BUSINESS DEVELOPMENT FOR SPACE TOURISM

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1. Introduction

I am pleased to talk about my own experiences of being involved in various technology development projects. However, I am wondering why I am here to comment on the space tourism study to be conducted by the Japanese Rocket Society. I just guess I am expected to talk about the secret of making money to start a new business developing advanced technology.

2. A Lucky Start

My first project concerned the development of the so-called Linear-Motor-Car (Magnetically levitated transportation system) whose key technology was superconducting currents for magnets. In 1968, super-conductivity was not so widely known as nowadays. It belonged to knowledge of specialists as a physical phenomena called "persistent current mode" in English. When I used to explain my plan to apply this principle to make strong magnetic fields to levitate and accelerate train cars, many people would not believe me. I remember, some said to me, "What did you learn in the university? You seem to be ignorant of a basic theory of physics". Under such circumstances, I was saved by just good luck.

In 1970, a Japan-US specialist conference on transportation was held in Washington DC. The participants from the two nations found that both were interested in high speed transportation systems exceeding a speed of 400 km/h. The Japanese proposed a joint project to develop superconducting mag-lev transportation, and the US responded to the proposal. We discussed various issues concerning the development of superconducting technology, such as US secrecy policy for technology. The discussions were so serious that representatives of the Japanese government began to change their view on this new technology, and also on the value of my proposed plan. This was another example of the bad Japanese tradition; To hear a translation from American sounds better than to hear the original from a native Japanese. This has not changed even now.

3. Cash in hand is better than any promise

Returning to Tokyo after the conference in Washington, I was hurrying to get the study started by the ministry of transportation. I was working for the Japanese National Railway (JNR) which had no special funds to take care of such a sudden decision. I said, "We have no money. I cannot do anything without money." "How much do you want?" "About one hundred million yen (approximately one million US dollars)" was the answer, which was a fairly large amount of money in those days. Even so, the money was prepared in a week, probably because of its urgent situation. This decision awakened a samurai-man in JNR who stopped my action saying "Don't get that money from the government, I will get it for you". But I always like cash in hand rather than a promise for the future, so I said this to the man. Then he called a special directors' meeting to decide the funding necessary for my plan. Thus, the first super-conducting technology project was officially begun.

4. Important Visitors to the Project

After considerable efforts, the maximum speed exceeding 500 km/h was achieved by an unmanned test vehicle. On the other hand, we developed the 002 model that could carry passengers onboard in order to study various problems associated with passenger accommodation. This vehicle was often used to provide honorable guests with opportunities to be familiarized with this high technology transportation. We took advantage of these guests for publicity of the new transportation system.

One day, such a guest train operation was suddenly interrupted by "emergency stop" because of sickness of a passenger. Later it was found that the sick passenger had claustrophobia, from being confined in the test car. He was used to flying only on jumbo jets. Thus, you will learn that vehicles for space tourism should be as large as possible.

5. Human relations : Space

As an extension of technology for the mag-lev transportation, I proposed a linear motor assisted take-off (LMATO) for a winged space launch vehicle, together with Prof. Nagatomo. A sled carrying a space vehicle is a modified version of the 002 model that I showed before. The maximum velocity required for this sled was 600 km/h which was within then available technology. So, I have been waiting for completion of our customers, the space vehicle, and I am now wondering what relation there is between that concept and space tourism.

While I was waiting for space vehicles, I started research on the practical application of the linear motor system for elevators. Its principle is the same as linear motor cars, but the direction of acceleration is vertical instead of horizontal. Looking for several institutions to have an interest in developing this system, I found sponsoring groups at the Power Reactor and Nuclear Fuel Development corporation. As a result of tests conducted at Toyama University, we were encouraged to think about applying this to launching rockets. These ideas were products of a group study with members of the committee for the Geotopia project supported by the Science and Technology Agency. Recently, I was invited by American colleagues to join their company established for electromagnetic launching system development. Thus, I am pending between various human relations. Now I dare say to you, "If you are serious about space tourism, you need a dedicated company."

6. Human relations : Shipbuilding

Another research field of superconducting technology has been propulsion for ships. This is a kind of electric propulsion that uses the force caused by the interaction of electric currents flowing in water and magnetic fields applied outside the hull. This project has been sponsored Mr. Sasagawa. When he visited to ride on the linear motor car as a guest, he surprised all of us by shouting loudly "Start! Let's go" at the moment of the operator's counting zero. He is always a man of commander. After the test ride, he asked me "How about Japanese marine technology?" I frankly answered "There has been no effort to develop new technology in this field. I know because I was engaged in this field during the war. The technology was all imported. Do you know any engine designed by Japanese?" This time he was surprised by my answer, and quickly ordered me to do something. So I proposed my idea to propel ships by means of superconducting magnetic force. He responded "Does it work well?" "I don't know. It is the purpose of research to find out. You already know a business of which the risk is fifty-fifty. "What's that?" "Your motor boat racing, sir" "You're right!" Anyway, he sponsored my research project of 'superconducting ship', which is known as Yamato-1. It was successfully tested last year. On the day of the completion ceremony, I heard that he had been advised by someone not to believe me because an American technical paper was negative to my idea. By the way, the superconducting ship can be used best for submarine type of cargo vessel.

7. Inner space trip

In February this year, I had a chance to join a sightseeing cruise in a submarine in Maui Island, Hawaii, which is one of three places providing this kind of service in the States. The submarine was 30m in length. Passengers took seats in a line on each side, and could look out
through each window. The crew members were three. One of them is a scientist guide and another one is an interpreter. Batteries to power the vessel were stored under the seats of passengers. The batteries warmed the seats during operation. Oxygen bottles were installed to supply breathing air. There was no toilet. After the trip, they issued a certificate to each passenger. This will be an important service for space travel too.

I enjoyed the submarine trip very much, and was interested in the price. I did not know what it was exactly, because it was included in the payment for the hotel fees. According to a pamphlet on the trip, 5 dollar-off price was 39.95 dollars. But it rose to 79 dollars if you are Japanese. Why? Because, they explained, Japanese translation required additional cost. I envied the interpreter's high salary!. However, I wonder if space travel can be as cheap as this.

Later, when I boasted about this experience to my friends, someone showed me a pamphlet of a Mitsubishi-made submarine for sightseeing. He said I could make a similar sightseeing trip with this ship in Okinawa. But I found the price was more expensive than in America. The reason is that the submarine is built to meet Japanese laws which are stricter than American laws. The laws may concern seaworthiness. Is there any difference of the seas in Japan?

8. Decide Upper Limit of Investment

Before making a company, you should learn one important thing, that is the upper limit of investment. Generally speaking, the railway people are loose in spending money. But I suppose the space people may be one order of magnitude more, or probably much more loose than the railway people. Say 500 million yen is allotted, then it will be easily exceeded up to 5 billion yen and even 50 billion yen for projects of developing new space systems, I guess. This approach cannot be used for a business project. Any business needs an upper limit of investment. And it is most important to manage the entire project within this limit.

Many people hated my strict attitude to control costs within this limit, but the strictness of Mr. Shima, the chief engineer in charge of the Shinkansen development was very famous. "Why do you need it?" was the answer to every proposition of new studies or tests. It is well known that the oldest Shinkansen line is affected easily by snowy weather. This is a result of his tight control. He predicted this drawback but ignored it because such troubles would take place once or twice in a year. After completion, people understood the real value of the transportation system, so that newer lines constructed later were fully protected against snow with more investment. This amount of money was not available for the first challenge.

9. Decide Responsible Leader

Finally, I would like to request you to decide who is responsible for the new business. Only a person assigned to a responsibility can be sufficiently serious to achieve it. In the case of Linear Motor Cars, JNR was responsible as I said. In Germany, an insurance company took responsibility for the same kind of transportation system development. They visited our office to ask for our advice, concerning which prospective customers we would have. I admired their attitude and enthusiasm. Therefore, my conclusion on this subject is that you should find someone who is responsible like this insurance company.

Yoshihiro KYOTANI graduated from Kyoto University in 1948, and joined the Japanese National Railway (JNR) as engineer. After working in administration at the Ministry of Transportation and at several JNR firms, he joined the JNR Technology Development Department, as deputy Director (1968-1976) and later as Director (-1983). During this assignment, he proposed a new high speed train system based on the principle of magnetic levitation and acceleration, and after approval of the proposal, directed the special project team dedicated to related technology development. He received national awards for this achievement including the Purple Ribbon Medal in 1988. After retirement he was invited to join TECHNOVA Inc. in 1987 as President, and has been Chairman since 1989. He is still actively promoting the government project for the Linear Motor Car train system as advisor of the Central Japan Railway company (JR Tokai).