

Interview with Yasutoshi Hyakusoku, Co-founder of Start-up “Tenchijin” & Chief R&D officer, Japan Aerospace Exploration Agency (JAXA)

The Usages of Data from Space

By *Japan SPOTLIGHT*

In Japan today, start-up companies are very popular among young people. Graduates from top universities are keener on entrepreneurship than joining large organizations that embody traditional Japanese practices like lifetime employment and seniority systems. They are looking for the seeds of start-up ventures and if they can find them they will try to launch a start-up of their own. Space is one of the domains where young people find many potential seeds and opportunities for a start-up business.

In this interview, we would like to introduce an engineer who has been working on weather satellites since 2004 for JAXA, a Japanese public agency supporting space development. Yasutoshi Hyakusoku is one such innovative person in Japan, who founded a venture called “Tenchijin” in 2019.

(Online interview on March 6, 2023)

Meaning of Tenchijin

JS: Could you tell us about your company’s brief history and why you named your company Tenchijin?

Hyakusoku: I have been working on development of artificial satellites in JAXA. They include a variety of satellites including telecommunication satellites, broadcasting satellites and positioning satellites. I have been engaged in the development of Earth observation satellites. In Japan, the weather observation satellite *Himawari* (Sunflower) is well known. There are other Earth observation satellites such as those observing the surface of the ground or soil and the temperature of land and sea. As I have been working on production of these satellites, I feel as if they were my children and wish they can be of some help for our society. The data collected by these Earth observation satellites have been mainly used by scientists working on countermeasures to global warming but not so much used for business. I found this a good opportunity to promote this data for business use and so started up Tenchijin. This start-up is what we call “product out”. We started a company by thinking about the utility of artificial satellites’ collected data. The name of the company derives from the words *Ten* (sky) and *Chi* (Earth), while *Jin* (person) has two meanings. The first meaning of *Jin* is human know-how, to be utilized for creating data for business, and the second refers to the fact that we are using a satellite in the sky to obtain data about Earth for the interest of human beings, namely our work is for the



Yasutoshi Hyakusoku

benefit of mankind. This is the origin of our company’s name.

JS: I think there must be a variety of information about the natural world. Could you tell us what information would be useful and how useful it would be?

Hyakusoku: There are lots of usages for such information. For example, as the first step in the assessment of land, there is a need for research on good places to grow agricultural products. There is another need for research on more profitable products to replace existing ones that have declined in quality due to the impact of global warming. For renewable energy, data are used to examine

where to set up a wind power station or solar panels. In the case of solar panels, we have used algorithms so far for establishing places with ample sunshine or south-facing slopes. In our land assessments we have added other information such as places with high power-generation efficiency or where malfunctions of power generation equipment would rarely occur.

We also conduct land assessments for infrastructure, to investigate the risk of water leakage in pipes or water being frozen in the pipe. As a result of the land assessment, we found where the high-risk points are and where the low-risk points are around the wide pipe coverage across the area. We consider the risk assessment and risk point indication crucial as water leakages potentially lead to malfunctions of pipes.

JS: Do you have users of your service all over the world?

Hyakusoku: Yes. As we have access to global data, we have users and customers all over the world. For example, on agriculture, we conducted research through the United Nations Development Program on Africa by using satellite data. In Europe, we have private corporate clients and run land quality assessments for them regarding what products they aim to grow there.

JS: Hereafter, I think it is not only Europe and the United States, but also India or the rest of Asia could be a potential market. What do you think?

Hyakusoku: Yes, I agree there would be huge potential in the Southeast Asia region. With the introduction of various data into that region, it would be straightforward to start business there.

Founding the Company

JS: How did you promote capital funding in starting up your company?

Hyakusoku: We founded our company in May 2019 and it was a business contest we participated in that encouraged us to establish it. In this contest in 2018, we won the 2-million-yen Special Jury Award and two awards from sponsors of half a million yen each. So we got 3 million yen in funds to start. This was a great help as initial funds for founding the company and for initial working capital.

At the start of our company, we promoted business by applying for public projects on space-related data utilization. For example, the “Demonstration Project for Advanced Space Utilization Models”, promoted by the secretariat of the Space Development Strategy Headquarters of the Cabinet Office since 2017, supports business operations on Proof of Concept (PoC) by using satellite data. Our company got official permission to join this project in 2019. We have been working on this one-year public contract on PoC, and additionally we asked for support from other private business clients simultaneously.

JS: As your business is to utilize big data on space, I assume you need a large budget?

Hyakusoku: The satellite data of JAXA are free in principle and open to the public for commercial use. Likewise, the data of the National Aeronautics and Space Administration (NASA) in the US and the European Space Agency (ESA) are also freely available for business purposes. Therefore, we can take advantage of the quantity of data provided by public organizations. Of course, some data must be paid for, such as those from a company developing artificial satellites specializing in a particular region or physical quantity. We combine the free and paid data when promoting our work. We do not necessarily have to purchase all the data. But, of course, we need funds to consolidate a working environment for analysis or as a base for our services. This is very important, and we have been working on fund-raising since our foundation. We got capital investment directly from JAXA in December 2022.

Human Resources Support

JS: What kind of experts work for Tenchijin and how many? Are they mostly data experts?

Hyakusoku: Our users, such as those working in agriculture, renewable energy or with water pipes as I mentioned, are not familiar with satellite data and providing them with raw data from satellites would not work as a business. Therefore, we developed a working tool called “Tenchijin COMPASS” (www.tenchijin.co.jp/compass/) to get multiple geographical space information from Internet browsers and by making an assessment of land by analyzing or visualizing it. This is our core service. To create the framework for this service, in addition to experts on satellite data, mechanical learning experts and IT programmers are necessary. We need a little less than 10 experts for each domain and in total around 30 engineers are working for our company.

JS: Are the other members of your company from JAXA like you?

Hyakusoku: No, most of the members have different backgrounds. Among the experts working on satellite data analysis, there are some who have knowledge of JAXA. But in other areas like mechanical learning or data science, we must have experts in each domain.

JS: How did you meet with such experts?

Hyakusoku: My co-founder, Yasuto Sakuraba, has an IT background and he has his own network in this area. I have my own in my area of expertise which is space satellites. The key challenge for us is that there are not a lot of experts in data science and now there is severe competition for the best experts in this area. We are also struggling to hire them.

JS: Since the pandemic, new working styles or a new wave of work-life balance seems to have been drawing attention due to the expansion of remote working. We also see an increasing number of people working flexibly among many companies. What do you think of these trends?

Hyakusoku: Our company's employees are working remotely nearly all the time. They are working on various employment contracts and in many places in the world such as Europe, Asia and the US. Among these employees, there are some whom I have never met. On the other hand, I meet those working on business development and meet with our clients several times a week at our Nihombashi office in Tokyo. It is common practice among our foreign colleagues rather than our Japanese ones to work for plural organizations by taking advantage of their expertise. I leave them to work as diversely as they like. I believe they find it easy to work for our company, just like working for other foreign affiliates. By contrast, some Japanese members may be rather surprised to see such a liberal way of working.

JS: On the question of the merits and demerits of working remotely, it is often pointed out that a hybrid style of remote work and in-person business meetings would be very effective. What do you think?

Hyakusoku: We are working remotely as a principle but in the meantime try to achieve better communication. For example, engineers working remotely are chatting simultaneously among themselves by using avatars. This is how they realize a virtual venue for gathering by using a digital tool, even though in reality they are not together. However, where members of a company work globally, the various time differences create a barrier impossible to overcome and so all of them cannot discuss matters on the same occasion. But this can be considered as a merit of remote discussions, since the

productivity of such a working style can be enhanced by sharing recordings of these discussions or tasks, so that issues are not postponed until the next day. Our development now mostly depends upon remote work, but this enables us to share updates in progress among ourselves and this has been working well so far.

Social Issues as Seeds for Ventures

JS: Your company aims to contribute to society by providing infrastructures that facilitate business using space-related big data. Do you think there are a growing number of Japanese start-ups aiming to contribute to society, and if so, in which area?

Hyakusoku: Solving social issues may appear to be a social contribution. But I think the point is that there are so many issues in our world today, including climate change energy provision, and those related to our daily life such as aging, caregiving, medical care, education for children, and so on. Solutions for these issues would have a business value and at the same time, it would be a contribution to society. I am personally not much interested in social contributions. I am more interested in solutions for such social issues that lead to creating business. I believe that people who have the same point of view are starting up businesses these days.

JS: There seem to have been many entrepreneurs born from the economic needs of the old days. It is not the case anymore.

Hyakusoku: Economic issues can be assumed to be solved to a certain extent by technology, but there are now social challenges, globally as well as locally, that cannot be resolved easily. Those who are motivated to solve such challenges and find it worth doing so because of their difficulty are now getting into entrepreneurship.

Enhanced Interest in Start-Ups

JS: It is often said that Japan suffers from lack of entrepreneurship, but at the same time I have heard that young people in Japan today are driven by a strong venture-oriented mindset and the traditional huge Japanese companies are no longer attractive to

them. Does this mean that the attractiveness of the traditional Japanese employment system is fading?

Hyakusoku: Three years have passed since I started helping Tsukuba University in lectures for a program to raise entrepreneurs. Having observed my students there, whether they establish start-ups or not, I find there are many potential entrepreneurs among them. I've been wondering what the reasons are. It may be partly from their dislike of existing Japanese companies' lifetime employment and seniority systems. But another answer may be that they think there is a greater chance in new industries to improve their skills, accepting the changes in the business environment and uncertainty about the future. This positive thinking is extremely rational. I guess this is the reason why these young people find start-ups or new industries very attractive.

Space as a Treasury for New Ventures

JS: There seem to be increasing number of start-ups working on space worldwide, such as those for collecting garbage in space or aiming to realize space journeys. But there also seem to be many that are not working well. Do you think space is a promising treasury for start-ups?

Hyakusoku: In thinking about space, there are two groups of issues. One concerns facing Earth and the other concerns seeing space as a frontier. Against the background of increasing social issues, data observed facing Earth could be regarded as a kind of sensor for the entire globe. I think the challenges and technological seeds in this area would almost fit each other and this provides a greater possibility for the utilization of space-related big data.

On the other hand, the area of space development such as building a spaceship, space hotel or visiting the Moon or Mars – this would be extremely attractive in terms of development of the frontier. But, of course, it is difficult to foresee the market or the challenges 10 years from now and this could provoke more negative views about it.

As I used to work on producing artificial satellites, I have a frontier spirit that would like to produce and site my own facility or robot farther in space and let it work there. But at this moment, I am working on the business of watching Earth from space.

JS: Cyberattacks could provoke military action. Having seen the Russian invasion of Ukraine and China's reactions to it, I think space is becoming an important area for national security. What do you think?

Hyakusoku: Yes, in this sense, sensors or telecommunication equipment in space looking at Earth should be a part of the infrastructures of the planet. Therefore, they have the potential to contribute to society and so could be a target for military attacks. I think this part of space is becoming a part of Earth.

JS: Your company has entered its fourth year since its foundation. Could you tell us about your future plans or ambitions?

Hyakusoku: We have finally completed “Tenchi COMPASS”, our core service as a company. From now on, we aim to enhance this service for the use of more customers. There are increasing numbers of space ventures producing private space satellites, and I believe we can raise the value of our big data by combining ours with the data from these private satellites, as well as open data from NASA, ESA and JAXA. As data increases, our “Tenchi COMPASS” has the potential to become a much more valuable service. So we aim to achieve this and increase the number of our users.

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