military disposition such as the ability to defend themselves (Klein, 2019). Finally, the same way public diplomacy is a tool of soft power to use communication resources to attract countries (Nye, 2008, p.94), space diplomacy is the use of space capacities for diplomatic objectives. It can be coercion such as dissemination of data from satellites to influence their actions, but also attraction such as high prestige due to qualitative assets, technology partnerships, international presence, access to space services given to other states (Whiting, 2010).

Space power therefore is Japan's space resources and their attractiveness, and how Japan is using them to shape other actors' behaviours through space diplomacy. Japan's space ambitions can be understood through this framework as Japan aspires at having an important space role.

3.3 Framing the space reality gap

This thesis explores the reality gap between theory and practice when it comes to space ambitions. "Theory" refers to the official intentions of Japan in space, framed through official documents depicting the country's programme, while practice is understood as concretely implemented programmes and infrastructures that aim to realise their ambitions. From an ontological point of view, depiction of reality is never completely the same as reality itself (Dale, 2014, p.132). In policy studies and analysis, such reality gaps are often conceptualised as "implementation gaps" which account for

the differences between “the expectations of policy makers and actual policy outcomes” (deLeon 1999; Hill and Hupe, 2009 in Cairney, 2012, p.34). This usually relates to policy failure rather than a gap with how the policies are implemented, the focus of the thesis. I assess this by considering what is in the documents and what is actually done on the field, and decide how coherent the theoretical ambitions are in practice. I inspired this framework by Cairney’s (2009, p.5) criteria defining the absence of such a gap: when the objectives of the policies are “clear, consistent, well communicated and understood”, the results are what the policy intended, resources are allocated as planned, implementation is carried out by “skilful and compliant officials” (Cairney, 2009, p.5). The reality gap in this thesis is exploring how space ambitions and aspirations mapped out in policy and legislation (the theory) are reflected in practice in Japan’s space activities such as national security. If the gap is small or non-existent, it means that implementation and therefore Japan’s articulation of their ambitions as defined in this thesis have been coherent and realistic.

4. Research design

This thesis is investigating how the space programme is framed discursively and practically through the analysis of official documents, and how this post-2000 aspirational space programme has been realised through concrete domestic and international space initiatives by drawing on the activities of JAXA and in the ISS.

This thesis is informed by qualitative research design as I am attempting to understand and interpret phenomena in my data (Denzin & Lincoln, 2011, p.43). The epistemological stance is interpretivism as I give an analytical interpretation of the intentions (documents) and actions (examples), in order to determine their meaning, and bring these two strands of analysis into conversation allowing identifying the reality gap.

4.1 Data collection

I chose for data documents highlighted in literature, news article and the JAXA website as important for Japan’s space activities, representing the core of Japan’s space programme (therefore ambitions). The set of data collected includes official documents such as policy briefs and laws, accessed through the policy data bases on the government and related organisations’ websites.

The chosen documents are: the Basic Space Law, the Basic Plan on Space Policy (2013 [2015]), the Law Concerning JAXA (2002), and the Space Industry Vision 2030 (2017). Their purposes and descriptions are available hereunder.

It is important to flag that documents gathered for the analysis are per se authentic and comprehensible (Bryman, 2016, p. 553). As such, they represent the aims of the state and public organization, the reality of the actor (Bryman, 2016, p. 56). That is why I chose this set of documents as they represent Japan's space programme the best.

The Basic Space Law/ Law No.43 of 2008 - BSL (2008)	
Data type	Legislation document
Document accessed	Unofficial English translation retrieved from the JAXA website on 16 December 2021.
Origin	The 169th Diet Session
Purpose	Promotion of space development and use. This law puts forward a BPSP and the settlement of the Strategic Headquarters for National Space Policy (SHNSP).
Analysed data	Full content
Importance	It unified previous policies and documents into one legislation, showing what Japan considers important in space, the very core of the ambitions. It marks the turn towards military (non-aggressive) use of space, enabling Japan to "deploy defensive capabilities in space" (Vijayakumar, 2020).

The Basic Plans on Space Policies – BPSP (2013, 2015, 2020)	
Data type	Policy strategy document
Document possessed	Unofficial English translation retrieved from the JAXA website (2013) on 13 December 2021. Unofficial translation of a summarised version from the website "aerospace" (2015) on 1 November 2021.
Origin	Office of National Space Policy (ONSP) (Nagai, et al., 2015, p.5)

Purpose	Revised version of the 2009 Basic Plan on National Space Policy, up to date documents responding to Japan's current needs and issues in space.
Analysed data	Full content
Importance	This series of documents, updates of each other, is straightforward about what are the issues to fix, what are the future goals to improve the efficiency of the space industry, it targets which aspects need to be fixed/improved/focused on, and has a real action plan.
Comment	In the thesis "BPSP" refers to the 2013 plan, which is prioritised in the analysis due to the document being more complete. I used the 2015 plan to improve the analysis, with for example evolutions.

The Law Concerning Japan Aerospace Exploration Agency/ Law No. 161 of 13th December 2002 – LCJAXA (2002)	
Data type	Legislation document
Document possessed	Unofficial English translation from JAXA's website on 16 March 2022.
Origin	Following on the ministries restructuration, with a certain push from the Ministry of Finance (Berner, 2005, p.14).
Purpose	"Establish the name, the purpose and scope of activities and others of JAXA" (Article 1).
Analysed data	Only key articles as most of the document focuses on functionalities (staff…)
Importance	JAXA is the main executive and practical entity for space in Japan.

The Space Industry Vision 2030 – SIV (2017)	
Data type	Strategy document

Document possessed	Original document retrieved from the Cabinet Office website on 17 March 2022, an A.I. automatic translation tool (Deepl) was used to generate the English translation of the document.
Origin	Cabinet Office
Purpose	Providing goals for the future of the space industry, with a focus on current global trends such as satellites data.
Analysed data	Full document
Importance	As a plan for 2030, it gives out the official discourse for Japan's future ambitions.

All documents except the LCJAXA (only relevant articles) are thematically coded through content analysis, analysed further through discourse analysis, and contextualised with secondary data analysis. In addition to the thematic coding, the documents outlined above contain concrete examples of practical implementations of such ambitions. These examples have been integrated in the analysis, while further data regarding more specific examples were collected through content analysis of the JAXA website, and two official documents on the ISS, found on JAXA's website.

First, JAXA's website was selected and coded for the analysis because it is the main space actor of Japan, and the website presents its main projects and their implementation framework and progress. Furthermore, it also showcases the agency's projects to the public thus being the public face of Japan's space investments/ambitions. For data collecting, I focus on the main page and the main sub-pages: "About JAXA", "Missions", "Global activities", and "Topics in your area" as they represent the main current activities of the agency.

As websites are constantly changing, it is important to capture in time the webpages to suggest a faithful analysis of a specific moment, and to avoid losing data (Rogers, 2015, p.4). Therefore, the Scrible software and screenshots were used to save webpages as they were at the point of data collection. I also took extensive fieldnotes to gather, secure and analysis the content, all on 13 April 2022. I used the official global English language website of JAXA and not its Japanese version. As such, the content presented here reflects Japan's space self-image intended for the global audience.

Then, ISS-related documents are analysed to understand the Japanese presence within the station, project in which Japan is visible to the rest of the world, therefore reinforcing its international prestige and even power. The chosen documents were found on the "About the ISS" section of the JAXA website. The "International Space Station Benefits for Humanity" created by the involved agencies, lists exactly what the ISS is doing in general, including JAXA's missions. In order to get similar information but from a Japanese standpoint, the "Kibo Utilization strategy Agenda" (2020) document from the JEM "Kibo" Utilization Center & Human Spaceflight Technology Directorate (JEMUC&HSTD), became the focus of the analysis as it explains the purposes and future aims of the module. It also outlines the future ambitions for this particular mission, which enriched the data set and the analysis with a perspective on the objectives of Kibo itself.

4.2 Analytical methods

To analyse the gathered policy documents, I focused on qualitative content analysis, discourse analysis[2] but also literature to interpret the ambitions of Japan through the key themes emerging from the policy and law documents. Then, digital content examples from the JAXA website and the two ISS-related documents were incorporated into the analysis, under each theme to individually assess the realisation of each ambition, as well as the space reality gap. The discussion on the findings is also integrated to the analysis thematically.

Qualitative content analysis structures the materials (Schreier, 2012, p.61) by highlighting themes (Bryman, 2016, p.563), which allowed me to develop thematic codes corresponding with the specific space objectives of Japan. Coding was developed to create categories (e.g. international cooperation). As such, those thematic codes allowed to mark various items of data related to the same issue, topic, theme or concept (Dawson, 2020, p.38).

As Bryman (2016, p.586) suggests, I found themes by spotting repetitions of topics inside but also across the data. I used a mix of data-driven (inductive) and concept-driven (deductive) methods (Schreier, 2012, p.84) to cover a big range of codes

[2] Bryman (2016, p.562) suggests qualitative content analysis, semiotics and discourse analysis to analyse documents. Semiotics are omitted from this thesis as they are interpretative, which can appear very arbitrary and might distort the analysis and the results.

possibilities. I designed them using the five documents to identify Japan's aspirations. I did not consider data from the examples in this process, as framing the reality gap is done by assessing if the codes designed from the documents are found in the examples. I listed topics and sub-topics thanks to a close reading of the documents (e.g. civil use) and the literature review (e.g. national security). I also used NVivo to calculate the frequency of words and created a thematic pool of key terms.

From this list I regrouped similar topics, and ended up defining categories, and sub-categories following Schreier's suggestion (2012, p.59-61) to create a "coding frame" (main categories). The final codes are as follows: National Security; Civil Use of Space; Infrastructures and Resources; International and Regional Cooperation; Research and Development (R&D), Human Resources; Commercial Use; Development of Policies and Laws. Each themed code is a broad ambition of Japan related to space. For example "International and Regional Cooperation" refers to the Japanese ambition to work in that field for different reasons and through diverse means, which are exposed and analysed. I printed the BSL and 2013 BPSP and highlighted codes on paper, then coded them and the LCJAXA on NVivo, data from the remaining documents have been integrated to the analysis thematically. The coding units are full articles (laws) or paragraphs to avoid losing the context of each unit.

Each theme frames a realm of ambitions. Inspired by Schreier (2012, p.94), I briefly define each category and sub-category, analyse through content and discourse analysis, and discuss the findings at the same time.

If various types of discourse analysis exists (e.g. visual), it relates to textual content in this thesis, as a way to analyse communication (Hewitt, 2009, p.2) to understand Japan's ambitions in space in documents. The discourse is considered as the actions expected from the text, therefore the expected outcome of Japan's space ambitions. Three key questions kept in mind throughout the analysis are "what is this discourse doing?"; "how is this discourse constructed to make this happen?"; and "what resources are available to perform this activity" (Potter, 2004, p.609). Critical discourse analysis, developed by Fairclough (1995) uses such a method for policy texts (in Cummings et al, 2020, p.99), allows also intertextual analysis (Fairclough, 1995, p.18) between different policy documents. Cummings, de Haan and Seferiadis adapted Fairclough's methodology to policy analysis and suggested steps of analysis that have

been adopted partially in this thesis: selecting a topic and overviewing past discourse, selecting and analysing texts (words, phrases, how the phrases relate to each other, and highlighting themes, then identifying discourses), and "describing how the text was created and how this potentially related to the discourses identified in the analysis of the text and discourses which have been identified" (Cummings et al, 2020, p.103-106).

Combining methods developed in the literature allowed to frame Japan's space ambitions, including the country's space power, through thematic and discursive coding, as well as presenting and categorising the content of policy, law and strategy documents and online website content. Finally, I thematically added the examples to the analysis to pinpoint how the ambitions are realised, and if it differs to what was suggested in the documents.

4.3 Challenges and limitations

The five aforementioned documents are chosen considering that credibility and representativity are critical criteria when it comes to documents according to Bryman (2016, p.553), they proposes a good highlight of the space ambitions, but do not represent completely reality as it is a selection of data. I also did not use certain documents such as the BPSP 2009, I prioritised more recent updates as more reflective of the status quo. That said, the 2020 version of the BPSP is the more representative strategy plan as being the most recent one, but I have not been able to access the document. Moreover, my data collection was conducted until 17 April 2022, data created or available after that date is not considered.

Language is also an issue as I do not have Japanese language proficiency and meanings can be lost in translation. Many official documents are "non-official", meaning not approved by the government, which needs to be considered. However, those translations are found on official websites and therefore were qualitative enough to be shared. The SIV was translated by the automatic translation software Deepl and has not been checked by anyone. Although the translation was very understandable to me, I need to point out that the content I am using was generated by an artificial intelligence, and has not been verified by a Japanese language speaker.

Limitations also arise in the methods. I took into account the issue of websites changing over time (Bryman, 2016, p.299), as explained previously. But it limits the website's messages and objectives to a certain point in time (e.g. 13 April 2022 for JAXA). Coding also might lose the context of the piece of data that has been coded, as it gets isolated (Bryman, 2016, p.583), and involves making subjective choices (Schreier, 2012, p.59). Overlapping themes was the biggest challenge while creating the codes. Therefore, "development of the industry and the expansion of the use of space" was removed as a code and incorporated in the analysis. Moreover, I chose JAXA and the ISS as specific examples which have limited significance (Creswell and Poth, 2017, p.161), which needs to be pointed out.

Finally, the reader has to keep in mind that the research question is answered within its own defined framework, and does not pretend to represent the perfect articulation of the Japanese ambitions in space. Framing the reality gap is a challenge, because it cannot be measured. What is questioned in this thesis is the reason for a gap to exist or not. The analysis concentrates attention on the reflection of the theory in reality, and does not give a measurement of the gap, nor on the efficiency of Japan's strategy.

5. Ethical considerations

I have consulted the ethical guidelines. Not analysing individuals but policies allows me to ensure ethical conduct. I have accessed documents that are publicly available on the government and agencies' websites, therefore I am working with public and non-classified content that is not problematic to use. But they present the political agenda of the authors: specific ambitions such as the reinforcement of capacities for national security in space are the ambitions of the government in place. It will reflect in the findings therefore I should make sure to acknowledge the bias and remain as neutral as possible in presenting them. The translation of documents, especially the SIV, also raises an ethical challenge. I am aware of the potential inaccuracies stemming from my decision to use content generated by a software, which I do not know the exact functioning of to assess the translation's neutrality. Finally, my discussion reflects the ambitions of Japan at a certain point in time considering the changing nature of website but also policy documents such as the BPSPs.

6. Analysis and discussion: the space ambitions of Japan

How has Japan been articulating their space ambitions? The close analysis of the Basic Space Law, two Basic Plans for Space Policy, the Law Concerning JAXA and the Space Industry Vision 2030 but also a focus on Japan in the ISS and the current main JAXA objectives are framing the country's idea of their space objectives as well as their application. National security, international cooperation and the importance of space law were predominant in the literature, while civil and commercial uses in the documents became categories (equivalent of codes). I placed R&D and human resources into an independent category as focusing on such resources can improve the industry, no matter what use of space is made. Finally, many documents, especially the BPSP, contain procedural methods to achieve their goals, such as the establishment of space institutions, and this has been coded as well.

Most codes are interconnected and my analysis flags these relations as they emerge. Initially, "Development of the industry and expansion of the use of space" was an independent category, but it was apparent that all other ambitions implied it. Therefore, through seven remaining categories introduced in the previous section and elaborated upon below, the analysis looks at how each ambition of Japan is expected to improve the industry and expand the use of space, which can be labelled as Japan's overarching ambition.

6.1 National security

The first ambition is national security, either the use of space or the discussion about space matters regarding Japan's national security: peaceful/military use of space discussions, satellites for surveillance, and disaster management in Japan.

Japan's space strategy has transformed significantly over the last two decades due to the increased need of using space for defence purposes to respond to contextual changes (BSL Article 3, 14) such as North Korea's missile launches, or to decrease American dependency. The creation of the documents implies this and they identify these factors as reasons for redirecting Japan's space programme around national security needs (BSL Article 1, BPSP p.3, BPSP 2015, p.3), "National security and disaster management" is one of the three priority areas of the BPSP (p.7), which also insists on the importance to develop this use of space in accordance to the National

Defence Program Guidelines (BPSP, p.36), showing coherence with the general defence strategy of the country. The 2015 BPSP (p.4-5) insists more on national security compared to the previous one, including allocating budget to "serve our national security interests in the mid-term to long-term", which shows a fast development of this ambition through commitment to finance it and reflects how the relevance of this specific ambition for Japan has increased through time following the normalisation debate.

JAXA is also expected to contribute to this use of space as stipulated in the BPSP (p.8), which states that even a R&D-oriented agency is expected to play a role in national security, because they develop science and technology capacities, needed for all uses of space. But it is not a defence agency, nothing straightforwardly security-related comes out on their website. Their purpose is contributing to science, not directly to space security, except for disaster management.

6.1.1 Peaceful use of space

Japan's national security use of space ambition is expanding the military use of space, which reflects the normalisation debate. The space programme has been affected by the politics of the time and the push from the Liberal Democratic Party (LDP) for normalising the country's defence. LDP legislator Takeo Kawamura, for instance, contributed to the implementation of a legal framework resulting in the BSL (Akimoto, 2020). If the peaceful use of space is a pillar of space development and use (SDU) in the BPSP, the BSL and the LCJAXA have officially changed the interpretation of "peaceful" toward "non-aggressive" (BPSP p.34-35), opening multiple possibilities for using space, which is a step forward space security normalisation. Japan and JAXA aim at remaining in a legal framework for "peaceful" use of space, following the Outer Space Treaty, other international agreements, and the Constitution of Japan (BSL Article 2, LCJAXA Article 24). Reminding the Constitution is a strong statement regarding limitations of military activities in space. A possible interpretation is reticence toward such a use of space, even though they have strong ambitions to enhance it, meaning Japan wants to ensure that this development is made according to the legal framework and is not fuelling the constitutional debate, which might affect the pacifist public opinion domestically and abroad. But the interpretation change shows that they are pushing Japan's normalisation at least in the domain of space (Moltz, 2011, p.44) because international treaties prevent militarisation of space anyway. Japan's ambition

is to reach a similar level of defensive use of space than other countries (BPSP, p.8). Japan counts on international cooperation on defence, especially with the US, with a reinforcement of the Alliance regarding military space use in 2014 (BPSP, p.34, 2015 BPSP, p.5). Japan still relies on the US while also attempting at breaking free from dependency, showing their indecision but also the inability to become completely independent, as long as Article 9 restricts the military. However, space is probably a good sector for Japan to gain overall autonomy, if Japan keeps increasing the efficiency of the industry, reducing the needs of foreign technology, for satellites for example.

6.1.2 Satellites and disaster management in Japan

The Great East Japan Earthquake in 2011 created an incentive to create a risk management structure (BPSP, p.3), this devastating event directed Japan's space ambition toward using space to mitigate risks, through satellites. They allow reinforcing national security through observation of Japan and its surroundings, detecting events, observing inaccessible areas such as the damaged nuclear power plants, communicating and gathering information regarding "land deformation" (to spot tsunamis for instance) thanks to remote sensing technology, notably through the Quasi-Zenith Satellite System, "Michibiki". The Japanese strategy advocates to develop the QZSS (BPSP, p.5,7,9,36), it is detailed in the following section on civil use of space.

When it comes to using satellites for defence purposes, responding to Northeast Asia threats, Japan planned (2015 BPSP, p.12) to launch a 3 satellites constellation "X-Band Satellite-Based Defense Communication Network", Kirameki. They indeed launched two, and the third one should be launched in 2022 (Fatton, p.20). It is an example showing that concrete plans in the documents are realised, no reality gap. Indeed, the 2021 space budget allocated 80 billion yen for Information Gathering Satellites, a considerable part of its total (Park 2021). It indicates that Japan has for ambition to place national security as a key priority, as the Ministry of Defense also received the third biggest proportion of the space budget, 55.3 billion yen. It is however not the biggest allocation which straightforwardly displays the aforementioned limits.

Finally, the BPSP (p.8) mentions the development of the Space Situational Awareness (SSA) system to monitor satellites against potential threats such as debris collisions.

This also was realised, 28.8 billion yen is allocated to the SSA. The biggest turn toward defensive use of space is the mobilization of the Self Defence Forces for space activities, with a plan that has been carried out of a 20 people team monitoring SSA (Park, 2021), involving Japan's main defence actor. This is a concrete example that normalisation is happening in the space sector, showing coherence between theory and practice.

Japan therefore planned and is implementing non-aggressive peaceful uses of space, normalising similarly to other countries, showing a strong ambition to use space for national security purposes. Japan is still limited in their military power in space, and even if it has developed, it is not Japan's strongest space power resource. One can also wonder if Japan does not prefer communicating in space science and technology breakthroughs instead of defence and security related advancements, considering both the Japanese population but also many countries in the region vouch for a pacifist Japan. Japan prefers to be seen as a technological soft power, much more attractive. Moreover, many defence-related projects are probably not visible to the public for confidentiality reasons. The limited amount of concrete actions is reflecting how this use of space is not absolute due to aforementioned limitations, there is no tremendous reality gap as Japan is not aiming at becoming a complete military space power.

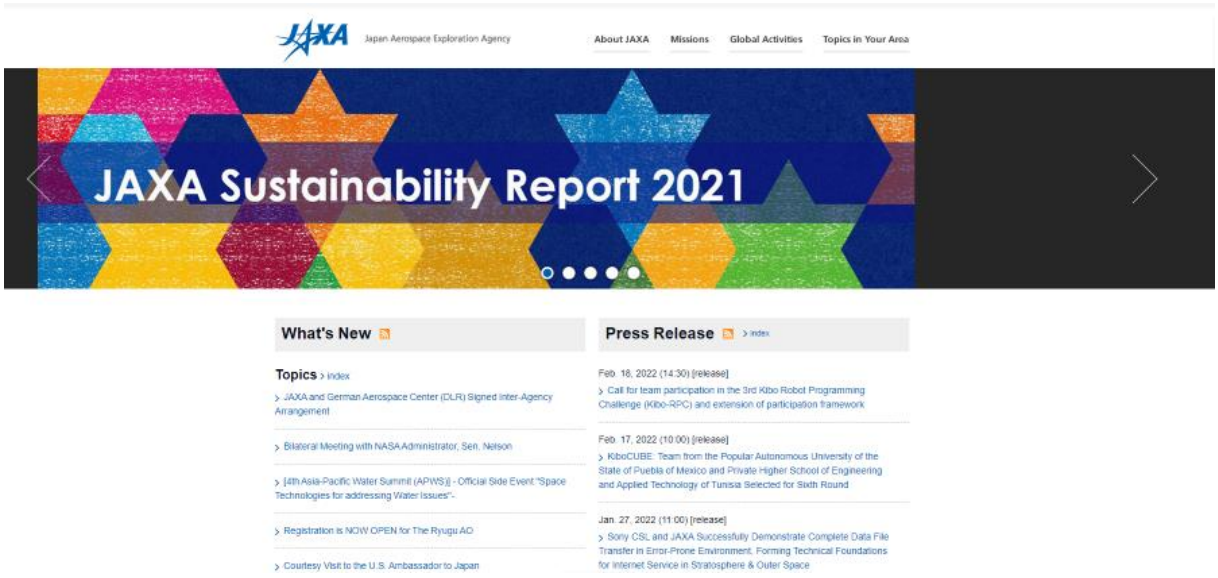
6.2 Civil use of space

Another dimension of Japan's space ambitions relates to the policy focus on the civil use of space, both domestically and globally. One of the core elements is the arena of international cooperation and Japan's domestic projects aimed at improving people's life, including more abstract objectives (e.g. the wellness of mankind), and more practical ones (e.g. using satellites, protection of the environment). For example, SDU should contribute to the improvement of people's lives, to the development of the economy and society in the BSL (Article 3). The expansion of the civil use of space is substantial, as stated by Fatton (2020, p.12) because security use is legally limited, allowing more budget to be allocated.

JAXA's philosophy is framed as follows:

(…) “realising a safe and affluent society using space and the sky. With broad wisdom we will create fruitful results of the leading technological developments and deliver this to human society.” (JAXA Website, 2022).

JAXA is therefore using space science, another field to be enhanced (section 6.5) to contribute to people’s lives. Many banners on the website’s front page (picture 1) display different programmes contributing to society, such as Earth observation on covid, monitoring the effects of lockdowns on electricity, for instance with how cities, or crops are affected by the pandemic through imagery. They also link a rainfall watch real time tracker (JAXA website frontpage, 2022).



Picture 1: the frontpage of JAXA’s website (13 April 2022)

Similarly, Japan’s main purpose in the ISS is to use Kibo, the lab module, for the benefit of humanity, as officially stated in the ISS Program Benefits for Humanity (ISS Program Science Forum, 2018, p.xi). It is perhaps the biggest public display of Japan’s altruistic purpose for mankind. Improving people’s lives through space experimentations has been successful for Japan in practice, mostly in the pharmaceutical industry, like improving drugs to fight breast cancer, or solutions against bone loss (ISSPSF, 2018, p.22,139).

This is the application of what is stated in the documents, the importance of using space to elevate humankind, as breakthroughs and advancing science creates a shared “intellectual heritage”, questions human existence and purposes on Earth and

overall generates new means of improving people's lives. (BSL Article 1, 5; BPSP, p.10-11). This displays a certain altruistic ambition of contributing not only to international space missions and collaborations but to mankind as a whole. This means that Japan wants to have a proactive positive international role with a quite idealistic purpose of using space to improve humanity.

Improving people's life also includes protecting the environment, while carrying out space activities but also using such activities to protect the planet, and collaborating at the international scale on that matter, as seen in the documents. This also involves the issues of space debris: Japan needs to protect its own satellites from collision, and they want to contribute to a legal international framework to monitor the risks and reinforce international cooperation on that matter, even showing an ambition of leadership by creating debris removal technology (SIV and BPSP). "Consideration for the environment" is an objective for Japan (as the sixth pillar of the BPSP) that also reflects a global responsibility, consequently it pictures another space-related field in which Japan's involvement can impact their role by increasing their international relevance. JAXA wrote a sustainability report for 2021 (JAXA website, 2022). This is not an absolute concrete action to save the planet (slight reality gap), but they do consider their impact on the environment.

6.2.1 Satellites and global disaster management

Improving people's lives is possible, for Japan at least, through the use of satellites. Japan wants to improve satellites technologies to become autonomous in the field, which contributes to the country's security and prestige, as stated in the BPSP (p.6-7), therefore enhanced uses of satellites should make Japan powerful enough because they contribute to their own Earth observation (from disaster management to GPS signals), but also provide such services to the Asia-Pacific region, as analysed under regional cooperation (section 6.4). Japan targets many fields: information and telecommunication networks, observation, positioning (for security and disaster management for instance) (BSL Article 13), "cartography, resource survey, agriculture, forestry, fisheries, and disaster monitoring in conjunction with land/ocean observation satellites; car navigation and geographical survey with GSP" (BPSP, p.8).

Japan are "one of the heaviest users of GPS", and they need to reinforce the capacities

with the QZSS (BPSP, p.6), which was expected to, at its launch in 2018, starts providing service for disaster and crisis management, and more technical services (SIV, p.20). The 2015 BPSP (p.12) says the QZSS will be 7 satellites, and the plan seems to be going in that direction with currently 4 satellites (one had to be replaced with a better life expectancy, meaning that Japan is adapting and improving missions that are already in place), and three more launched in 2023 and 2024 (QZSS Website, 2022). The QZSS sends reports about earthquakes and tsunamis happening in the Northwest Pacific Ocean to all interested countries including Southeast Asia and Oceania (QZSS Website, 2022). Japan therefore has a certain leadership providing such important information, protecting populations in the Asia-Pacific, but also creating a certain dependence of these countries toward Japan. This actually is an application of the policy, as the BPSP (p.12,19) requests the creation of a "Disaster Management Network for the ASEAN region" for example, which will happen: currently, one of the two cameras equipped on Kibo, both with Earth observation purposes, provides data to the Sentinel Asia Programme of the Asia-Pacific Forum on disaster management (ISSPSF, 2018, p.189).

Through space diplomacy, Japan is providing satellite services to countries who do not have a choice because they do not possess such technology. This is Japan's strategy to become a regional leader, an important ambition. The tension between theory and practice is minimal, the reality gap only stems from to what extent Japan is a regional leader compared to expectations, they seem content with the situation but are striving for more power.

6.3 Infrastructures and resources

Infrastructures and resources is a more practical framing narrative. It relates to the means to develop the industry, including budget, which are necessary for the development of the industry and the use of space. Therefore the implementation of Japan's ambitions depends on infrastructures and resources, and a high budget in a specific field displays its importance.

The BSL (Article 1, 24) implements the creation of the Strategic Headquarters for Space Development, charged with the creation of the Basic Space Plan, whose purpose is the promotion of SDU measures. Moreover, organisational structures are

defined in the BPSP (p.4), including the Cabinet Office now responsible for coordinating ministries concerned with space. JAXA is also defined “as the core organisation that provides technical support for the entire governmental development and utilisation of space projects” (BPSP, p.4). JAXA is asked to develop its Mid-Term Goals based on the BPSP (p.46). The policy documents aim at structuring the broad space institutional framework for Japan to increase efficiency, having organs to work on space development, and sharing the responsibilities (and therefore the costs) between domestic actors. The implementation happened, where theory and reality might clash lies in the quality of the work of each space actor. As this would require extensive research, I limited the analysis of this section to budget allocation.

The 2013 BPSP (p.3) considers the first BPSP and concludes that the previous budget of 2.5 trillion yen for five years coming from private and public sources was not achievable. The SIV (p.12) and the 2015 BPSP (p.13) suggest as a goal 5 trillion yens from the public and the private sector over a period of 10 years.

The space budget of Japan overall increased: 449.6 billion yen for 2021, allocated to different goals (Park, 2021). A total of 212.4 billion yen is allocated to the Ministry of Education, Culture, Sports, Science and Technology, for JAXA. This includes 51.4 billion yen for the Artemis programme: improving R&D allocated to international cooperation projects is a priority, Japan needs its secured spots in such missions to embrace a role adapted to their resources, and showcase their overall technological and scientific power. 5 billion are going to increase the country’s competitiveness with 300 allocated to microsatellites (cheap to produce), developed in section 6.6, which also increases Japan’s power. Finally, the budget for defence has been mentioned in the national security section.

Japan’s space power definitely increased compared to the early 2000s thanks to the efficient restructuration of the space activities, and increased the budget carefully allocated to key missions that shows that Japan is prioritising their ambitions.

6.4 International and regional cooperation

Cooperation with space actors is another strategy for Japan, it is indispensable for peace, security, science and research. I also focus on the ISS as a general strategy to potentially increase Japan’s international influence.

Promoting international cooperation, from following international frameworks to joining global missions and institutions is very present in the documents, it is displayed as a key ambition (BSL Article 2, 6; BPSP p.11). The policies advocates for reinforcing cooperation between countries and between space agencies (SIV, p.57; BPSP, p.22). The BPSP (p.11) explicitly explains how it contributes to "secure Japan's presence in the international scene", with their "highly regarded" contributions. Japan's self-reflection about their international presence is positive as affirmative sentences are used, meaning that their ambition of having a great role is already fulfilled but is encouraged to be enhanced through space diplomacy. The country sounds content about its situation already in 2013, but is aiming at reinforcing the fields they are already excelling at (e.g. technology), showing that they are confident about their level of power and either want to solidify their position, or increase it. In what follows I detail the areas Japan is focusing on for that purpose.

6.4.1 Science, research and security

Cooperation in science and research is also part of Japan's strategy. Many missions such as space exploration or wide use of satellites require cooperation de facto due to their large scale (BPSP, p.7, 16). Japan understood the particularities of the global space activities, such as the ambition to promote "standardization for methods of design, quality, and evaluation of space technologies" (BPSP, p.34), which display again this altruistic ambition of contributing to the improvement of global space activities. The ISS is an example of such cooperation, it is the tool for Japan's ambition of conducting human space activities. The policy documents wants the Japanese activities in the ISS to promote the industry, with in 2013 a budget of 40 billion per year, mostly allocated to the transfer cargo vehicle (BPSP, p.26, 27). Japan having its own lab module (Kibo) not only gives the country an important role in the ISS but also grants them privileges: Japan has the right to use 51% of the Kibo lab and 12% of its resources. The ambitions of Japan with Kibo are improving people's lives through investment in R&D, which should, as literally stated in the BPSP (p.10), enhance Japan's reputation.

Interestingly, the 2015 BPSP (18) questions the relevance of constant investments in Kibo's activities beyond 2021 considering its general costs, trends in other countries, its potential lack of outcome, and the effective effects on diplomacy. Kibo therefore

reflects Japan's main ambitions. Getting inspired by other countries' strategy, which comes up often in the policies, creates a feeling of insecurity from Japan's point of view, meaning that the confidence of their capacities is not absolute. This shows the limits of Japan's power, as medium space powers are defined. In the end, Japan resumed its ISS activities, meaning that the cost-benefits assessment was positive. Kibo overall is a tool to enhance Japan's space power. The Kibo Utilization Strategy (JEMUC&HSTD, 2020) states however that Kibo's activities need to benefit Japan, especially the economy. One can consider Japan's work on developing technologies to tackle the bone loss issue is due to its steady transformation into an aged society, it might be a coincidence because the effects of low gravity on astronauts allow research on such a topic.

Space diplomacy is also used as a tool for national and international peace and security. Mostly through actively taking part in international space activities and debates (for instance on space laws), and following treaties (BPSP, p.33, BSL Articles 1, 2, 3, 14). Moreover, bilateral strategies with each space partner are more or less related to security, such as with the US, which Alliance is expected to be strengthened as the 2015 BPSP (p.8, 12) requests, to improve the US deterrence in the region which overall increases Japan's safety. Despite the wish of gaining autonomy, the Alliance is still inherent to Japan's strategy as long as Japan cannot militarise. This space partnership also concerns civil uses especially cooperation on satellites. Civil use cooperation is more central with other partners such as the EU, Australia or India, the latter having also a focus on security because of a common fear towards China (2015 BPSP, p.12). Japan is part of the global trends related to security (mostly fear of China and North Korea) and can easily find partners with similar worries and build strong partnerships, which seems to be their strategy to reinforce their international role. While Japan is working on gaining technological autonomy, collaborating for security and civil use allows Japan to "make friends" and reinforces their presence at the same time as benefiting its national interests (security and improving lives) thanks to shared costs and responsibilities.

6.4.2 Japan's role as a medium power

Japan is articulating their ambition as a medium space power by being a regional leader and helping emerging space powers to enhance their industry in order to

contribute to the global enhancement of space activities and industries. Japan's specific strategy on that matter is analysing the needs of countries, and providing a relevant "package" (BPSP, p.12), for instance by providing satellite data to countries in the Asia-Pacific which do not own such technology. The official stance on this is "building a framework for mutually beneficial cooperation" (BPSP, p.11). One can wonder if that is just opportunism: the balance of power is favourable for Japan as it makes those countries dependent. However, they get access to data for their national interest, and Japan reinforces their relationship with the country and their overall regional leadership. Japan also provides direct support to those countries by training students from emerging countries to improve their own space human resources (BPSP, p.41,42). They have programmes in practice for this purpose: the "Asian Try ZERO-G 2018" programme selected students from many Asian countries to submit experiments ideas for astronaut Norishige Kanai to carry out in the station (ISSPSF, 2018, p.199-200). Despite having a general domestic purpose, Japan offers their ISS services to many countries especially from Asia: launching a Singaporean satellite from the station for instance (ISSPSF, 2018, p.22). Japan recognize their technological superiority but is altruistically willing to share information, perhaps to strengthen their regional leadership and attractiveness.

What Japan is providing is relative to the country's power. Japan does not provide technology related to launching manned crews, this limits Japan as a medium power. However, their multiple initiatives to contribute and support others make the country's ambition of "being important" very clear. Japan successfully accomplished its ambition to have a medium role in practice.

6.5 R&D and human resources

R&D and human resources, including education, academic research and public relations are resources that Japan aims at improving and creating to enhance SDU, mostly through JAXA and universities (SIV, p.34, BPSP, p.7). It is a strategy for Japan to advance other ambitions. High technology, for example, allows Japan to take part in international space missions. Kibo's purposes are, among others, advancing space science through academic research, and contributing to national research promoted by the government (JEMUC&HSTD, 2020, p.8), representing this ambition in practice.

6.5.1 Science and technology

Even though the policy documents aimed at expanding the scopes of the industry with specific focuses (e.g. security), investing in space science and technology is important for Japan's SDU, as stipulated in the documents (BSL Article 1, 5; BPSP, p.10, 2015 BPSP, p.3). The reason is that Japan shines internationally thanks to the high quality and innovative technology they have been developing. Therefore the "space scene" is a great arena in which Japan displays their skills and secures a key space actor role. For instance, the priority area flagged in the BPSP (p.7) is "progress in frontier areas including space science". which is also a purpose of JAXA, and it aims at enhancing national security, the industry's efficiency and competitiveness, people's lives, Japan's space autonomy (BPSP, p.6, LCJAXA Article 18). This reflects indeed the ambitions of Japan as categorised in this thesis, confirming the coding choice was right. For instance, Japan describes space science as aiming "to accumulate intellectual properties and to achieve intellectual results for all people" (BPSP, p.24). The current missions of JAXA on the website page "About our projects" are mostly related to science and technology: "utilising space through satellites", "space transportation system", which indeed depicts the focus of the agency on science and technology advancements.

Japan aims at maintaining success regarding space science (BPSP, p.25), meaning the cost-benefit assessment is also important, as it was with the ISS. This shows that Japan is cautious about allocating resources to sectors that are positively benefiting the industry and/or society. Perhaps it displays a lack of confidence, that Japan's current role and power rely on a fragile current success. It does not make Japan a lesser power, as any actor would also limit costs and risks on a project, but coming up often in the documents shows a certain discomfort. Japan's missions are successful so far, as the ISS experiments for breast cancer treatment for example (ISSPSF, 2018, p.22&61), which shows that Japan cleverly defined their priorities for positive benefit-cost results to elevate their industry.

Japan's strategy towards improvement of science and technology is maintenance and reliability of such capacities (BSL Article 17). The government identified "key policy targets", including for instance private and public sector cooperation, improving launching facilities, investment in cheaper and more competitive satellites… (BPSP,

BSL Article 16). The documents pinpoint the right problems and design strategies to tackle them. For instance, as only 4% of all global launches where Japanese in 2013, the BPSP therefore suggests seeking for a constant amount of launch opportunities per year, to adapt their rockets to the changing sizes of satellites[3], priority to Japanese rockets, R&D, or the renovation of the Tanegashima Space Center (BPSP, p.22,23). More recently, the SIV (p.42, 43) adds the more competitive H3 rocket in development, and the promotion of development of domestic launch centres (p.48). This has been respected as 18.9 billion yens are allocated to its development in 2021 (Park, 2021). They also renovated the launch site, as planned, to welcome the new rocket (Sarae, 2019). One cannot forget Japan's history of launch failures, it is even more important for the country to showcase its newly-acquired success rate to have an attractive launching market.

The absence of both strategy and plans regarding domestic human space flight shows that Japan does not have it as an ambition, and therefore is not expecting to become a great space power. However, this questions Paikowsky's definition. China, Russia and private companies offer this service, meaning that except for independence purposes, it might not be worth investing in such capacities. However, relying on others can be considered as a sign of weakness. Japan's efforts seem to be directed towards other elements to show their space strength (e.g. diplomacy, privatisation) as Klein (2019) defined medium space power's strategies. Therefore Japan's space ambition is being a medium space power, and among the greatest ones.

6.5.2 Human resources, public relations and academia

Once again, Japan outlined the problems of its space activities in its strategy and aims at fixing them. Japan has the ambitions of improving public support and its space staff (BPSP, p.41). Indeed, getting a space job is complicated, workers with needed skills usually do not join the space industry, and universities have very little space-oriented programmes (SIV, p.65-67). The BPSP (p.9) mentions that the number of employees went from 10 000 in the late 1990s to 7000 (in 2013).

Increasing human resources again is needed to strengthen the industry (BPSP, p.41). For that matter, the general public needs to get interested in and understand space,

[3] Remote sensing satellites are becoming smaller and the others larger (BPSP, p.22-23).

they need stronger ties between the industry and the education sector, especially universities but also elementary and secondary schools (BLS Article 10, 21, 22). It would allow Japan to increase space interest and train the next generation of space workers (BPSP, p.41, 2015 BPSP, p.21). This ambition is tackled practically: business awards already exist in that matter, whose objectives are encouraging people and increasing networking opportunities to improve personnel mobility (SIV, p.68). Finally, JAXA has for objective to develop space academia in general (LCJAXA Article 4, 18).

JAXA and Kibo are once again demonstrating that Japan is applying in practice their ambitions and strategies, as an "academic/scientific research platform" (JEMUC&HSTD, 2020, p.5). A programme created to improve space interest among students involved seeds stored for nine months in the ISS distributed to schools from kindergartens to high schools. The aim is for students to learn "real scientific investigation" by spotting mutant plans among normal ones (ISSPSF, 2018, p.195). If measuring increased interests is impossible, Japan is still accomplishing what the strategy requires. Not only this programme attempts at indirectly solving public perception and human resources issues, but it also follows the purpose of the ISS to be used efficiently (hopefully) to improve Japan's space activities. Japan spots issues, designs strategies to solve them, and implements solutions. Public relations to improve the attractiveness and support in the space sector is focused on students and science experts, there is not much explicitly on targeting the broader population. But this is done indirectly by having a strong and successful industry, because the former lack of public support was partly due to previous failures (Berner, 2005, p.30), and as explained, Japan is actively allocating resources to secure future launches, notably with the H3 rocket, and showcases their know-how power and reliance.

6.6 Commercial use of space

Increasing the use of space for commercial purposes is another ambition of Japan, especially to increase the industry's competitiveness. As space-advanced countries enhance competitiveness by relying on private actors, Japan wants to catch up (BPSP, p.5,9), and not left behind. They are ambitious enough to get inspiration from great space powers, reaching a high level of space power. The use of external actors to achieve national objectives is interesting to note, because the space industry that Japan aims at enhancing is both a private and public sector, in the end Japan's

international image and role is related to the whole industry. Moreover, it is a medium power strategy to rely on private actors (Klein, 2019) to compensate for what they are missing. But the Japanese government cannot control the private sector's performances, meaning that there is a certain tension between ambitions in theory and in practice.

Japan is again pinpointing an issue to fix: the lack of competitiveness of their space industry. They highlighted reasons: lack of demand from the private sector, the industry mostly responding to the government's need (BPSP, p.3,5,9). Spacecraft sales are 90% based on governmental demands, while it is 50% in Europe (SIV, p.34, BPSP, p.30). Japan needs to catch the demand by understanding customer's needs, (e.g. satellites), developing and enhancing the responding services (e.g. better satellites and launchers), this would make those services attractive therefore competitive, beneficial for Japan's economic growth and therefore power.

For that purpose, the policy documents suggest that they need to stand out in the market (SIV, p.11), privatise R&D results (BSL Article 4), coordinate with private business actors (BSL Article 10)… The SIV and the BPSP state many subdomains of domestic and foreign demand which, if technology is advanced and competitive enough, would expand the industry. For instance, by directly encouraging business to invest in space technologies, by making the industry attractive, or through initiatives such as the Space New Economy Creation Network which would support them (SIV, p.60-63). The "Task Force on the Overseas Deployment for Space Systems[4]" is established by the 2015 BPSP (p.23) to structure private-public collaboration, which main purpose was the overall expansion of Japan's presence (therefore power) in the international commercial market.

The key sector is satellite and data because they are useful for private companies and governments. Small satellites, for example, are cheaper to produce in bigger quantities, therefore are easily competitive (SIV, p.28). Japan is using their robotics in the ISS to mount, transfer and launch small satellites, including the American "CubeSat", another fruitful partnership matching Japan's needs and ambitions. The satellite industry has attracted actors like Turkey or Vietnam, but the sector is still not

[4] Provisional name

competitive enough. Launching services (including for countries) is also a sector of interest for Japan to enhance its industry but also international role, but it needs to be improved with the implementation of the H3 rocket for instance.

JAXA, as an R&D-focused agency, is expected to "provide assistance and advice concerning the operations set forth in items (iii) and (iv)[5] in response to requests from private enterprises" (LCJAXA Article 18). This was a late amendment to the law, displaying that commercial use of space is a much more recent ambition, perhaps as a more recent trend, as it is at the international scale. Indeed, the agency's website has sections to inform industries of their services. Moreover, Japan is hoping that future results within Kibo could contribute to the enhancement of the industry's competitiveness (BPSP, p.27), it indeed became a "commercial activity platform" as stated in its current strategy (JEMUC&HSTD, 2020, p.5). So far, the breast cancer drug research (the JAXA Protein Crystal Growth programme) has been successful on that matter, exemplifying the absence of a reality gap. It is a partnership with a private company called PeptiDream Inc. The lab provides a 4°C environment which allows to speed up the process of crystallisation of protein for the drug, which accelerates its fabrication process. This considerably reduces research costs and makes it more competitive. (ISSPSF, 2018, p.22&61).

This is a perfect summary of the ambitions of Japan, investment in R&D and in international projects (which reduces costs), which are attractive and qualitative enough to attract the private sector, and is for the benefit of mankind. The 2021 space budget allocated 5 billion yen to increase technological competitiveness of the country (e.g. 300 million on technologies related to microsatellites). It is not the most consequent budget, therefore not the biggest priority. However, as competitiveness is about counting on the private sector, and making profits, government money is not absolutely needed.

The greatest ambition behind a competitive space industry is to enhance competitiveness of other industries as well (BSL Article 16). In this case, it is a use of space (commercial) that is hoped to be expanded to the benefit of Japan as a whole,

[5] About satellites (development, launches etc.)

similarly to the civil use. This ambitious idea could increase Japan's economic and technological power, if many industries are expanding. Moreover, increasing competitiveness would bring among other actors partner countries to use Japan's services, increasing Japan's international role and relevance.

6.7 Development of policies and laws.

Developing policies and legal frameworks is important for Japan to adapt to the rapid contextual changes regarding space.

On one hand, Japan can only aspire to improve SDU through constant adaptation of their strategy, including laws and policies. The constant updates of BPSPs, defining relevant priorities, is an example. Even JAXA supports this, they offer support for a space law related Moot Court (competition) for instance (JAXA Website, 2022).

On the other hand, Japan has the ambition to actively take part in debates and formulations of international legal frameworks, a field with many challenges, and works on making sure existing ones are respected. For instance, "Japan will proactively pursue partnerships with other nations on realising and reinforcing the rule of law in outer space" (2015 BPSP, p.11). Japan supported the International Code of Conduct for the Outer Space Activities, suggested by the EU concerning space debris and satellites attacks (BPSP, p.12, 2015 BPSP p.11, 2015 BPSP, p.11,22), and encourage other countries to do the same (BPSP, p.34). Japan's aim at acquiring technology for removing space debris (through venture companies) is its own initiative (SIV, p.40-41), finally emancipating themselves and finding a space field in which they can be a leader and a specialised space power.

Proactively taking part in international law and policy making is a very straightforward means to contribute to the international space world, reinforcing Japan's role, and defining the country as an issue-concerned and reliable space power (no reality gap). Japan wants "to play the greatest possible role in the creation of rules by the international community." (2015 BPSP, p.22). Interestingly, Japan is the fourth country with a law legally protecting private companies wishing to exploit space resources (Katori & Ogawa, 2021). It shows the support for privatisation of space activities. Despite supporting the development of space legal frameworks, Japan made their own

national legislation to compensate for their absence, creating a reality gap. It is perhaps to show leadership in a recent, almost futuristic issue in space. It also orientates this debate (space resources belonging to humanity or not) according to Japan's interests.

This ambition shows once again Japan's will to have a strong role on the international scene by being present in global debates. They understand issues, which means they possess capacities to understand complex situations because they are involved, but also capacities to solve those issues (e.g space debris removal) or to take matters into their own hands (space resources). No matter what space power level Japan reached, they are powerful enough in many areas, or at least they want to be pictured as such.

6.8 Final discussion

Enhancing security-related, civil and commercial uses of space, fostering international cooperation, and overall developing technologies, science, and international laws are ambitions all related to Japan's overarching space ambition: the development of the space industry and the expansion of the utilisation of space (SDU), shortened as development of space activities. This was already an objective of NASDA (Berner, 2020), at the start of the space programme. The BPSPs are inherently plans for the promotion of SDU, and it is a goal of JAXA as well (LCJAXA Article 4).

Japan hopes that developing their space industry would create "spin-off effects" on the other industries and therefore positive economic effects (BPSP, p.9). Japan's ambitions might be enhancing the space sector to increase the economic but also attractive (soft) power as well. Improving the efficiency of all aspects of the industry, would allow Japan to be more autonomous and gain a relevant role on the international space scene. The need for efficiency is visible in Japan's strategy: costs-benefits assessments, redefinitions of priorities areas, better budget allocation, restructuration of the organisation in the 2000s. For example, the BPSP (p.3) states not "deeming every project as essential, in order to achieve maximum effectiveness under limited resources" and lists methods, such as elimination of redundancy or better cooperation between domestic space actors. A long term vision is also suggested as the budget used to be yearly allocated (2015 BPSP, p.6,7), which is done through the Space Industry Vision 2030.

This thesis does not assess the efficiency of the space strategy but how the ambitions are articulated, and therefore I conclude that Japan intends to make their industry more efficient, and is indeed implementing measures accordingly.

Developing and expanding the industry secure a certain autonomy of Japan in the industry, the BPSP (p.6) considers that autonomy is the "core concept of Japan's space policy", needed for national security and socioeconomic benefits. In 2017, 40% of satellite components and 80% of electronic components for satellites came from overseas. As seen previously, Japan needs to become more competitive, for instance in manufacturing those components (SIV, p.34). One again, investment in R&D and the role of the private sector are key (BPSP, p.7).

A more efficient and autonomous Japan would increase their space power and international presence. It has been shown throughout the analysis as a serious ambition for Japan by the constant comparison with the achievements of other countries. They want to catch up, or at least secure a solid position on the international space scene, to be relevant. Explicit examples are numerous, the 2015 BPSP states:

"Japan, as well, must position its space development and utilization capabilities as a crucial tool for strategic diplomacy, contribute to the resolution of global issues using its strengths in space technology, and move to strengthen its diplomatic presence." (2015 BPSP, p.6).

Comparing themselves with great space powers like the US or China makes Japan very ambitious about the way they picture how powerful they can be, because they pretend achieving a power level rivalling with them. Japan is one of the very few countries with "a full-set space industry", from the development to the launch of assets (SIV, p.7). Considering the analysis, Japan's ambitions are pretty much drawn on existing elements (issues, successes, following other countries' trends). Japan is increasingly leaving its role as a follower to become a leader in specific areas and for emerging countries. The Hayabusa-2 sampling return mission placed Japan as a leader in the field, and the same goes with their aim to create structures to clean Earth orbits from space debris. Japan's space leadership is still timid and niche, but is also fields of new space (e.g. space resources), which are potential future profitable commercialisation of space activities, not extensively explored yet. If we stick to the

definition of great space power, a state capable of autonomously send human crews in space, which is not in Japan's programme, Japan remains a medium power, but a higher tier medium power, a specialised great medium power perhaps. Japan's role relates to how "big" its reputation is in space, both practically (resources, capacities) and attractively, which is in the end a form of soft power, with space diplomacy as a tool. If Japan is not achieving total attractiveness due to its industry still not being competitive enough, they have the ambition to.

At last, the implementation reality gap is small. First, the documents themselves are consequences of each other: the BPSPs are the implementation of the BSL Article 24. The analysis of the concrete actions compared to the policy documents is more interesting. The JAXA website and the ISS missions have been analysed firstly separately to be incorporated in the analysis, it was striking how the codes (ambitions) where perfectly fitting in these two examples. Many other cases are also confirming that Japan is implementing means to achieve their ambitions, such as the SDF team to monitor satellites for national security-related use of space. Many projects were already ongoing while the documents were released, such as the ISS. It probably facilitates policy making, considering they are formulated on a pre-existing basis (e.g. what to do next with Kibo, but Kibo exists already).

In any case, there are concrete examples of the application on the field of all the Japanese ambitions represented in the policy documents, therefore I conclude that the ambitions in practice are the accurate reflection of the ambitions in theory, there is little implementation gap. Japanese ambitions in space are coherent because concrete actions reflect the evolution of the programme (increased focus on space defence and security), and the programme itself. Policies and laws are formulated with great understanding of the domestic and global space context, and the ambitions through the space programme are designed accordingly to be reached through means they possessed or have the capacity to possess, it is realistic. The theory/practice difference lies in the effectiveness of such ambitions, if Japan is actually achieving their goals, but the answer is not the topic of the thesis.

7 Conclusion

Constrained by the Constitution and the Alliance with the US in the post-war period, Japan gradually gained almost full autonomy and developed their space industry. Civil use of space and international cooperation were first at the core of the still uncertain Japanese space programme. Contextual changes including growing security threats, the constitutional debate and a wish to enhance the country's international relevance made space security quickly become one of the main ambitions of the country. The Japanese space story is evolving towards space normalisation (Pekkanen & Kellander-Umezu, 2020, p.34; Moltz, 2011, p.44).

How is Japan articulating their space ambitions? The literature on the topic and the findings of the thesis tally on the aspect that Japan is strengthening its overall space power, through a mix of content and discourse analysis to interpret the meanings of the Japanese space programme. The Basic Space Law and the Basic Plans on Space Policy are documents which marked a serious turn in Japan's approach towards a serious space strategy, and more importantly have a new focus on security. The law concerning JAXA allowed the understanding of the purpose of one of the main space actors. Finally, the Space Industry Vision 2030 provides detailed planning for Japan's future. The stance of this thesis is that Japan wants to increase their international relevance and overall space power, including their attractiveness.

The formulated codes and their subcategories turned out to be well-fitting for the ambitions of Japan, both theoretically and practically. It shows that the ambitions are realistic because they are articulated coherently as each ambition in theory is implemented in some way. The main ambition of Japan is the development of the industry and expansion of the utilisation of space. The country needs to improve each component of the space programme, by making them more efficient, which would increase Japan's space resources and therefore effective power. This would allow a bigger autonomy for Japan and therefore a bigger role for the country.

The ambitions analysed and discussed in this thesis are as follows. Japan wants and uses relevant infrastructures and allocates more budget to improve the industry. They are actively accumulating resources to enhance their space powerfulness. Technology and science must be improved, high technology level is the key for an efficient industry

and to achieve the other goals. Japan also counts on ameliorating space staff and public perception to increase its human resources, therefore the efficiency.

Japan also targets each use of space. An increased commercial use of space allows improving R&D to have efficient but not expensive capacities. Attractive technologies would improve the industry's competitiveness, therefore Japan and domestic private companies can be a big service provider, enhancing the industry, Japan's power and role as a whole. The civil use of space is also an ambition because it has a positive impact on society through risk mitigation, or useful data like GPS. Japan aims at using space to benefit mankind, revealing a need to make a significant contribution and be an important space actor for humanity. At last, Japan wants and is expanding the use of space for national security purposes to emancipate themselves from American reliance, with the use of satellites. They even started involving the SDF for monitoring objects in orbits, effective application of the change of interpretation of "peaceful use" from non-military to non-aggressive.

Furthermore, international cooperation is indispensable for Japan to participate in the international space arena, to maintain and deepen ties with partner countries (US, Europe, India…) and therefore to remain relevant and important. Moreover, Japan is working on being a leader for emerging countries and a regional space power in the Asia-Pacific, through different programmes helping those countries. Japan is using the opportunity that most countries do not have space capacities (especially launching), or access to the ISS to offer their services to other nations. They consider that it is helping them to enhance their own space industries (they do provide educational training and opportunities to Asian countries), while being beneficial for Japan directly (economic benefits of launching a foreign satellite for instance). Japan is also present in participating in space international law and policy discussions, showing their competence in understanding current problems and their willingness to make, again, a contribution, to be relevant.

To summarise Japan's ambitions, improving R&D and human resources allows Japan to become more competitive and attractive. This would lead to the expansion of use of space for security, civil and commercial purposes, expanding Japan's space industry. This would give Japan the practical capacities and knowledge to set up their own missions, participate in international projects and discussions, and consequently

reinforcing Japan's international presence and therefore power. There is also no big implementation gap between theory and practice, each ambition is found in the examples of applications, meaning that Japan articulates their ambitions in a coherent way. Through this thesis, I position Japan on the international space arena, but also on the international scene as a whole, as Japan's space power is part of the country's overall power (hard and soft through resources but also attractiveness). Analysing the ambitions through the discussion and analysis allows understanding Japan's domestic and international behaviours in the field of space, including anticipating Japan's future behaviours. It also explains why the space sector is important for the country: satellites for security and everyday life data, or improvement of the industry generating economic benefits for instance.

After understanding how Japan is framing and realising their space ambition, a follow-up question is the efficiency of the Japanese strategy. Is Japan succeeding at achieving their goals? Japan is surely on the right track to become a "specialised great medium power", taking part in the biggest international missions like the ISS or Artemis, becoming a leader in some fields such as sampling return missions, and possessing among the highest quality space technologies and capacities. Japan has yet to demonstrate how powerful they have become and if they are meeting the expectations of their space ambitions.

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