

Triple Helix IX International Conference

“Silicon Valley: Global Model or Unique Anomaly?”

11-14 July 2011, Stanford University

Sub-themes

3. Triple Helix ecosystems and regional development

3.7. ‘Smart specialization’ as a strategy to align regional innovation strategies: how to construct comparative advantages, role of institutional settings for research, education and innovation.

From regional development to ICT innovation: A case study of project formation in Hokkaido

Makoto Tanifuji

Ritsumeikan University, Japan

Copyright of the paper belongs to the author(s). Submission of a paper grants permission to the Triple Helix 9 Scientific Committee to include it in the conference material and to place it on relevant websites. The Scientific Committee may invite accepted papers accepted to be considered for publication in Special Issues of selected journals after the conference.

Abstract: The purpose of this paper is to clarify conditions to succeed an attractive business models regarding with projects in Japan. This paper focuses on the Green energy Data Center Project to build a data center in Hokkaido, Japan within the method of case study. The project has a unique property of project formation including the Japanese third sector, which concerns public and private enterprise activities for regional development. This relationship brings not only to incubate regional activation but also to innovate new technology in data center industry by taking advantage of regional condition. Major characteristic of the collaboration is that project formation among of the members is flexible and can be changed when necessary.

Keywords: regional activation, data center, green technology, the third sector and project

1. Introduction

Due to economic slump and changes in business facilities in recent years, the difficult situation relative to regional development not only in urban area continued in Japan. It is particularly hard for regional associations and firms set up new project even when they make attractive suggestion for regional development. In these circumstances, the growing ICT market is bringing fresh business opportunities and there is a data center building boom in several parts of Japan. However there are tough challenges for Japanese business, coming from co2 reduction objectives, reducing electricity usage, and low-price due to the competition of overseas providers who hold a dominant position in the market. What conditions then are necessary to succeed an attractive businesses proposal? This paper focus on the project Green Energy Data Center (GEDC) project which aims to build a data center by the triple helix and the Japanese

¹ Makoto Tanifuji is graduate student of the Graduate School of Core Ethics and Frontier Sciences at Ritsumeikan University, Kyoto, Japan. Her research interests include project management, inter-organizational management and regional activation. She has presented work at the 7th International Conference Multiculturalism and Social Justice: Democracy and Globalization in Kyoto. She has also 5 years of working experience in public service industry. e-mail: tanifujim@gmail.com

third sector(Tao, 2010) in Ishikari city, Hokkaido, Japan, as an example of such models. The purpose of this paper is to clarify the roles to bring good effects to the triple helix in this project by the Japanese third sector.

2. The data center industry trend and its policies for Japanese government

Cloud computing, which is an Internet based computing service that provides resources from vendors without the need for preparation or management by users, has recently been changing information management. Enhancing the international competitiveness in ICT industry requires not only corporate efforts but also regulations review in related industries and promoting public private partnership.

The data center market is rapidly growing and data centers have an increasing role to play as a foundation for cloud services and are located platforms in business information and communication environment. This enhancement is of growing concern and data center need to grow. Even in the case of damage to servers, networks and infrastructure when earthquakes or other unexpected events occurs, data center utilization disperses the risk. But tackling energy consumption is necessary for this technology development.

However, reaction against increased power consumption both inside and outside Japan and co2 reducing objectives all point towards energy-deficient ICT equipment as a difficulty. The Japanese Ministry of Internal Affairs and Communications has maintained support for data centers using green energy and for energy efficient data centers since the report of the ICT policy committee for dealing with the program of global warming in 2008. To improve international competitiveness for Japanese data center industry the METI Japan Data Center Council was established on 2008 instituting an industry-university-government collaboration relationship. Since the revised Energy Conservation Law that came into force in April 2009, company having data centers faced more energy efficiency and conservation objectives than before.

After East Japan Earthquake, Tokyo Electric Power Company and Tohoku Electric Power Company areas have been required to save substantial amount of energy, so that, power saving of 15%(compared to last summer) is required of industries except data center industry and other specific industries at this stage. Moreover, higher electricity prices and to unstable power supply, are expected in the future.

3. Japanese third sector

The GEDC project takes place in what is defined as the Japanese third sector. The definition of the third sector is different in Japan from what it is in Europe and America. It concerns public and private enterprise activities co-funded by the central government, local

public government and private enterprise in view of regional development rather than activities that are independent from public and private sector in general (Tsunao;1993, Horiba and Mochizuki 2007, Tao2010), and in most cases it takes the form of this type of cooperation. The reason why the Japanese third sector often takes the forms of such cooperation is the historical result of successful co-funded businesses. Public service corporations, foundations and so on are also included in the broad definition of the third sector but this paper focuses on cooperation between local government, industry and others. The main reasons to establish such joint cooperation is to promote efficiency by introducing private sector management methods and to fund projects that include interest for public aspect not only as it is represented by not-for-profit organization but also by the public sector. This definition of Japanese third sector which appeared in official documents of the Tanaka cabinet in the Economic and Social Basic Plan in 1973 aimed to maintain local cities, to promote the environment, to enhance social capital, and financial efficiency as a creation of enriched environment. A numbers of Japanese third sectors ventures were established in that period. After the first oil shock, the Japanese third sector was mostly stagnant, however, after the second oil shock, signs of development appeared again, and there was an explosive boom from 1984 to 1988. During that period there was a trend towards concentration in Tokyo and as response there also were efforts to expand regional development projects to prevent regional loss of population and employment. In consequence, many public facilities and resort facilities were established by the Japanese third sector for the purpose of developing local economy. In that period, new laws, like those concerning Interest-free loans, were established in relation to the Japanese third sector. After the bubble economy, management of the Japanese third sector became difficult, and some of these laws were amended. Of course, in many cases projects still continued to make use of the mechanism of the Japanese third sector especially in association with local government.

The form of cooperation, found in the Japanese third sector combines private efficiency and public interests, presents many advantages and disadvantages. Its main advantages are that these are business institutions created under the special law, that utilize private capital, human resources and technology, to plan and manage large-scale projects, which are expected to created synergies that profit both the public and private sectors. For the private sector, good relationship with the public sector that increase new business opportunities and lead to better regional development planning are advantages. For both side, there is a diversification of administrative services, benefits from the projects and an expected increase in employment. These expected advantages in fact play an important role in setting up such projects however, there also are disadvantages. In consequence of the financial crisis of local governments there has been a retreat in public responsibility, and for the private sector, low return business as well as higher risks in such ventures. Furthermore there has been pressures on specific industries,

shortage of human resources; and for both side, if we take in consideration the gap between them, the risk of future tax hike and growing cost. While planning such a project, project members have to consider these problems and carefully take into account the danger of uncertain plans, easy commercialization, excessive investment, as well as of ignoring some advantages and overestimating profits, and the effects of negative information disclosure.

3. Case: building a data center in Hokkaido

3.1 Characteristics of Ishikari city and Ishikari Bay New Port Area

Ishikari Bay New Port Area is the largest industry complex in central Hokkaido area, Japan. It is located to 15 km from central Sapporo city and can be reached by car from Sapporo in about 30 minutes. Hokkaido is the northern island of Japan and Sapporo is the seat of the Prefectural government of Hokkaido. The Sapporo area concentrates all the functions relative to central Hokkaido but is not a city of head offices as much as a city of many subsidiaries and branch officers. In spite of the fact that Sapporo, is at the same latitude as Rome there is a lot of snowfall in western Hokkaido and it is famous for the Sapporo Snow Festival and is where the Olympic Winter Games were held in 1972, for the first time in Asia. 2.3 million people, which amount to 40 percent of the population in Hokkaido, live in Sapporo area where we find public administrations, banks, health services, welfare agencies and educational institutions. Agriculture, fisheries and forestry are also active in Hokkaido, and there still is much available land. Many tourists visit Hokkaido to profit of good tasting local food, and to enjoy outdoors in summer and skiing in winter. It is easy to access from Tokyo by plane and the Tokyo-Sapporo is an airline route that is a very profitable one.

Ishikari Bay New Port Area plays the important role of a physical distribution center between the Sapporo area economy and overseas, and many industrial companies are present there for example, manufacturing, distribution business, warehousing businesses transportation businesses and service businesses. About one third of the total area is a 3,000ha wooded area that is being promoted by Hokkaido government, Otaru city, Ishikari city, and ISHIKARI DEVELOPMENT Co., Ltd., a Japanese third sector, Hokkaido enterprise. More than 600 companies are settled there because of its good location. The Ishikari New Bay Port Area has high potential and easy access to central Sapporo city as well as surrounding cities within the National highways and Hokkaido highways. It takes 60 minutes to the New Chitose International Airport, and within these highway, there is hardly ever traffic jam even in winter, because Sapporo city and Ishikari city have excellent snow removal services. Since 1997, it has a high volume of container ships exchange with the port of Busan in South Korea, and has been increasing its cargo volume from Southeast Asia, Northern Europe and North America. Ishikari Bay New Port has mainly focused on being an international container depot.

3.2. Project background

Before establishing GEDC, there was 4 or 5 five years ago another project to effectively manage snow removal in the area. There is more snow in Sapporo city and Ishikari city than in other cities in Hokkaido. Snow-mountains are made during winter in snow dumping area and they start breaking apart when spring arrives and the sun starts melting snow in late March. These snow-mountains are the result of snow removal on roads and parking in the city beginning in late December. They are located in the Ishikari Bay New Port Area as this is the place contracted by the city to move the snow taken from the city and roads. Because these snow-mountains are big, they harden and are not easy to break down. However cities want to reduce the price of the rent of the snow disposal yard (which in this case is also a Japanese third sector enterprise) and snow-mountains are artificially dissolved without waiting for the sun to do its effect. This was the main incentive to consider the effective usage of snow as natural resource rather than as an expense for city tax payers.

Associations and groups encourage businesses to improve their technology by using cool heat energy in Hokkaido², for example, icehouses to save food. In the Ishikari case, there was a proposal to supply cool air to factories inside the Ishikari Bay New Port Area by using cool heat energy.

The members of this project submitted this idea to Hokkaido Bureau of Economy, Trade and Industry to obtain research funding. However, because METI Hokkaido and other local associations and governments often give grants to new businesses, and it is now more difficult than before to obtain a large sum for new business in the private sector. This proposal was therefore adopted as one year project only. To investigate the possibility of doing this companies which produce air quality control technology and universities leading in research in building environment were contacted; to these were added as partners the Hokkaido government, Otaru city, Ishikari city, as well as the METI Hokkaido as an observer. Some of the members have already demonstrated the feasibility of such a project and have dates to start implementing it, as well as relevant patents and technology, so they did not take much time to prepare for business.

Then members established the New Energy Snow Ice Use Society (which is presided by the Graduate school of Engineering, Hokkaido University). It makes and manages plans related to research development of technology, information dissemination, and project implementation for the purpose of contributing to global environmental conservation with the goal of reducing fossil

² Some projects have started to use new energy mainly in Hokkaido, for example, the famous demonstration of how to use a snow cooling system for air conditioning at the G8 Hokkaido Toyako Summit in 2008.

fuel consumption. The Ministry of Land, Infrastructure, Transport and Tourism has started the Cool Project since 2007, and considered in 2009 to supply snow cool heat energy as for the cooling of the Terminal Building in summer season by using snow removed in the winter season at New Chitose International Airport. The project was adopted and this system in the first year, covered 20% of the usual energy consumption for air conditioning purpose.

3.3. Green Energy Data Center Project

ISHIKARI DEVELOPMENT Co. Ltd. attended for PR reasons a seminar held by electronics energy in Tokyo on the idea of providing air conditioner system by using natural energy and met there a member Tokyo Green Energy Data Center Study Group. They got together repeatedly and confirmed that they could match their needs and ideas to use natural energy in a bid to reduce co2 and electric usage. Achieving this could also attract some industries which had never been attracted to the area as well as foster regional development. This is how the Hokkaido Green Energy Data Center project was started in spring 2009. It is composed of some members of New Energy Snow Ice Use Society, DC vendors, contractors, Japanese third sector regional real estate developer, municipal government officials, university, and related agents in the area. The purposes of this project are to develop the useful technology, to promote construction of the first of shared-used GEDC, and to approach to customers. For management purposes member were divided into three groups; one, realizing technology by collaborating technology companies and Hokkaido University, two, promoting collaboration of ICT industry companies and government, and three Business promotion. In response to industry changes, it was important to get results on this project as soon as possible.

3.4. Project performances

The climate of Hokkaido is cool throughout the year, and the average temperature of Sapporo is 8.5 degrees Celsius compared with that of Tokyo which is 15.9, further Ishikari is cooler than Sapporo and there is no summer rainy season in Ishikari. The local snow removal system is equipped by the road administrations of cities and the Japanese government. On the routes of Ishikari Bay New Port Area, snow removal insures that traffic is never blocked. The size and number of earthquakes in Hokkaido are greater on the Pacific Ocean side of the island than in the Sapporo area, and Hokkaido has fewer thunder storms and typhoons than the rest of Japan.

Presently, data centers in Japan tend to be built in the Tokyo area and southern part of Japan, so this industry rarely thinks of building in the northern part of Japan, especially since many industries demand, or at least tend to build data centers near their own offices. However, it is not technically necessary to build DCs near where industry offices are located. There is, for

example, no problem to building them in the suburbs. Yet it is difficult for companies to offer low prices because most of them maintain their data centers in Tokyo area, where rent and construction fee are high. These costs in Hokkaido are much cheaper than in Tokyo, so vendors could achieve significant cost savings if they opened data centers there. Moreover, the Ishikari area has less natural disaster and greater electricity stability as well as good security. It therefore constitutes a most suitable place to build data center (Krugman, 1991; Sassen, 2001; Saxenian, 1984).

In regard to green energy, data centers generally use a huge amount of electricity to run servers and cool them down, so reducing the electricity cost is a key for lowering prices (Barroso and Holzle, 2009). In addition to that, the present Japanese government aims to reduce co2 emissions 25% (compared to 1990) by 2020, which puts an extra pressure on Japanese ICT business to reduce electricity usage. Hokkaido is in the northern part of Japan its cooler air is useful for cooling down data centers. The huge amounts of snow in Hokkaido also turn out to be useful for cooling down data centers instead of exclusively depending on electric power. The project in Hokkaido is said to be the first in the world that uses snow to cool a data center. In addition to that, the area is suitable for wind power generation, which can also support the electric power supply of the data center. In fiscal 2012, the wind company will establish 15 windmills on a 2,000kw basis. In this way, it is possible to reduce the electricity costs as well as co2 emissions of data centers in Hokkaido.

Hokkaido government established Hokkaido Data Center Assessment Committee from November 2008 to March 2009 to evaluate which area is the best to build data centers. The members of this committee formed another university-industry-government relationship and there were nearly 50 applicants. This committee investigated and examined the location environment of data center, and focused on five final candidates showing the advantages and challenges of each candidate. As a result, the Ishikari area was evaluated as the best with no disadvantage point. Since then, not only GEDC as a whole, but also each member of GEDC has been actively promoting the idea with the data center industry. They were present at seminars and at ICT Expo There were also study session at the Hokkaido University and in Ishikari for citizens to express their opinion. Finally a company was attracted to Ishikari and decided to build the data centers for the first time.

3.5. Investment enterprise

SAKURA Internet Inc., a leading domestic ICT company in order to expand its data center business, decided to build largest data centers using cool air energy in Japan. It should start running in the fall of 2011 and be able to set up 500 racks on a two story steel frame, the total floor area is 6,325 square meters in 51,448 square meters land. This is the first of its planned

data centers. Moreover, the company has started the SAKURA ISHIKARI HVDC Project to improve efficiency of power using high-voltage direct current. The project contributes more cost competitiveness if it succeeds.

4. Conclusion: Triple helix and innovation in Hokkaido

For this Hokkaido project, DC vendors, contractors, Japanese third sector, municipal government officials, university, and related agents in the area collaborated and developed ideas for new type of DC that incubate existing technologies in a way that finds advantage in Hokkaido's unique resources (Day and Schoemaker, 2006; Granovetter, 1973; MacIver, 1917; Thompson, 1967). Local government had to design policies without waiting for a national policy to support new business in order to create collaboration between the management of immovable resources, such as land, national condition and so on, and the management of movable resources like technology, human resources.

Regarding Japanese third sector once project members had decided, the network of interaction they formed demonstrated its efficaciousness. When they needed to plan together to succeed their common project, they provided the necessary information, knowledge, technology and other kinds of resources on trust. One of the characteristics of such collaboration is that the style of the relationship between the members is flexible and can be changed when necessary.

Today, U.S. vendors as global companies lead the rapidly growing cloud computing industry, which has been developed with active U.S. government support. Thus, U.S. vendors can offer flexible and reliable cloud computing services at a reasonable cost. This challenge can actually be an opportunity for the late coming Japanese cloud computing industry, but it needs a unique strategy to attract users and to survive and thrive in competition with the dominant U.S. cloud computing vendors (Utterback, 1994). To create a situation where industry leaders are not only to be U.S. vendors but also vendors based in other countries, Japanese vendors need to innovate business and technology strategies that draw on local strengths to develop global services that are different from those of the U.S. vendors and thus offer a unique value. The example presented above shows the possibility of a new business model where Japanese data center vendors manage, by taking advantage of environment friendly circumstances, to build DC without spending huge initial and running costs. However to plan medium and long term strategy will be required for sustainable competitive advantage of Japanese ICT industry.

Differences among the locations, for examples countries and cities, and in business customs (for example, easier or less easily outsourcing in various areas), differences in defacto standard, in geographic condition, in regulatory control all create opportunities. Managing in a typical and unique way in function of local areas difference is important to support global internet services and to realize business innovation and innovative technological strategies in the start up

stage of cloud computing industry (Baumol, 2002).

As a result, this paper clarified that the Japanese third sector accelerated the triple helix in the case. The requirements of the Japanese third sector to promote the triple helix are the following;

- 1) To make sure that there is the key person (Henton, Melville and Walesh; 1997) who has regional broad network
- 2) To access to local governments easily.
- 3) To adjust university-industry-government relationship to connect their resources.

5. Future work

To estimate the performances on inter-organizational capabilities, I will conduct to define the efficiency of the entrepreneurial network within the case in this paper.

References

- Barroso, L. A. and U. Holzle, (2009) *The Datacenter as a Computer: An Introduction to the Design of Warehouse-Scale Machines*, Morgan & Claypool
- Baumol, W. J.,(2002)*The Free-Market Innovation Machine: Analyzing the Growth Miracle of Capitalism*, Princeton University Press
- Day, G. S. and P. J. H. Schoemaker, (2006) *Peripheral Vision*, Harvard Business School Press
- Granovetter, M. S. (1973) "The Strength of Weak Ties", *American Journal of Sociology*, 78:1360-1380
- Henton, D., J. Melville and K. Walesh (1997) *Grassroots Leader for a New Economy*, Jossey-Bass Inc., Publishers
- Hirschman, A. O. (1984) *Getting Ahead Collectively: Grassroots Experiences in Latin America*, Pergamon Press Inc.
- Horiba, I. and M. Mochizuki (eds.) (2007) *Daisan sekutah (The Third Sector)*, Toyo Keizai Inc
- Kirzner, I. M.,(1973) *Competition an Entrepreneurship*, The University of Chicago
- Krugman, P. (1991) *Geography and Trade*, The MIT Press
- Maclver, R. M.,(1917) *Community: A Sociological Study; Being and Attempt to Set Out the Nature and Fundarmental Laws of Social Life*, Macmillan and Co.
- Sassen, S.,(2001) *The Global City: New York, London, Tokyo*, Princeton University Press
- Saxenian, A., (1994) *Regional Advantage Culture and Competition in Silicon Valley and Route*

128, Harvard University Press

Tao, M. (2010) *Koukyo keiei ron (Theory of Public Management)* Mokuyo Bokutakusha

Thompson, J. D., (1967) *Organizations in Action*, McGraw-Hill, Inc.

Tsunao, I. (ed.) (1993) *Daisan sekutah no kenkyu (reaserch of the third sector)*, Chuohoki
Publishing Co. Ltd.

Utterback, J. M., (1994) *Mastering The Dynamics of Innovation*, Harvard Business School Press

Acknowledgement

Especially I wish to express my thanks to ISHIKARI Development Co., Ltd. for providing in depth information and materials.