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STS in Japan and East Asia: Governance of Science and Technology and Public Engagement

Yuko Fujigaki

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1 Introduction

In this paper, I will provide an overview of the development of Japanese science and technology studies (STS) by focusing on the governance of science and technology and public engagement in Japan. First, I will discuss the interaction and development of several STS research groups in Japan since the 1980s and outline the process by which the venue for the Society for Social Studies of Science (4S) 2010 annual meeting was decided. Second, I will focus on the governance of science and technology and public engagement in the Japanese context by discussing several case-studies such as that of the Minamata disease (mercury poisoning) and the itai-itai disease (cadmium poisoning). In addition, by referring to the case of the Monju nuclear power plant incidents, I will show that the Japanese society is now shifting from a technocratic model to a more democratic model in decision making in science and technology. This transition has been in parallel with the shift from the deficit model to lay expertise model or to the public participation model in science communication. Third, I will mention science communication funding provided by the Japanese government and analyze the gaps between government-driven public participation programs and grassroots public participation, and government-driven public understanding of science (PUS) and science communication. Finally, the universal nature and culturally bound aspects of STS concepts will be discussed.

Y. Fujigaki (✉)
Tokyo University, Tokyo, Japan
e-mail: fujigaki@idea.c.u-tokyo.ac.jp

2 Background of 4S 2010 in Tokyo

Table 1 shows the development of several STS research groups in Japan. For example, STS Network in Japan (STSNJ) was established in 1990 and the first president of STSNJ was Hideto Nakajima. In 1992, the *Japan Journal for Science, Technology and Society* was established by Japanese Association for STS (JASTS), and Miwao Matsumoto currently has overall responsibility for this journal. In 1998, the International Conference on STS was held in Tokyo, Hiroshima, and Kyoto. This conference was organized by Yōichirō Murakami and there were 245 Japanese participants and 127 foreign STS researchers (including invited speakers.) This conference enhanced exchange among several STS research groups in Japan and promoted international discourse on STS. It became one of the stepping-stones for the establishment of Japanese Society for Science and Technology Studies (JSSTS) in 2001. The first president was Tadashi Kobayashi. The total membership of JSSTS was about 200 in 2001, but by 2009, it had reached around 600.

The International Conference on STS in 1998 encouraged the involvement of Japanese researchers in the governance of 4S. For example, Hideto Nakajima was elected to the council of 4S and served on the council for the period 2000-2002. Yuko Fujigaki and Miwao Matsumoto also served on the council in 2003-2005 and in 2009-2011, respectively. Yuko Fujigaki was also included in the program committee of the 4S 1999 meeting in San Diego, the 4S and the European Association for the Study of Science and Technology (EASST) 2008 meeting in Rotterdam, and the 4S 2009 meeting in Washington D.C. This involvement eventually led to 4S 2010 being held in Tokyo jointly with JSSTS.

At both the 4S 2005 council meeting in Pasadena on October 19 and the business meeting on October 22, the 4S community expressed an interest in having an Asian meeting. In particular, the outgoing and incoming Presidents Bruno Latour and Susan Leigh Star both supported the idea of holding a joint meeting in Asia. The Council for the Japanese Society of STS, which at the time had 511 members in Japan, met on November 12, 2005 and agreed to propose a 4S-JSSTS joint meeting in 2010 in Tokyo. The proposal of 4S 2010 in Tokyo by JSSTS was discussed at the 4S 2006 council meeting in Vancouver on November 1, and accepted at the business meeting on November 3.

JSSTS was in the process of constructing an East Asian STS network with Korea, Taiwan, and China. This network already had already had six East Asian STS meetings (Beijing, 2000; Seoul, 2001; Kobe, 2002; Taipei, 2003; Seoul, 2004;

Table 1 Development of research groups of STS in Japan

1990	STS Network Japan was established
1992	Japan Journal for Science, Technology and Society by Japanese Association for STS
1998	International Conference on STS in Tokyo, Hiroshima, and Kyoto
2001	Japan Society for Studies of Science and Technology was established
2005	4S in Pasadena:
	The 4S President, Council meeting and Business meeting expressed an interest in having Asian meeting

Shangyang, 2005; Kobe 2006/2007; Wuhan 2008; and Tainan 2009). This emerging network is considered as an additional pillar of support for the 4S-JSSTS meeting in Tokyo. The merit of having the 4S 2010 meeting in conjunction with JSSTS and the East Asian STS network is to encourage the participation of Asian members and to increase the Asian membership in 4S. In addition, 4S members will be able to have the chance to experience, interact, and understand the ethno-diversity of Asian cultures. It will facilitate access to 4S by not only Asian scholars but scholars from India and Australia as well, and ultimately strengthen the STS network worldwide.

3 Case Study of the Governance of Science and Technology and Public Engagement

After the establishment of JSSTS in 2001, an annual meeting has been held every year since 2002. In November 2009, the eighth JSSTS annual meeting will be held in Tokyo. There are, on average, about 100 papers presented at each meeting. Thus, over 8 years, there have been some 800 oral presentations in total. The first issue of the *Journal of Science and Technology Studies* was published in October 2002; and in October 2009, issue no. 7 was published.

Among the topics covered by Japanese STS, there are many which deal with the governance of science and technology. In studying this area of STS, we need critical case studies which deal with decision making in science and technology and throw light on the relationships between experts, citizens, policy makers, and other stakeholders. Some major examples are Minamata disease (mercury poisoning), itai-itai disease (cadmium poisoning), Monju nuclear power plant incidents, food poisoning, organ transplants, bovine spongiform encephalopathy (BSE), and genetically modified organisms (GMOs) in Japan. Thanks to funds from the Japan Science and Technology Agency (JST), my colleagues and I conducted analyzed these cases in collaboration with several international STS researchers and published an STS textbook.

3.1 The Editing Process of the STS Case Study Book

The project began in January 2002, and we received helpful advice from Sheila Jasanoff at the Science and Democracy Meeting held in Berlin in 2002. Based on her advice, we held an international workshop in December 2003. Michel Callon, Brian Wynne, Ulrike Felt, Rob Hagendijk, and Thomas Gieryn gave us much useful feedback. In the 4S/EASST 2004 Paris meeting, we organized a session on the results of the project, in collaboration with Michel Callon and Edward Hackett who were commentators. After we submitted a final report to JST, we published the STS Textbook, *Case Analysis and Theoretical Concepts for Science and Technology Studies* (Univ. of Tokyo Press, 2005). The book includes nine case studies: the Minamata disease, itai-itai disease, Monju incidents, food poisoning, AIDS transmission due to the transfusion of HIV-infected (non-heat-treated) blood products, BSE, GMOs, climate change, Japanese social movements for medical waste, and the Winny Scandal (the software developer of the P2P file exchange program who was arrested for aiding illegal copying). This book is now widely used in teaching STS in Japanese universities. The book also opens the door to discussing the universality and culturally bound features of STS concepts which will be discussed later in this paper.

3.2 Comparison of Minamata Disease and Itai-itai Disease

Of the nine case studies, I have chosen to focus on a comparison of Minamata (Sugiyama 2005) and itai-itai diseases (Kaji 2005) since they are useful in illuminating the role and the importance of public participation in environmental problems in Japanese contexts.

The first patient suffering from what became known as Minamata disease was identified in 1956, in the Minamata district of the southern part of Kyushu. The disorder attacks the central nervous system and results in ataxia (difficulty in walking), a restriction of the visual field, difficulty in speech, headaches, abnormal sensations, and jerky limbs. Doctors at Kumamoto University who investigated the symptoms of patients found that the symptoms were similar to alkyl-mercury poisoning. Based on these observations, the doctors made a public announcement regarding their speculation as to the causes of the disease. Namely, they believed that alkyl-mercury contained in wastewater from the Chisso-Minamata factory had polluted the sea, and human beings who ate contaminated fish had fallen seriously ill as a result. The factory criticized such speculation. They argued that they only used inorganic mercury at the factory and the production of alkyl-mercury in the acetaldehyde production process had not yet been proven. The Ministry of Trade and Industry also supported such criticism and did not give administrative advice to stop the wastewater. This delay led to a substantial increase in the number of people who fall victim to Minamata disease.

In contrast, in the case of itai-itai disease, countermeasures to deal with the wastewater occurred much faster than was the case with the Minamata disease. The term itai-itai disease first appeared in a local newspaper in the Toyama district in 1955 to describe a disorder which resulted in severe pain in joints and the spine. Doctors reported that the cause of itai-itai disease was cadmium which could be traced to mining-related pollution of the Jinzu River by the Mitsui Company. Some chemists pointed to the high level of zinc in the river water and they detected cadmium in the sample. In trials held over the period 1967-1972, 236 attorneys formed a team to support patients. After the court's final decision which found the Mitsui Company responsible, the Residents Association and the company concluded a Pollution Control Agreement. Based on this agreement, the residents conducted wastewater inspections in collaboration with attorneys, experts, and citizens from other districts. This activity succeeded in reducing the levels of cadmium in wastewater.

There are several interesting comparisons which can be made between the two cases. For example, we can examine the socio-economic background of the victims. Although victims of itai-itai disease were from the wealthier sections of the agricultural community, most victims of Minamata disease were from the poor fishing community. As a result, citizens who worked at the Chisso-Minamata factory discriminated against Minamata victims. Also relevant laws are of interest. The Minamata case relates to Article 709 of Civil Law, whereby a plaintiff needs to prove a causal relationship and the fault of the company, whereas the itai-itai case relates to Article 109 of the Mining Law, which meant that plaintiffs did not need to prove the fault of the company. As a result, a Mr. Hashimoto who was responsible for dealing with public environmental hazards in the Environment Agency was able to take action against the disease despite insufficient evidence. However, the most important differences lie in the use of a Pollution Control Agreement in the case of itai-itai disease and the role of public participation. Under the Pollution Control Agreement, there was collaboration among residents, experts (attorneys and scientists including chemists, agricultural chemists, and medical doctors), and other citizens nationwide. In contrast, in the case of the Minamata disease, there was no such agreement. There were only medical doctors who supported patients and, furthermore, residents in Minamata and citizens nationwide could not help patients effectively. The lack of collaboration and public participation served to isolate the victims from other Minamata residents and resulted in internal fragmentation of victim groups.

In this way, by comparing the cases of Minamata disease and itai-itai disease, we can see the role and the importance of public participation in dealing with environmental problems.

3.3 Monju Nuclear Power Plant Case

In this section, I will discuss the case of Monju nuclear power plant incidents (Kobayashi 2005). Through careful case analysis, we can observe that Japanese society is now in the transition phase from the technocratic model (in which getting more and better scientific input into decisions is required and where the technical incompetence of the bureaucracy is the most significant barrier to making the right decision) to the democratic model (which emphasizes the involvement of stakeholders in the decision-making process). This transition is parallel to the shift from the deficit model to lay expertise model or to the public participation model in science communication. Experts (including legal experts and nuclear power experts) have begun to re-consider the technocratic model and deficit model through the litigation relating to Monju.

In May 1983, the Japanese government (Ministry of Trade and Industry) approved the establishment of Monju Nuclear Power Plant in Tsuruga District, Fukui Prefecture. In response, local residents began legal action against the government in September 1985. Nevertheless, the government commenced construction of the plant in October 1985, and the plant began operation in April 1994. However, an incident involving the leakage of sodium at the Monju plant occurred in December 1995 and the plant was required to stop operations. This incident was widely publicized by the media and the public was, as a result, cautious about the outcome of litigation. In 2000, the residents' litigation failed in the Fukui District Court. However, they were successful in the High Court in 2003. Despite the fact that the residents failed in the Supreme Court in 2005, the High Court outcome stirred much debate regarding the safety of nuclear power plants and the future of the energy supply.

Legal experts argued regarding the rights and wrongs of the High Court's decision in their journals, and several experts pointed to the lack of public participation in the administrative process in the initial approval of the construction of the plant. They said that administrative discretion was originally a tool for step-by-step handling of complicated problems with the involvement of stakeholders. However, this kind of administrative discretion did not function in the decision-making process for the establishment of Monju. They pointed out that if the government had considered public participation in the approval process, the process might have been much better. This criticism meant that in 1983, the administrative decision-making process had been closed off by experts and policy makers, without the involvement of residents, in spite of the fact that the process should have been open to the public. It meant that in the 1980s, the decision- making process was based on the technocratic model, whereas in the twenty-first century, there has been a shift to the democratic model.

This transition from the technocratic model to the democratic model is in parallel to the transition in the science communication model. When the nuclear power plant professionals lament regarding public concerns regarding the safety of new technology, they are likely to have several illusions about the public. That is, they sometimes feel that the public's negative attitudes toward science and technology are caused by their lack of information and knowledge (Wynne 1996). It is referred to as the deficit model. The deficit model tries to interpret the situation solely in terms of public ignorance or scientific literacy (Ziman 1991). In this formulation, it is the public who are assumed to be deficient, while science is deemed "sufficient". Lacking a proper understanding of the relevant facts, people fall back on mystical beliefs and irrational fears of the unknown (Sturgis and Allum 2004). Indeed, most nuclear power plant professionals believe in the deficit model without being aware of it (Fujigaki and Hirono 2008). However, several professionals have begun to emphasize the importance of public communication regarding nuclear power. They are now eager to communicate with residents. This attitude was also observed in communication with residents after the earthquake in the Niigata District where the Kariwa nuclear power plant is located. Experts now show an interest in approaches which are different from the deficit model. For example, the "lay expertise model" which involves giving authority regarding local knowledge to nonscientists in particular situations, and the "public participation model" which acknowledges local knowledge and the need to invite nonscientists in the decision-making process for scientific and technological matters that affect society at large.

In this way, Japanese society can now be considered to be actively looking at the potential of the democratic model, and reconsidering the technocratic model in the decision-making process regarding the governance of science and technology. We can also observe a shift in models of science communication.

4 The Present Status of Science Communication and Public Engagement

The Japanese Government has emphasized the importance of the public understanding of science and science communication in the Third Basic Plan for Science and Technology (2006-2010), and funded several programs for promoting communication between science and society. For example, there are three programs (Hokkaido University, Waseda University, and the University of Tokyo) for educating science communicators funded by Special Coordinating Funds for Promoting Science and Technology (2005-2009). In addition, there are programs for science communication at Tokyo Institute of Technology, Ochanomizu Women's University, Kyoto University, and Osaka University.

Although science communication programs appear to be prospering, we can also observe a gap between government-driven PUS and science communication that is substantially needed for controversies between science and society. For example, most people think that "outreach" from professionals to the public is important for science communication. Outreach is a term coined by the government-driven PUS. Furthermore, few people think that controversies regarding Minamata disease or itai-itai disease can be seen as failures of science communication. In addition, few consider that grassroots movements to fight air pollution in the Mishima/Numazu/Shimizu, Kawasaki, and Chiba areas in the 1970s can be regarded as problems in science communication. In this way, there is a gap between government-driven PUS and science communication in grassroots social movements. Why do these gaps occur?

First, science communication in Japan has tended to be promoted under the auspices of the government which seeks to enhance the public understanding of science and seeks to deal with policy issues such as the enhancement of science literacy, countermeasures for indifference towards science, the enhancement of public support towards funding basic science, and promoting collaboration between university and industry. These government-driven public understanding of science programs sometimes promote the "deficit model" without being aware of it. Therefore, we should be very cautious regarding them. Second, in Japan, controversies relating to older technologies such as nuclear power plants and those of newer technologies such as GMOs and BSE are sometimes discussed separately. This separation also promotes a gap between government-driven PUS and science communication. Third, based on these two reasons, government-driven science communication sometimes sees science communication as just an "outreach" activity from professionals to the public, a one-way form of outreach.

It is gratifying to see that several universities have attempted to link science communication and controversies. For example, Hokkaido University has tried to engage the public regarding GMO and nano-technology, and Nagoya University has also tried to do the same regarding waste problems and global climate change.

5 Universality and Cultural Difference in STS Concepts

What meaning does hosting 4S 2010 in Tokyo have? What can STS researchers (or 4S) do for the present state of governance of science and technology in Japan? What does holding the annual meeting in Asia mean for STS research worldwide?

The answer to the first and second questions is that, for the present state of governance of science and technology in Japan, STS can open people's eyes to the historical and regional relationships between science and society, constructed by stakeholders such as professionals, policy makers, citizens, NGOs, NPO, business enterprises, and ministries. STS can provide a multi-dimensional perspective for the actual, real-life problems of science and society, as well as suggest methodologies for analyzing historical and regional relationships among stakeholders. In addition, STS can provide a stockpile of case analyses on controversies relating to science and society.

Having the annual meeting in Asia opens people's eyes to questions relating to the universality or otherwise of STS concepts. In doing case analyses, we examine the applicability of foreign concepts to Japanese cases as well as the transmitability of original concepts from Japanese cases. For example, can STS concepts developed mainly based on European cases and US cases be applied to Japanese cases? Are there any original concepts based on Japanese cases that will appeal to international STS? Most STS research is sensitive to cultural contexts and localities, putting weight on contexuality and contingencies, whereas natural sciences focus on globalization and standardization. Is every STS concept available to use by all nations? Since the relationship between political systems, social traditions, and science and technology can vary according to culture, some concepts, such as "counter movements" or "essentialism of technology" do not always have the same meanings in other cultures. Therefore, we can observe that the relationship and distance between social movements and social constructivism develops differently in different contexts (Fujigaki 2005). In addition, we can observe differences in the introduction of certain theories in Europe compared to the USA and Japan. For example, social movement theories have mainly been introduced in environmental sociology in Japan, whereas social constructivism is mainly discussed in gender studies rather than science studies.

At the same time, some concepts are common to Japan, the USA, and Europe. For example, "Type 2 Error" by government means doing nothing despite the existence of problems. In most cases, these effects are proved long after victims are first discovered. We found that this phenomenon can be seen not only in Minamata but also in the European Union.

Thus, having the 4S annual meeting in Asia will potentially open the door to questions regarding the universality and cultural differences of STS concepts. I hope that much exciting research on this theme will be produced in the future, triggered by 4S 2010 in Tokyo.

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