

The Development and Limits of Inter-University Research Institutes as a New Model for the Postwar Japanese Research System in the 1950s

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1. Introduction

In the 1980s, the American government planned a big science project to build the ultimate accelerator facility based on a superconducting supercollider (SSC), however, Congress eventually decided to cancel the project in 1993 due to budget constraints. This cancelation was made against the backdrop of the end of the Cold War. In one symbolic episode, Senator Dave Durenberger, a Minnesota Republican, said about the SSC project: “If we were engaged in a scientific competition with a global superpower like the former Soviet Union, and if this project would lead to an enhancement of our national security, then I would be willing to continue funding the project. But...we face no such threat.”¹ Physics and national security in the United States had been closely connected since the Second World War (WWII), but the relationship drastically changed after the end of the Cold War. The cancelation of SSC showed that modern physics projects could be influenced by changes in the political and international climate, particularly because of the enormous costs associated with large science projects.

In the case of Japan, after the end of WWII the management of sciences, including physics, were reorganized without the presence of a military interest. As such, its development has almost never been linked up with national security problems. However, physics projects were influenced by the larger social and cultural climate, including scientific consensus, public opinion, and changing international relations. The Japanese people aspired to the rebirth of their own country via the peaceful development of science and technology under a democratic political system. When Hideki Yukawa (1907–1981) was awarded the Nobel Prize for physics in 1949, he said to Japanese reporters: “the Nobel Prize provided a great delight to all Japanese

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¹ Daniel J. Kevles, *The Physicists: The History of a Scientific Community in Modern America, with a New Preface by the Author* (Cambridge, MA: Harvard University Press, 1995), Preface 1995, xxxvi.

people and it is a great honor for me as well. The award will surely encourage the people to build a peaceful cultured society.”² His comment represented the great hopes of the Japanese people at that time.

Considering the development of national “inter-university research institutes (IURIs)” for scientific joint research activities, this paper explores the peaceful development of science under the democratic system in postwar Japan. IURIs served as important joint research centers in various fields throughout the second half of the twentieth century.³ In the IURIs management system, despite belonging to national universities, scientists made up the advisory board, or the management council, which functioned as an organ reflecting the opinions of the most prominent scientists in Japan. Particular emphasis will be placed on how the foundation of particle physics and nuclear physics research was created in the postwar period, how the research on particle physics and nuclear physics progressed under postwar conditions, and how the management system for basic science developed during the 1950s under the influence of the Cold War.

2. A Symbol of Renewal in Postwar Japan: Research Institute for Fundamental Physics as an IURI

Two atomic bombs destroyed Hiroshima and Nagasaki in August 1945, leading to Japan’s unconditional surrender to the Allied Powers. The General Headquarters (GHQ) of the occupation forces then ruled Japan and initiated the demilitarization and democratization of all sectors of Japanese society, including science.⁴ Japanese scientists themselves often perceived “democracy” as a counterweight to wartime militarism and nationalism, and enthusiastically sought to introduce democracy into

² “Yukawa hakase ni kagayaku eiyo: Nobel shō hare no jushōshiki (Brilliant Honor to Dr. Yukawa in Great Nobel Prize Award Ceremony),” *Asahi Shimbun*, December 12, 1949.

³ See the website of Ministry of Education, Culture, Sports, Science and Technology of Japan: https://www.mext.go.jp/a_menu/kyoten/ (accessed on August 12, 2020). The IURIs system changed to a new system called the “Joint Usage/Research Center (JURC)” in July 2008. In 2008, there were basically 48 IURIs at national universities, and in 2020, there were 100 JURCs at national, public, and private universities in Japan. For details on the number of IURIs and JURCs, see the file on the website: https://www.mext.go.jp/b_menu/shingi/chousa/shinkou/044/shiryo/_icsFiles/afieldfile/2017/03/28/1383515_04.pdf (accessed on August 12, 2020).

⁴ Shigeru Nakayama, “Senryōki (Occupation Period ’45-’52),” *Tsūsi Nihon no kagakugijutsu 1* (The Social History of Science & Technology in Contemporary Japan, vol. 1) (Tokyo: Gakuyō shobō, 1995), 17-44; Shigeru Nakayama, “Introduction: Occupation Period 1945-’52,” *A Social History of Science and Technology in Contemporary Japan, vol. 1* (Melbourne: Trans Pacific Press, 2001), 23-56; Dong-Won Kim, *Yoshio Nishina: Father of Modern Physics in Japan* (New York: Taylor & Francis, 2007), 165.

the scientific community.⁵ Some scientists advocated the democratization of the laboratory, and organized the Association of Democratic Scientists (Minka) to unite science and democracy. In the postwar period, the Science Council of Japan (SCJ) was a significant institute organized to promote peaceful and democratic scientific research. A research institute founded through the support of some SCJ members was the Research Institute for Fundamental Physics (RIFP) at Kyoto University.

2.1. Foundation of the Science Council of Japan (SCJ)

A significant event of the postwar science movements was the foundation of the SCJ in January 1949. SCJ was established as a special organization under the jurisdiction of the prime minister,⁶ with the strong support of the Scientific and Technical Division of the Economic and Scientific Section (ESS/ST) of the GHQ.⁷ H. C. Kelly of the ESS/ST stated at the inauguration of SCJ on January 21, 1949 that according to the SCJ charter, “the Council [SCJ] is established on the conviction that science provides the basis of a cultural country, and by the joint will of the scientists throughout Japan, will contribute to the peaceful rehabilitation of Japan, the promotion of the welfare of human society, and the advancement of science in cooperative relationships with the academic societies of world.”⁸ Then, Kelly insisted that “in fulfilling these responsibilities, the individual members of the Council [SCJ] must first transcend their particular scientific fields of interest and locality.”⁹

The SCJ was a representative organization of Japanese scientists with “the purpose of promoting and enhancing the field of science, and having science reflected in and permeated into administration, industries, and people’s lives,”¹⁰ and it symbolized the reconstruction of science in the democratic regime. The SCJ consisted of 210 members in seven different sections, such as humanities (section I), social sciences (section III), natural sciences (section IV), and medical sciences (section VII). The members were elected democratically by the scientists and researchers belonging to each field.

The SCJ had several standing committees and special committees for specific issues. Among those committees were the Liaison Committee of Nuclear Physics (LCNP), the Liaison Committee of Physics Research (LCPR), and others. LCNP

⁵ Nakayama, *A Social History of Science and Technology*, 470-481.

⁶ See the website of the SCJ: <http://www.scj.go.jp/en/scj/index.html> (accessed on April 30, 2020).

⁷ Shigeru Nakayama, “Gakujutsutaisei no saihei (the Recognition of Research Structure),” *Tsūsi Nihon no kagakugijutsu I* (cit. n. 4), 132-141.

⁸ Nihon gakujutsu kaigi (SCJ), *Nihon gakujutsu kaigi 25 nen si* (25-Year History of SCJ) (Tokyo: Nihon gakujutsu kaigi, 1974), 22.

⁹ Ibid.

¹⁰ See footnote 6.

was established for “communicating with domestic and overseas [scientists] regarding nuclear research,” and LCPR, which functioned as the Japanese Committee of International Union of Pure and Applied Physics (IUPAP), was for “communicating with domestic and overseas [scientists] regarding physics research.”¹¹ In 1952, LCNP was reorganized into the Special Committee of Nuclear Physics (SCNP), aiming to “discuss how to conduct nuclear research, and to make decisions concerning future plans for nuclear research.”¹²

SCJ also began to make some concrete proposals to the government in order to improve the basis for the promotion of scientific research. The proposals in the early years of SCJ included matters concerning the administrative rearrangement of the scientific research institutes and research laboratories, the establishment of new research institutions, improvement of the patent system, a discussion of peace issues, proposals for nuclear research, and plans for participating in international conferences.¹³ In the proposals for new research institutes, the SCJ requested the establishment of research institutes for particular fields, such as nuclear physics, solid state physics, and protein research.

2.2. Establishment of the Research Institute for Fundamental Physics

The new research institutes proposed by SCJ were also intended to include a new system for joint research projects. This new type of research institute was defined as a national inter-university research institute (IURI) that would enable scientists from related fields to work together. The first example of this kind of institute was RIFP at Kyoto University. The RIFP building, called Yukawa Hall, was built in commemoration of Hideki Yukawa’s Nobel Prize in physics 1949, and the building opened in July 1952. RIFP started as a national research institute stationed at Kyoto University in August 1953,¹⁴ and became open to scientists working not only at Kyoto University, but also at other universities. The research system of RIFP would be an important prototype of IURIs in the 1950s, and the IURI system would become established within postwar Japanese academic communities.

From the end of 1949 to 1951, RIFP plans were discussed among Yukawa, who was in the United States as a visiting professor at Columbia University between 1949

¹¹ See SCJ, *Nihon gakujuitsu kaigi 25 nen si*, 531. The LCNP was part of the National Committee of Nuclear Physics, which had the task of reporting to the occupation forces on nuclear research in postwar Japan.

¹² *Ibid.*, 525.

¹³ *Ibid.*, 3-51.

¹⁴ On the establishment of RIFP, see Daisuke Konagaya, “Yukawa Institute Connecting Prewar, Wartime, and Postwar Science in Japan,” *The Korean Journal for the History of Science* 36:2 (2014), 205-215; “Kyōdōriyō kenkyūjo wa butsuri kenkyū o dō kaetaka (How the Inter-University Research Institute Changed Physics Research),” *Butsuri* 72:4 (2017), 258-262.

and 1953,¹⁵ Sin-itiro Tomonaga (1906–1979), who was in the United States as a visiting scholar at the Institute for Advanced Study (IAS) between 1949 and 1950, and the physics professors at Kyoto University and other universities. As most of the leading physics professors were also members of the SCNP and the LCPR of the SCJ, their thoughts and opinions influenced the establishment of RIFP through the meetings of the SCJ and its subcommittees. RIFP was founded through the actions of leading physicists of the SCJ, who were influenced by the democratic climate in postwar Japan.

The RIFP system reflected the postwar democratic transition and also other important scientific activities. It was also designed partially based on the system of the Institute of Physical and Chemical Research (RIKEN), in which the leading physicists had participated in prewar Japan, and the system of IAS at Princeton, where Yukawa and Tomonaga stayed between 1948 and 1950.¹⁶ RIKEN adopted a system that allowed scientists from other institutions to have their own RIKEN research groups. IAS had a system in which domestic and overseas scientists stayed for six months or one year and conducted their own research. Around 1950, while being influenced by the research systems of prewar RIKEN and the Princeton IAS system, the research system of RIFP was designed under the influence of the scientists' involvement in democratic movements in postwar Japan.¹⁷

2.3. The Joint Research System at RIFP

To carry out joint research with different scientists from other institutions, RIFP was managed by an executive board, an advisory board, and a research management committee.¹⁸ The executive board was formally the highest decision-making body of RIFP, but its decision-making had taken into consideration the determination of the advisory board. The advisory board was an organ responding to the RIFP director's inquiries about important matters concerning the institute. The research management committee was created to advise on the research conducted at the institute, including launching new research projects and selection of appropriate scientists for

¹⁵ Yukawa also stayed in Princeton as a visiting scholar at IAS between 1948 and 1949.

¹⁶ “Zadan Kisobutsurigaku kenkyūjo o megutte (Round-table Talk about RIFP),” *Tomonaga Sin-itiro chosakushū* 6 (Tomonaga Sin-itiro Collected Works, vol. 6) (Tokyo: Misuzu shobō, 1982), 244–280.

¹⁷ These sentences refer to the connection of Japanese scientific research systems between prewar and postwar periods. For the connection of technology between prewar and postwar periods, see, e.g., Hiromi Mizuno, Aaron S. Moore, and John DiMoia, eds., *Engineering Asia: Technology, Colonial Development, and the Cold War Order* (New York: Bloomsbury Academic, 2018).

¹⁸ On the executive board, the advisory board, and the research management committee in RIFP, see *Kiken annai* (Information about the Research Institute for Fundamental Physics) (Kyoto: RIFP, 1958), 19–25.

each new research project. In RIFP, there existed a horizontal (not vertical) relationship between the executive board, the advisory board, and the research management committee.

While the executive board members were composed of full-time academic staff at RIFP and Kyoto University, members of the advisory board and the research management committee were involved with other institutions and research groups. The first members of the advisory board consisted of eight academic and administrative staff members at Kyoto University and eight professors at other universities, and they were selected according to the intentions of the SCNP and the LCPR under the SCJ. The first members of the research management committee consisted of twenty particle physicists and ten solid-state physicists, and they were selected from a nationwide pool of scientists in the two fields, based on the decisions of the research groups on particle physics and solid-state physics in Japan. The management policies and research plans of RIFP were decided through the input of Japanese scientists from across the country, despite being an institution of Kyoto University.

One way in which RIFP at Kyoto University fulfilled its collaborative research function was hosting of the International Conference on Theoretical Physics (ICTP) at Kyoto University in September 1953.¹⁹ The ICTP in Japan was approved by the IUPAP at Copenhagen in 1951, and in 1953 ICTP was sponsored by the SCJ, co-sponsored by Kyoto University and the Physical Society of Japan (JPS), and prepared with the support of United Nations Educational, Scientific and Cultural Organization (UNESCO) and the Rockefeller Foundation. Eighty-four physicists and chemists from abroad participated in the ICTP, 15 of whom were later Nobel laureates, including John Bardeen and Richard P. Feynman. The international conference at Kyoto University was the first large conference for physics held in postwar Japan, and it greatly stimulated Japanese physics research activities.

RIFP had some original workshops to promote different joint research projects, and the research management committee organized workshops on non-local field theory, theoretical astrophysics, theoretical biophysics, and other topics.²⁰ The workshop system was mainly composed of two types of workshop: long-term workshops and short-term workshops. Long-term workshops were for broad discussions on major topics, such as quantum field, mesons, and atomic nuclei, over a period of two to three months. Short-term workshops were for deep discussions on topics introduced in the long-term workshops and for intensive improvement of those discussions over a period of one to two weeks. The research management committee of RIFP gathered the opinions of physicists related to particle theory and solid-state physics from all over the country, and through the committee, the members decided

¹⁹ On ICTP at Kyoto University in 1953, see Yoshio Yamaguchi, “1953 nen no Rironbutsurigaku kokusaikaigi kaisai to Kotani sensei (International Conference of Theoretical Physics 1953 and Professor M. Kotani),” *Butsuri* 49:6 (1994), 472-475.

²⁰ On the workshop system of RIFP, see *Kiken annai* (cit. n. 18), 31-46.

what kind of topic the workshop would discuss, who would manage the workshop, etc.

The RIFP workshops were operated through the research management committee, which reflected the opinions of researchers in the relevant fields. The new functions of the RIFP succeeded in facilitating the prompt exchange of opinions among the researchers and through these committees and workshops facilitated improvements in a wide range of research activities in Japan. The institute also contributed to the development of new fields, such as nuclear astrophysics and biophysics, the cooperation between theorists and experimentalists in some fields, and the international exchange of research through these workshops and the domestic and overseas researchers working within them.

RIFP's general activities, including these workshops and the international conference held in September 1953, had a major impact on Japanese academic communities. In the joint research system of RIFP, Japanese scientists could discuss and make decisions about the management of the research institute and its workshops; thus, the system was in line with the more democratic form of management sought after by postwar Japanese scientists. Therefore, the joint research system of RIFP became an important model that acted as a reference for newly established postwar research institutes.

3. The Institute for Nuclear Research as an IURI

Many postwar Japanese scientists participated in democratic movements and sought to improve their research conditions. SCJ actively advised the government on various policies to improve research conditions in basic science and recommended the establishment of other national institutes, similar to RIFP, which would work within a democratic research system. One recommendation was for the foundation of the Institute for Nuclear Research (INS) for nuclear physics research.

3.1. SCJ's Recommendation for INS

In May 1953, regarding how important basic research would be for the future of Japan, SCJ announced that "basic science research is not intended for direct practical use; it is the source of all progress and a crucial factor in determining the future destiny of humankind."²¹ Despite such high recognition, at the time in Japan research conditions for basic science were poor. Therefore, the SCJ advised the gov-

²¹ *Nihon gakujutsu kaigi 25 nen si* (cit. n. 8), 44.

ernment to recognize the importance of fostering basic science and give due consideration to its promotion. Particularly, SCJ recommended that the government establish INS for nuclear research, together with installation of a reflecting telescope for astronomical research, in order to enhance research facilities that promote basic science.²²

The SCJ thought that it was necessary to construct a large nuclear research facility and to establish a central research institution that could be fully utilized by scientists nationwide.²³ A research institute satisfying the following criteria had to be established: (1) have a large research facility; (2) develop a system for nationwide joint research; (3) have an organization that enables independent operation by researchers; (4) have staff unique to the institute and to engage actively in personnel exchanges with universities throughout the country; and (5) accept graduate students from universities and supervise their research.

SCJ not only requested the creation of a large and expensive nuclear research facility; it also asked the government to establish a democratically-operated research institute in collaboration with scientists across the whole country. This request was in line with the demands of Japanese scientists for the democratic management of science in postwar Japan, in addition to the need to establish a shared experimental facility in the field of nuclear physics. Since the research management of RIFP at Kyoto University was regarded as an important model for the democratic management of basic science, SCJ and related scientists proposed that INS also adopt the management system of RIFP.

RIFP was one of the research institutes of Kyoto University, but its advisory board, which was half made up of scientists from outside Kyoto University, and mainly managed the institute. The policies and operations of the RIFP research system were decided through discussions in the research management committee, comprised of scientists elected by researchers nationwide in their respective fields. Therefore, the actual management of RIFP was independently carried out under the autonomy of the scientists, or “the research community’s autonomy.”²⁴ Since at that time the management system of the institute was considered as a model for future IURIs, it was natural that most of the physicists thought that INS should adopt the same system as RIFP.

²² *Ibid.*, 44–46.

²³ *Ibid.*

²⁴ Hitoshi Yoshioka, “Gensikaku shōrai keikaku no hyōryū (Future Plans for Nuclear Physics Research Go Adrift),” *Tsūsi Nihon no kagakugijutsu 3* (The Social History of Science & Technology in Contemporary Japan, vol. 3) (Tokyo: Gakuyō shobō, 1995), 113–132, on 116; Hitoshi Yoshioka, “Future Plans for Nuclear Physics Research,” *A Social History of Science and Technology in Contemporary Japan*, vol. 3 (Melbourne: Trans Pacific Press, 2006), 167–190, on 170.

3.2. INS and the University of Tokyo

The relevant scientists opined that INS should be established in Tokyo. This choice partly reflected the location of cyclotrons in Japan during and after the war.²⁵ In Japan, three cyclotrons had been built in Tokyo and Osaka, and one cyclotron had been under construction in Kyoto until the end of the war.²⁶ A cyclotron is a device that accelerates charged atomic or subatomic particles in a constant magnetic field, and it was the most advanced device for nuclear physics experiments at the time. But all of the Japanese cyclotrons were destroyed while under the control of GHQ in November 1945. After the reconstruction of cyclotrons was approved in 1951, their reconstruction began at Osaka University, Kyoto University, and RIKEN in Tokyo.²⁷ RIKEN's 26-inch cyclotron with magnet poles 26 inches in diameter was planned in Tokyo, while Osaka University planned a 45-inch cyclotron and Kyoto University a 40-inch cyclotron.²⁸ Although being the smallest among the three under construction, the RIKEN cyclotron was completed first. Therefore, in the early 1950s, the only cyclotron available in Japan was RIKEN's small one in the Tokyo region. The relevant scientists wanted to build INS with large-scale experimental facilities in the Tokyo region.

The scientists thought that INS would adopt the RIFP management system, which allowed the participation of many researchers from universities across the country.²⁹ In establishing INS after the RIFP's management model, many scientists thought that it should be installed at the University of Tokyo. The establishment of INS in Tokyo was also an action to maintain a balance of power, as it was decided that major experimental equipment be set up at universities in both the Kansai region (the central area of western Japan) and the Tokyo region (the central area of eastern Japan).

In the case of RIFP at Kyoto University, the foundation of the institute was part of a project commemorating Hideki Yukawa's Noble Prize in 1949. Yukawa graduated from Kyoto University and was a physics professor there. Kyoto University advanced the RIFP establishment project by listening to the opinions of the physicist community, including Yukawa, and carefully exchanging opinions with SCJ and the

²⁵ Sin-itiro Tomonaga, "Gensikaku kenkyūjo no setsuritsu to Kikuchi sensei (Establishment of INS and Prof. Kikuchi)," *Tomonaga Sin-itiro chosakushū* 6 (cit. n. 16), 305-327.

²⁶ Masakatsu Yamazaki, *Nihon no kaku kaihatsu: 1939-1955* (Nuclear Development in Japan: 1939-1955) (Tokyo: Sekibundō, 2011); Akira Masaie, *Arakatsu Bunsaku to gensikaku butsurigaku no reimei* (Bunsaku Arakatsu and the Dawn of Nuclear Physics) (Kyoto: Kyoto University Press, 2018); Yoshioka, "Gensikaku shōrai keikaku no hyōryū" (cit. n. 24).

²⁷ RIKEN was known as the Scientific Research Institute (KAKEN) between 1948 and 1958. In 1958, KAKEN changed its name back to RIKEN. See the website of RIKEN: <https://www.riken.jp/en/about/history/story/> (accessed on May 29, 2020).

²⁸ Yoshioka, "Gensikaku shōrai keikaku no hyōryū" (cit. n. 24), 114.

²⁹ INS, *Kakuken nijū nen si* (20-Year History of INS) (Tokyo: INS, 1978), 23-24.

Ministry of Education, Science, and Culture. The final proposal for RIFP included a management system in which the institute would respect the decisions of its own advisory board and research management committee, which included physicists from other universities. After a difficult process of discussions with SCJ and related physicists over the establishment of RIFP, Kyoto University approved the special management system for RIFP in the early 1950s.

But in the case of Tokyo University and INS, there were more heated discussions than the case of RIFP at Kyoto University. This might have been due to the difference in school culture between the two universities. While Tokyo University cultivated a strong tradition of bureaucratic training and an authoritarian culture, Kyoto University developed a free culture that emphasized “independent learning” among their students.³⁰ The discussions on INS did not proceed smoothly. During negotiations with Tokyo University, the question over who would run the institute emerged as a heated issue. It was a conflict between the autonomy of the scientists and the autonomy of the university.³¹ The university wanted control over INS, whereas the scientists wanted to maintain autonomy over management. Although scientists in the field wanted to apply the RIFP management system, which guaranteed the autonomy of the scientists, the university pointed out that this might compromise the autonomy of the university.

When SCJ recommended that the government establish INS in May 1953, one of the items that the SCJ wanted to include into the system of INS was “to have an organization that enables the independent operation of researchers.” But Tokyo University thought that “it was difficult to make rules that would infringe on the autonomy of the faculty meeting or the council of INS at the university. It was considered difficult to establish a management committee [like the advisory board of RIFP at Kyoto University] with the rules [including the autonomy of the scientists] specified in the original draft, from the standpoint of the autonomy of the university.”³² The related researchers, on the other hand, were concerned about whether the university would respect “the research community’s autonomy.”³³

In the fall of 1953, Seishi Kikuchi (1902–1974), a representative member of the SCNP of SCJ and the first director of INS, and Tadao Yanaihara (1893–1961), president of Tokyo University, continued their tough discussions over the establishment of INS. Eventually, a common understanding between the nuclear physicists and

³⁰ See e.g. Morikazu Ushioji, *Kyoto teikoku daigaku no chōsen* (Challenge of Kyoto Imperial University) (Tokyo: Kōdansha, 1997).

³¹ Kohji Hirata and Yoshinobu Takaiwa, “Kyōdōriyō kenkyūjo niokeru jichi no sōkoku (Inter-University Research Institutes and the Conflict of Two Types of Autonomy),” *Kagakushi kenkyū* (Journal of History of Science) no. 293 (2020): 38–52. In their paper, the two types of autonomy were “the autonomy of the research community” and “the autonomy of the university.”

³² *Kakukē nijū nen si* (cit. n. 29), 24–25.

³³ Yoshioka, “Gensikaku shōrai keikaku no hyōryū” (cit. n. 24), 118; Yoshioka, “Future Plans for Nuclear Physics Research” (cit. n. 24), 171–172.

Tokyo University was reached. The university requested that the rules of INS include an article for the establishment of a management council, which is similar to the advisory board of RIFP at Kyoto University, reflected the opinions of scientists nationwide, in addition to the INS faculty.³⁴ Furthermore, it was requested that INS should not limit the number of INS professors with an affiliation to other institutions. The members of SCNP approved these requests, and this controversy over autonomy came to a resolution in December 1953.

3.3. Establishment of INS after Nuclear Turmoil

After the 1953 agreement, it was decided that INS would be established at Tokyo University and that the costs for the establishment of the institute in 1954 would be paid by the Japanese government. In April 1954, the preparatory committee (PI committee) for INS establishment was set up at Tokyo University. In the PI committee, Yanaihara, president of Tokyo University, served as the chairman, Seishi Kikuchi, who had been appointed as the first director of the INS, served as vice chairman, and Sin-itiro Tomonaga also joined as a member. The PI committee was responsible for the selection of full-time personnel, such as INS professors, the selection of the institute's location, the design of INS buildings, and so on.³⁵

In March 1954, the PI committee witnessed two difficult events. The first was that the preparatory costs for constructing Japan's first nuclear power plant were incorporated into the 1954 national budget. Japanese politicians, including Yasuhiro Nakasone (1918–2019), who had seen the peaceful, industrial use of nuclear energy in the United States in 1953, began preparing for nuclear power in Japan. Yet the Japanese academic communities, including the SCJ, felt that the nuclear budget was a political move that went against the wishes of the scientific community. In response to the event, some of the SCJ members tried to create rules for peaceful handling of nuclear power.³⁶

The second event was the Bikini Incident. On March 1, 1954, the United States conducted a powerful hydrogen bomb test, codenamed Bravo, at Bikini Atoll in the Marshall Islands.³⁷ A Japanese tuna fishing boat, the *Daigo fukuryū maru* (Lucky Dragon No. 5), was long-line fishing 160 km away from the test site during the bomb explosion. After the explosion, radioactive ash covered the boat, fishermen, and tuna, although they were outside the danger zone; the crew of the fishing boat subsequently came down with serious radiation poisoning. The *Asahi Shimbun* wrote of

³⁴ *Kakukun nijū nen si* (cit. n. 29), 25; *Tomonaga Sin-itiro chosakushū* 6 (cit. n. 16), 323.

³⁵ *Kakukun nijū nen si*, 25.

³⁶ Yamazaki, *Nihon no kaku kaiatsu: 1939-1955* (cit. n. 26), 152-158.

³⁷ For recent historical research on the Bikini Incident in 1954, see e.g., “The special issue: Nuclear Peril in International Contexts,” *Historia Scientiarum* 25:1 (2015).

the incident, “twenty-three crew members of the *Daigo fukuryū maru* were the third victims of atomic bombing in Japan, after Hiroshima and Nagasaki.”³⁸ The incident also made the Japanese people deeply fearful of the effects of nuclear energy.

It was in the midst of this nuclear turmoil in 1954 that the PI committee conducted discussions about the INS plan, including the location, personnel, and other matters. One of the problematic issues was the location INS, and the committee could not immediately reach a conclusion. Although several sites, including the sites of Tokyo University in Chiba and the Ministry of Transport in Mitaka, were listed as promising candidates, the discussion faced difficulty due to budget and jurisdiction issues, and a location could not be easily decided.³⁹ However, in July 1954, after discussions at Tokyo University, the university finally announced that the location would be in Tanashi. The Tanashi site was part of the Tama farm of Tokyo University and was easily accessible from the center of Tokyo. The final location was decided thanks to successful coordination between the executive members of Tokyo University and the Faculty of Agriculture at Tokyo University.⁴⁰

While various reactions regarding nuclear matters had been growing in Japan after March 1954, news of the proposed INS location was suddenly released to the people living in Tanashi. Strong opposition to the establishment of the INS took place in the town of Tanashi.⁴¹ Some Tanashi residents rejected the proposal because of the risk of radioactivity, especially after the Bikini Incident. Others questioned the difference between nuclear physics and nuclear power and suspected that INS would be a facility to develop atomic bombs. In response to such opinions, the Tanashi town council decided against the establishment of INS, and in July 1954, it submitted its decision to the president of Tokyo University.

PI committee members, such as Kikuchi, Tomonaga, and Hiroo Kumagai (1911–1977), had many rounds of discussion with the residents of Tanashi after the summer of 1954. In October 1954, not only local Tanashi residents, but also some scientists who were interested in the INS problem attended a meeting to discuss the matter, and they actively talked about the various issues concerning INS with members of the PI committee. The participants of the meeting raised many questions⁴²: Could INS be used for nuclear power or weapons? If the government provided a budget for the nuclear power, would INS scientists start studying this topic? How was nuclear research linked with the interests and well-being of the people? In response, the PI committee members replied with the following: “INS is not a place to study atomic

³⁸ “Bikini no hai (Bikini’s ashes),” *Asahi Shimbun*, March 17, 1957.

³⁹ “Sikichimondai kaiketsu e (Promote a Solution for the Site Problems),” *Yomiuri Shimbun*, May 20, 1954; “Gensikaku ken sikichi hongimari (The Site of INS was decided),” *Yomiuri Shimbun*, July 17, 1954.

⁴⁰ Hiroo Kumagai, *Jikken ni ikiru* (Live in the Experiment) (Tokyo: Chūō kōron, 1974), 189–190.

⁴¹ *Kakukun nijū nen si*, 26.

⁴² The History of Science Society of Japan, *Nihon kagaku gijutsu si taikai* 5 (The History of Science & Technology in Japan vol. 5) (Tokyo: Dai-ichi hōki shuppan, 1964), 391–394.

bombs,”⁴³ “...although we don’t know when and how nuclear research can be useful...that is the scientists’ job.”⁴⁴ These discussions ended without arriving at any decisive solutions.

Construction of INS started on October 19, 1954,⁴⁵ but in response to the abovementioned discussions, some physicists, residing close to the nuclear field, also argued against the establishment of INS. Although Tokyo University asserted that it would not stop construction even in the face of considerable opposition, some of the physicists insisted that they should stop construction until the project received approval from the residents of Tanashi. Discussions continued about the institute’s establishment in Tanashi among the physicists and sometimes with Tanashi town council members. However, the physicists feared that INS could not be established by stopping the construction, and they could not make a decision to stop it.⁴⁶ Although it took several years to construct the INS buildings due to a limited budget, the construction work proceeded steadily to the end. In July 1955, INS at Tokyo University was legally approved as a research institute with the purpose of “experimental research on nuclear and elementary particles and related theoretical research.”⁴⁷ The main building of INS was completed in Tanashi in May 1956⁴⁸; the INS faculty was organized in the end of 1956, and the rules of the faculty were outlined in January 1957.⁴⁹

4. INS and Problems with IURIs

The INS faculty took over the management of INS from the PI committee in November 1956, and then INS commenced with its work. As for the experimental facilities, many nuclear physicists had repeatedly had discussions about the facilities throughout the first half of the 1950s, and these discussions led to the installation of a 60-inch cyclotron. The first INS facility was decided to be a 60-inch synchrocyclotron operated in two modes. These were the frequency fixed (FF) mode and the frequency modulated (FM) mode, in order to produce several kinds of particles, such

⁴³ Kumagai, *Jikken ni ikiru* (cit. n. 40), 190-192.

⁴⁴ *Ibid.*, 393.

⁴⁵ “Kyo chakko kokuritsu Gensikaku kenkyūjo (Today, the Construction Work of INS starts),” *Asahi Shimbun*, evening edition, October 19, 1954.

⁴⁶ Kumagai, *Jikken ni ikiru*, 192.

⁴⁷ Law no. 44 (July 1, 1955) in the website of the House of Representatives, Japan: http://www.shugiin.go.jp/internet/itdb_housei.nsf/html/houritsu/02219550701044.htm (accessed on June 18, 2020).

⁴⁸ “Tōdai Gensi kaku kenkyūjo kansei (Completion of INS at the University of Tokyo),” *Yomiuri Shimbun*, May 29, 1956.

⁴⁹ *Kakukun nijū nen si* (cit. n. 29), 26-27.

as deuterons, α -particles, and protons.⁵⁰ The FF cyclotron at INS was completed in September 1957, and its first experiment was conducted in June 1958.⁵¹ The FM cyclotron at INS was completed in May 1958, and its first experiment was conducted in October 1960.

INS was approved as the second IURI for physics research in 1955. But even after its commencement in 1957, INS's ability to function as an IURI remained insufficient. In establishing INS at Tokyo University, the institute and the university had settled some of the conflicts between them in 1953, such as those concerning the creation of a management council at INS, a scheme which enabled INS to reflect the opinions of scientists nationwide. Furthermore, by the end of 1956, Tokyo University had also completed the rules for the management council. However, even after 1957, the management council had still not been organized at INS. Although the INS subcommittee of the SCNP had initially been acting as a substitute of the management council until the INS organized the council, the subcommittee opposed the rules of the council made by Tokyo University due to conflicts over personnel problems.⁵² After that, the INS subcommittee continued to play the role of the management council at the institute, and the management council remained non-existent at INS for about 20 years thereafter.

At the institute, the faculty of full-time scientists managed the research institute, but after getting to know the intentions of the INS subcommittee of the SCNP, the faculty also handled more important matters.⁵³ The faculty conducted the management of INS according to the intentions of the INS subcommittee, which was in line with the autonomy of the scientists. The management style was strongly oriented toward the development of democracy in postwar Japan. In the scientific community, democratic ideas were particularly connected with the joint management of various matters, ideas of egalitarianism, collectivism, and grassroots democracy.⁵⁴ The following situations illustrate how the institute was managed democratically. The INS subcommittee of the SCNP, which reflected the wide opinions of scientists in related fields, was mostly responsible for INS management. The four divisions of INS were high energy, low energy, theory, and cosmic rays, and they were each given equal priority. The INS personnel system had a fixed term, 5 years, in order to give equal opportunities to physicists throughout the country. When considering INS research projects, there was a tendency to prefer collaborative research.

The INS's thorough egalitarianism and democratic principles were sometimes

⁵⁰ Kumagai, *Jikken ni ikiru*, 193-200; Yoshioka, "Gensikaku shōrai keikaku no hyōryū" (cit. n. 24), 119.

⁵¹ See the website of KEK (High Energy Accelerator Research Organization): <https://www.kek.jp/en/About/History/> (accessed on June 18, 2020).

⁵² Hirata and Takaiwa, "Kyōdōriyō kenkyūjo niokeru jichi no sōkoku" (cit. n. 31), 43.

⁵³ *Kakukun nijū nen si* (cit. n. 29), 27.

⁵⁴ *Ibid.*, 12-22.

compared to a convenient “public toilet” that everyone could use freely.⁵⁵ Gyo Takeda (1924–), the third INS director between 1966 and 1968, recalled about INS at that time as follows: “It was a surprising fact that many scientists moved to other universities for the fixed-term system [of the personnel] of INS, and one research institute [INS] supplied a large number of scientists to outside institutions for just 20 years.”⁵⁶ Even if the scientists worked at one of four divisions in the INS, they had to know most of the goings-on of all the divisions. Since “the INS democracy” strongly trained the scientists, it was said that if scientists could work at INS, they could work anywhere. For Takeda, INS also served as a training ground for scientists to incorporate into themselves the scientists’ sense of democracy and to learn how to work in a democratic environment. He strongly encouraged the autonomy of the scientists, which was highly evaluated at the time.

In addition to INS, SCJ recommended other IURIs to the government. At the general meetings of SCJ in 1956, it recommended the establishment of a research institute for solid state physics (ISSP) and a central institute for protein research (IPR) to the government. As a result, in 1957 the ISSP was established “to promote condensed matter physics [solid state physics] and materials science research in Japan,” as one of the IURIs at Tokyo University, despite the INS problem.⁵⁷ Then IPR was established “with the aim of facilitating close cooperation among researchers from a wide variety of scientific fields had continuously grown among scientists in the relevant fields” in 1958, as the first IURI at Osaka University.⁵⁸ At the general meetings of SCJ in 1958, the establishment of a research institute for mathematical sciences, an institute for ocean research, and an institute for plasma research, were requested by the long-term research plan committee of SCJ.⁵⁹ In April 1961, the Plasma Research Institute (PRI) was established as the first IURI at Nagoya University; in April 1962, the Ocean Research Institute (ORI) as one of the IURIs at Tokyo University; and in April 1963, the Research Institute for Mathematical Sciences (RIMS) as the second IURI at Kyoto University.

In sum, during the 1950s, IURIs were established at several national universities, such as Kyoto University and Tokyo University, and they then became the centers of joint research projects in particular fields. As the case of INS at Tokyo University showed, the management system of IURIs took a form that attached importance to the opinions of scientists across the country, while the decision-making of IURIs also depended on the university. The IURI system basically elicited conflicts between the autonomy of the scientists and the autonomy of the university. As long as

⁵⁵ *Ibid.*, 21–22.

⁵⁶ *Ibid.*, 22.

⁵⁷ See the website of ISSP: http://www.issp.u-tokyo.ac.jp/maincontents/about_en.html (accessed on June 20, 2020).

⁵⁸ See the website of IPR: <http://www.protein.osaka-u.ac.jp/en/about/history> (accessed on June 20, 2020).

⁵⁹ *Nihon gakujutsu kaigi 25 nen si* (footnote 8), 84–85.

the IURI system continued its operation at universities, these kinds of problems would not disappear.

Even if INS is a particular difficult case-in-point, the fact that the institute could not organize its own management council for about 20 years shows how serious the conflicts were. After all, it might have been unsustainable to operate huge experimental facilities that required a large budget in the IURI system at a specific university. After around 1960, relevant scientists began to discuss the possibility of such experimental facilities under a new system of a national laboratory, independent of the IURI system belonging to the universities. These discussions faced extreme difficulties and continued for about 10 years. One of the fruits of these difficult discussions was the National Laboratory for High Energy Physics (KEK), which was founded in Tsukuba in 1971.

Over half a century after 1953, about fifty IURIs were established, but several large-scale research institutes among them, such as KEK (1971), the Institute for Molecular Science (1975), and National Institute for Basic Biology (1977), became research facilities under the direct control of the Ministry of Education, without belonging to national universities. INS was integrated into KEK in 1997, ceasing to operate independently. This integration of INS and KEK put an end to the approach of managing a large-scale institution with huge equipment, which had been discussed among the relevant scientists in the 1950s and 1960s. In 2004, large-scale research institutes, including KEK, were reorganized under a new organization of “inter-university research institute corporation (IURIC),” which is different organization from the IURIs. In 2008, the IURIs of national universities, such as RIFP (Kyoto University, 1953), ISSP (Tokyo University, 1957), and IPR (Osaka University, 1958), were reorganized under a new system: joint usage/research center (JURC). This system is not limited to national universities but also includes public and private universities. In 2020, one hundred research institutes and centers were operated as JURC institutions at fifty-three universities (thirty national universities, twenty-three public and private universities) in Japan.⁶⁰

5. Conclusion

During the democratic transition in postwar Japan, many leading scientists eagerly wanted a peaceful and democratic management approach to science, and they organized a variety of specific committees and meetings in their communities, such as the SCJ, and talked about the democratic management of their new scientific research. One of the outcomes of those discussions was the IURI system. In the early 1950s, the management system of RIFP became an important prototype of the IURI

⁶⁰ See footnote 3.

system, and in the RIFP system, management policies and research plans were decided by consensus within the scientific community through their networks of nationwide research groups, even though RIFP was a research institute of Kyoto University. The RIFP system was an ideal model for most scientists who sought democratic management of research in postwar Japan.

A leading model for the IURI management system worked well in the case of RIFP at Kyoto University. But its model also ran into conflict between the autonomy of the scientists and the autonomy of the university over the management of research institutes. In the case of INS at Tokyo University, although the IURI system worked in general, its management system caused several serious organizational problems. With the establishment of INS at Tokyo University in the early 1950s, INS and Tokyo University found a solution to their organizational conflicts by creating a management council, which would reflect the opinions of scientists across the country. However, the management council did not come into existence for about 20 years, and the INS subcommittee organized by SCNP continued to function as a substitute. From the scientists' point of view, the IURI system was considered an example of an ideal democratic management system, but it produced a serious contradiction for the management of research institutes belonging to the universities. INS was eventually integrated into KEK in 1997, such that it became part of the future IURIC for institutions equipped with huge facilities and large research projects. This fact revealed that the IURI system was not quite suitable for managing research institutes with expensive and huge experimental facilities, such as large accelerators.

While Japan rapidly changed to a more democratized society in the 1950s, many Japanese scientists sought a democratic research system and an egalitarian management of science. They gathered opinions from scientists across Japan about how to accomplish that goal. In establishing RIFP and its management system, the physicists of the main SCJ and SCNP members, together with the nationwide research groups, discussed those problems and tried to solve them through RIFP's management system. In 1953, RIFP was created as a prototype of the IURIs. It might be viewed an ideal model for the self-management of science based on the autonomy of the scientists in a limited context. But as the number of scientists increased and the scientific communities grew, the experimental facilities required an extremely large budget, and the trend of international relations had a direct impact on scientific research, such as for nuclear research. In fact, the scientists had no choice but to conduct difficult discussions about the direction of scientific research and the establishment of INS, especially after the Bikini Incident in 1954. Through the 1960s, they also were unable to coordinate their opinions concerning the future of the KEK and eventually had to stop the plan, although the KEK was established in 1971 after repeated compromises.

To develop a system for the management of science in a wide context, the scientists had to consider political, administrative, and bureaucratic situations as well as the opinions of their own communities. In particular, the INS case demanded that

the scientists pursue both their ideas and also deal with complex situations, such as domestic and overseas issues concerning nuclear research, domestic issues of future nuclear administration, and the impact of international relations influenced by realities of the Cold War. In facing the INS problem, most of the physicists understood the potential as well as the limitations of their desire to promote postwar democratic management of science in the complicated context of Japan in the 1950s.

Abstract

In the 1950s, postwar Japanese scientists argued for the establishment of new research institutes that would pursue a democratic management of science. Their discussions led to the establishment of national inter-university research institutes (IURIs) for joint research activities, such as the Research Institute for Fundamental Physics (RIFP) at Kyoto University and the Institute for Nuclear Research (INS) at the University of Tokyo. IURIs served as important joint research centers in various fields in postwar Japan. In the management system of IURIs, despite belonging to the national universities, the scientists made up an organ reflecting the opinions of scientists across the country. In the initial stages, the IURI model seemed to work well as an ideal approach to the democratic management of science. However, in the case of INS, the system resulted in a conflict between scientists and the university, and the IURI system led to several serious organizational problems. The establishment of INS also faced difficult problems over nuclear research after the Bikini Incident in 1954.

Keywords: inter-university research institutes, democratic management, postwar Japan, nuclear physics, particle physics, the Bikini Incident