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A Hesitant Relationship Reconsidered

University-Industry Cooperation in Postwar Japan

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1. Introduction

The need for more intensive collaboration between universities and industry has been well-recognized in recent years in Japan, and various attempts are being made to construct a closer relationship between the two sectors. Although such collaboration existed on a much smaller scale in the past, the student protests of the late 1960s inhibited it. However, university-industry collaboration was strong in prewar Japan, when universities were funded by foundations as well as the government. This chapter explores the differences before and after the Second World War, first surveying funding from industry to universities in the prewar period. It will then analyze three important events that may have influenced the relationship: the Occupation, technology importation, and the student protests.

2. Prewar Background

A symbolic episode showing the close tie between universities and industry was the Furukawa family's donation to the foundations of Kyushu and Tohoku Imperial University. Furukawa owned a large mining corporation and had made a fortune during the Sino-Japanese and the Russo-Japanese Wars, but its mine caused a serious pollution in Ashio, which developed into a political scandal. The Furukawa family decided to donate a large sum of money for the establishment

of new departments of the above two universities at the suggestion of Takashi Hara, Minister of Interior, who was serving as an advisor for the Furukawa Corporation.[1]

Although less dramatic than this example, many large *zaibatsu* and industrialists, some of whom had made fortunes during the above two wars and the First World War, donated handsome sums to assist the establishment and consolidation of universities and their attached research laboratories. For example, the Sumitomo Corporation helped support a major expansion of the Metallurgical Research Laboratory of Tohoku Imperial University, and the industrialist Ginjirō Fujiwara helped establish the Engineering Department of Keio University.

Donations from industrialists and corporations were an important financial source for the universities, though they also received government funding. As in the United States, philanthropic foundations were also important financial supporters of university investigators in prewar Japan. The following foundations provided actively for social welfare as well as the advancement of research and development: Morimura Hōmei Kai (1913), Tōshōgū Sanbyakunensai Kinenkai (1914), Keimei Kai (1918), Harada Sekizen Kai (1920), Saitō Hōon Kai(1923), Taniguchi Kōgyō Shōrei Kai (1929), Hattori Hōkō Kai (1930), Asahi Kagaku Kōgyō Shōrei Kai (1934), and Mitsui Hōon Kai (1934). The word "Hōon (報恩)" in the names of some of these foundations means the requital of kindness, indicating that their mission was nationalistic and patriotic as well as philanthropic; financial support for research and development at universities was considered a patriotic deed in these periods.[2]

Just as many corporations contributed financially to universities, so many university faculty members served as technical consultants for corporations in prewar Japan. At one Diet meeting, it was suggested that university professors were too frequently engaged in consulting work for private corporations, to the detriment of the education of

1. Akira Tachi, "Kigyō to Daigaku: Senzen no Sobyō (Corporations and Universities: A Sketch of Prewar Period)," *IDE*, no. 244 (1983): 3–11.
2. Yujiro Hayashi and Yoshinori Yamaoka, *Nihon no Zaidan* (*Foundations in Japan*) (Tokyo: Chuo Koron Sha, 1984), pp. 43–130.

their students. It was, however, argued that the raison d'être of the universities was to serve the nation and that professors' consulting work should be considered national service.[3]

Because of this consulting work, the quality of research work at universities appeared lower than those at Western universities. Hidetsugu Yagi, the father of Japanese electronics research and director of the Board of Technology—the Japanese counterpart to the OSRD (and so highly regarded that Karl Compton called him "the Vannevar Bush of Japan")—recalls the following prewar episode when his German mentor Heinrich Barkhausen visited Japan. Barkhausen, a leading electronics engineer, told him that he had expected large corporations such as Mitsui and Mitsubishi to have excellent research laboratories. Surprised to find none, he pointed out the need for such research laboratories if the companies were to be competitive in the world, and further remarked that university professors were instead engaged in the kind of R&D activities that would be more naturally pursued at industrial corporations.[4] Yagi could only answer that Japanese shareholders expected high dividends and did not respect corporate R&D efforts which, they considered, would not increase their dividends.

The above two episodes reveal that there were generally very few R&D efforts at industrial corporations, and therefore that the engineering faculty from Japanese universities took the role of pursuing industrially oriented research and development.

3. The Wartime Mobilization of Science and Technology

After the war began, university and industrial research was geared

3. James R. Bartholomew, *The Transformation of Science in Japan: Building a Research Tradition* (New Haven: Yale University Press, 1989), p. 230.

4. Hidetsugu Yagi, *Gijutsujin Yawa* (*Night Stories of an Engineer*) (Tokyo: Kawade Shobō, 1953), pp. 130–31, quoted in Shigeru Nakayama, "Kigyōnai Kenkyū Kaihatsu Katsudō no Kōryū: Chūo Kenkyūjo Būmu," in *Tsūshi Nihon no Kagaku Gijutsu* (*The Social History of Science and Technology in Contemporary Japan*) vol. 3 (Tokyo: Gakuyō Shobō, 1995): 44–50.

to military purposes. The government took measures for rapid expansion of scientific and technological departments at universities and a variety of new research laboratories were set up to conduct war work. At Tokyo Imperial University, the Second School of Engineering was established to meet the sharply increased demand for young engineers for military R&D. The number of engineering faculty and students was doubled.

Other universities also established various research laboratories before and during the war. The following is a list of such academic research institutes established in the 1930s and 1940s.

1930s: Architectural Materials (TIT), Telecommunications (Tohoku), Resource Chemistry (TIT), Industrial Science (Osaka), Precision Machinery (TIT)

1940s: Ore Dressing (Tohoku), Low Temperature (Hoku), Fluid Engineering (Kyushu), Ceramic (TIT), Scientific Measurement (Tohoku), Elastic Engineering (Kyushu), Ultra Short Wave (Hoku), Catalysis (Hoku), High Speed Dynamics (Tohoku), Aeronautical Medicine (Nagoya), Acoustics (Osaka), Wood Materials (Kyoto & Kyushu), Glass (Tohoku).[5]

Some research laboratories were planned but not built during the war. The Research Institute for Aerial Electricity at Nagoya Imperial University was designed to investigate the technology of meteorological forecasting in the southern areas by measuring the disturbance of aerial electricity. Its research initiated during the war, but it was not established until afterward.

Two points should be mentioned on the prewar and wartime origins of many of these university research laboratories. First, although some of them had long traditions of relevant research and many continued to pursue significant investigations in their own technological fields, the nationwide arrangement of research laboratories at Japanese universities was not designed to adapt to the postwar Japanese econo-

5. TIT: Tokyo Institute of Technology. Tohoku: Tohoku Imperial University. Hoku: Hokkaido Imperial University. Osaka: Osaka Imperial University. Kyushu: Kyushu Imperial University. Kyoto: Kyoto Imperial University.

my. Because of the tenacity of the national university system and their wartime origins, some university laboratories found it difficult to adjust to postwar industrial conditions.

Second, some of these research laboratories were beneficiaries of adjunct foundations, which formed a financial conduit between industry and university in order to fund their parent research institute. The Foundation of the Advancement of Telecommunications Technology, for instance, was established in 1944 to support the Telecommunications Research Institute of Tohoku Imperial University. The foundation, however, did not take an active role as a financial conduit until around 1953. In 1956, seventeen percent of the total budget of the Telecommunications Research Institute came from this foundation.[6] These adjunct foundations served as financial supporters of postwar university laboratories.

Another notable feature of the Japanese wartime mobilization was the establishment of a research group called "Kenkyū Tonarigumi (Research Neighborhood Group)." These groups, each of whose missions was intended for investigation into a specific technological field, consisted of academic and industrial engineers and facilitated the exchange of fresh technical information among its members. The discovery of a new dielectric characteristic of a titanium alloy was reported at the 8012th Kenkyū Tonarigumi, which consisted of engineering professors from Tokyo, Kyoto, Nagoya, Osaka, and engineers from Toshiba, Hitachi, and others. The information network developed by this wartime arrangement would serve university-industry collaboration in postwar Japan.

4. The Occupation and the Reorganization of the University System

With the end of the war, the institutional system of research and development in Japan was forced to change radically. The emerging postwar framework of the university-industry relationship was deeply

6. Tohoku University, ed., *Tohoku Daigaku Gojūnenshi* (*The Fifty Year History of Tohoku University*) (Sendai: Tohoku University, 1960), pp. 1651–53.

influenced by the educational and industrial policy implemented by relevant sections of the Occupation's General Headquarters (GHQ) under the Supreme Commander of the Allied Powers. Their initial and primary purpose was to demobilize and democratize the entirety of Japan. For this purpose, they ordered the Japanese leaders to abolish old institutions and organize new ones. Accordingly, the military R&D activities in wartime Japan were thoroughly investigated, and most of them stopped and disbanded. The experimental cyclotron of the Institute of Physical and Chemical Research (Riken) was destroyed and thrown into the sea, and all aeronautical research was forbidden.[7] While the GHQ attempted to create a new national system of research and development at universities and industries, their policy was not entirely consistent among their sections and throughout the period of the Occupation. These policies and their inconsistencies cast a shadow on the postwar relationship between universities and industry in postwar Japan.

Reparations were the main issue during the first phase of occupation, and the original policy of GHQ was to reduce Japan's economic level to that of other Asian countries that had been exploited by military Japan during the war, for which they planned to confiscate half the equipment and facilities still in Japanese factories. But around 1947, they significantly moderated their former economic policy owing to the advent of communism in China and the rise of the Marxist movement inside Japan. The National Security Council announced a change of policy toward Japanese economic recovery due to the movement of Communist threat; instead of reducing the economic power of postwar Japan to the prewar level, they began to promote Japan's economic activities.

One of the organizations chiefly responsible for the reorganization of Japanese scientific and technological R&D was the GHQ's Economic and Scientific Section (ESS). It helmed a Scientific Division, later renamed the Scientific and Technological Division (ESS/ST),

7. On the disposal of the cyclotron and the demobilizing process during the Occupation, see Morris Low, *Science and the Building of a New Japan* (New York: Palgrave Macmillan, 2005), chapter 3 "The Impact of the Allied Occupation: Nishina and Nakasone."

which was in charge of scientific and technological matters relating to economic problems. Many New Dealers, it is told, joined the ESS, and they were active in disbanding large Japanese concerns. But some officials at the ESS tried to reorganize and reestablish a new Japanese R&D system in order to help the restoration of the postwar Japanese economy. Harry Kelly, at ESS/ST, was one of them.

Kelly, a young physicist who had worked on the development of radar at the U.S. Radiation Laboratory during the war, was invited to assist with the technical details in investigating Japanese devices and facilities. In communicating with Japanese scientists, Kelly found that GHQ did not need to concentrate on the demobilization of wartime research activities, but rather should pay more attention to restoring the devastated Japanese economy and reforming its research and development system.[8]

ESS/ST accordingly emphasized the importance of industrial applications of academic research, and attempted to strengthen the tie between universities and industry. In 1947, under Kelly's initiative, it sponsored a "science advisory group" organized by the American National Academy of Sciences, which turned in a report on the "Reorganization of Science and Technology in Japan" and suggested that they set up an Advisory Council on Higher Education and Research be established, following its own model. This eventually led to the establishment of the Science Council of Japan (日本学術会議). At the same time, the report mentioned the condition of university research. It criticized its orientation toward basic research, saying that too much emphasis on basic research was detrimental to applied research.[9] The ESS/ST proposed this report as a basic policy text, and emphasized the importance of education in science and technology for the sake of the economic recovery of Japan.

8. Hideo Yoshikawa, *Kagaku wa Kokkyō o Koete: Kerī Hakushi Hyōden* (*Science Crosses over the National Boundary: A Biography of Dr. Kelly*) (Tokyo: Mita Shuppankai, 1987) recounts Kelly's biography and activity in postwar Japan.

9. "Report of the Scientific Advisory Group to the National Academy of Sciences on the Reorganization of Science and Technology in Japan." See Takashi Hata, "Shinsei Daigaku to Rikō Kyōiku (New-system Universities and Education of Science and Technology)," in *Tsūshi Nihon no Kagaku Gijutsu*, op.cit., vol. 1, pp. 143–51.

However, the proposal of ESS/ST was strongly opposed by the Civil Information and Education Section (CIE) which was responsible for the reformation for the newly democratized educational system. The CIE worked to reform the Japanese educational system, beginning by implementing the American 6-3-3 system in primary and secondary education. In reforming the universities, they emphasized the importance of liberal education at the college level.

In opposition to the policy of the ESS/ST, the CIE argued that scientific research was only one of the many functions of the university, and that the university's primary goal was to "train and produce all kinds of leaders needed for a free society." It therefore proposed that the report should be accepted only insofar as it was not against the policy and plan already adopted by the CIE. In this way, CIE argued for the importance of the autonomy of university professors and university education away from industrial goals. Scientists and engineers were certainly necessary for the economic recovery of postwar Japan, it said, but their number had grown so greatly during the war that there were enough of them for postwar Japanese needs.

In the end, the ESS/ST policy was not implemented in Japanese universities, which were largely shaped by the policies of the CIE.

5. The Importation of Technology

By the early 1950s, the San Francisco Peace Treaty ended the Occupation, and the Japanese government started to implement its own economic and industrial policy. As foreign capital regulation was greatly relaxed, Japanese corporations began vigorously to introduce the advanced technologies of foreign companies. To introduce foreign technologies, a Japanese company had first to submit a proposal and receive permission from the government. The proposals were examined by government officials and academic engineers. The abovementioned Yagi was one of these examiners. Between 1950 and 1960, over a thousand technical innovations had been introduced (most of them from U.S. companies), at a total expenditure of more than 100 billion yen.

There were various forms of purchasing foreign technologies. The Japanese companies could simply buy patent rights relevant to a specific industrial product, but in many cases they obtained not only such patent rights and design drawings but also the services of engineers to provide on-site technical know-how. This was especially helpful in introducing technologies relating to new production systems such as oil refining and automobile production.[10]

The introduction of Western technologies has been the most important concern of Japanese industrial leaders from the Meiji Restoration onward; the direct introduction of cutting-edge technology from foreign to Japanese companies significantly influenced the relationship between university researchers and industrial corporations. University researchers had no doubt played an indispensable role as technological consultants in earlier technological transfers, being able to understand the foreign technologies, to explain them to industrial engineers, and even occasionally to transform them for domestic industrial needs. But now the technical staff of Japanese companies was in touch with their counterpart companies, and they learned directly about advanced technologies from U.S. or European companies. Because of this cooperation, the previous role of the university researchers as technology transfer agents became minimized.

Between 1955 and 1963, in an attempt to introduce foreign technologies, Japanese firms established a total of 108 "central research laboratories," and invested heavily in new facilities. Especially in the electrical and chemical industries, technology importation required a substantial research and development effort was required to digest advanced technologies from foreign countries. These "central" laboratories were established during the last phase of the investment boom. Many were the result of the reorganization of small laboratories within the same company, and aimed at introducing and digesting foreign technology. But others aimed at developing their own new technologies.

During this period large corporate research laboratories recruited

10. Katsuhiro Arai, "Gijutsu Dōnyū (the Importation of Technology)," in *Tsūshi Nihon no Kagaku Gijutsu*, op.cit., vol. 2, pp. 158–69, on p. 166.

many university researchers, and some corporate researchers even boasted that universities were unnecessary for industrial research and development in Japan. While certainly an exaggeration, this implies the superiority of research facilities at corporate laboratories to those at universities. By the mid-1960s, however, the boom was over; the recession forced companies to cut the budget of their research laboratories.

6. The Research Institute as a National Engineering Forum

Some industries soon recognized the need for research and development of their own technologies, and the need for domestic technology, in which academic engineers played critical roles. Episodes from the two leading Japanese industries—steel and shipbuilding will serve examples.

In the Japanese steel-making industry, corporations adopted advanced foreign technologies—machines, processes, and designs. However, such technological transfers impeded further development of industry: As the Japanese corporations grew larger and more competitive in the international iron and steel market, foreign corporations became less willing to share their advanced technology with their potential competitors. Secondly, and more importantly, Japanese metallurgical engineers gradually became aware of the potential problem of technical reliance on foreign companies. They recognized that because the users of their steel products also relied on other foreign technologies, they lacked information on the physical properties of the materials they purchased were thus unable to develop reliable new products.

For this reason the National Research Institute for Metals (金属材料研究所) was established in 1956 under the newly established Science and Technology Agency. Its official function was to perform (1) research on the production and processing of metallurgical materials which required equipment outside the scope of one corporation; (2) basic research on a consistent production processes from materials to products; (3) research on the production and processing of metals

appropriate to the natural resources of Japan; (4) research on metallic materials for nuclear and aeronautical technologies; (5) research on the production of pure metals; and (6) materials testing requiring large-scale facilities, and the development of metallic materials that private corporations were unable to produce.

The same year, the Science Council of Japan further requested that the Science and Technology Agency establish a new research laboratory on the physical properties of metallic materials. And the next year, in 1957, an Institute for Solid State Physics (物性研究所) was established at the University of Tokyo. Its first director was Seiji Kaya, a notable metallurgical physicist. At the Research Institute for Industrial Technology (生産技術研究所), a blast furnace for experimental purposes was built in 1955 and metallurgical research and development began. Research laboratories were also established at private corporations. In 1959 and 1960, such research laboratories were set up at Fuji Seitetsu, Yawata Seitetsu, Sumitomo Kinzoku, Nihon Kokan, and Kobe Seikojo. From these corporative research laboratories important industrial innovations emerged, some of which were transferred to foreign corporations.

The Japanese shipbuilding industry also recognized the need for cooperative research, especially for the construction of supertankers of greater than 50 thousand tonnes capacity. For this purpose a Shipbuilding Research Society was established. In the postwar development of the Japanese shipbuilding industry, both prewar and wartime naval engineering played an indispensable role, and in postwar Japan it provided new key technologies as well as niche for those leading naval engineers who had gone into the private sector due to postwar restrictions on bureaucratic positions. In 1955 a 45,000-tonne supertanker was built by Mitsubishi, and the shipbuilding companies received orders for still larger tankers. But the design and construction of ships larger than 60,000 tonnes required technological breakthroughs on welding, structure, and performance of such large ships: As an example, thicker steel plates were harder to weld, which required the development of both special steel and special welding techniques.[11]

11. Eiichi Kaneko, ed., *Gendai Nihon Sangyō Hattatsushi* (*A History of Industrial Develop-*

Because of this necessity to develop new technologies, a new Japanese Society for the Research of Naval Architecture was established as a forum for representatives from shipbuilding companies, ship-owners, academic laboratories, and the government. Their three-year research on the subject brought new technological information which was fully utilized for the subsequent construction of the new class of ships. Among others, *Nisshō-maru*, a 130,000-tonne tanker, attracted worldwide attention.

The above two industries, based on a prewar accumulation of relevant technologies, were perhaps exceptional. But they show how academic engineers were able to contribute to important developments of industrial technologies. The national and academic research institutes served as a forum for the exchange of technological information between engineers from both academia and the industry; annual meetings of professional engineering societies also provided an important forum for information exchange not only between academia and industry but also between industries, through academia. Japanese corporations were a fairly closed world, and these public forums were catalysis for one corporation to provide technical information to another.

7. Collaboration Encouraged and Discouraged

As Sputnik in 1957 had a great impact on scientific and technological research and education at American universities, the Ministry of Education in Japan also decided to promote scientific and technological education at universities. In that year, Chūō Kyōiku Shingikai, the main advisory board of the Ministry of Education, proposed measures to promote scientific and technological education. The report pointed out the poor financial and material conditions at universities and the need to improve both their research facilities and the quality of their graduates. As to university and industry cooperation, the report stated that universities should engage in "closer cooperation

ment of Contemporary Japan), vol. 9 (Zōsen) (Tokyo: Kojunsha, 1964), p. 474.

with industry by taking into account requests from industry and by sending students to industrial factories," and that "attached university laboratories should be able to re-educate engineers in industry."[12] The University of Tokyo accordingly changed its rules, and began to encourage industrial engineers to visit its laboratories.

Industrial leaders, too, acknowledged the urgent need to cooperate more closely with the university in recruiting competent engineers and collaborating on industrial research. "Keizai Dōyūkai (経済同友会)," a group of such industrial leaders, actively promoted such collaborative relationships between industry and universities, and even planned to establish a center for industry and university collaboration.[13]

Thanks to these policies and efforts, in the 1960s the engineering departments of universities began to receive more financial support from relevant industries. Such donations allowed the University of Tokyo, for instance, to build many research facilities, and the Engineering School responded by reorganizing and expanding its departments to adapt to contemporary industrial needs.[14]

The movement toward closer ties between universities and industry was blocked by the student protests of the late 1960s: While American universities were excoriated for their military connections, Japanese students criticized the close relationship between the universities and private corporations. I will cite two statements responding to this protest movement, one by industrial leaders and the other by leaders at a university.

Industrial leaders responded to the student protests by emphasizing the social need for such collaboration and proposing to reform the university administration. The Keizai Dōyūkai group proposed a doc-

12. Chūō Kyōiku Shingikai, The Fourteenth Report, "Measures to Promote Scientific and Technological Education" (1957).

13. "On the industry and universities' collaboration of Keizai Dōyūkai," *Asahi Shimbun*, 10 July 1960. Quoted in Yokohama Kokuritsu Daigaku Gendai Kyōiku Kenkyūjo, ed., *Zōho Chūkyōshin to Kyōiku Kaikaku: Zaikai no Kyōiku Yōkyū to Chūkyōshin Tōshin* (*Zen*) (*The Central Educational Board and Educational Reform Policy: Pedagogical Requests from Industry and the Reports of the Board*) (Tokyo: Sanichi Shobō, 1973), pp. 201–2.

14. Tokyo Daigaku Hyakunenshi Henshū Iinkai, ed., *Tokyo Daigaku Hyakunenshi* (*The Centennial History of the University of Tokyo*) vol. 3 (Tokyo: University of Tokyo Press, 1987), pp. 648–49.

ument, "The Institution of Higher Education for the Advanced Welfare of Society," as their specific response to the student movement.[15] Concerning university-industrial cooperation, it stated:

> Keizai Dōyūkai have been proposing the urgent need to promote university-industry cooperation since 1959. We consider that such cooperation is necessary for universities to play a leading role in the coming advanced welfare society, and repeat our view below.
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> University-industry collaboration coincides with modern educational thought to encourage the shift from "learning for the sake of learning" in an ivory tower to "academic research open for society." The history of the relationship between universities and industry in the United States, the USSR, and Japan, which accomplished rapid industrialization, would tell us that both grew and developed stimulating each other and that university-industry collaboration is a historical trend.
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> Some delimit university-industry cooperation as a simple exchange of money and ideas between a specific researcher at a specific university and an individual corporation, and regard it as a wrong effort to make university researchers industrial subcontractors and to distort research freedom. But the functions of universities and industry interact with each other to drive social development, and their cooperation exists in various fields. Furthermore, the advancement of industrial research and development, the emergence of big science, the increasing social demand for adult education—all will increase the importance of their cooperation.
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> The reason we dare to promote university-industry cooperation is that the institutional structures of universities do not respond to tendencies in real society. So-called academic freedom would be diminished, if applied research did not open new fields for basic research or if theoretical research did not relate to real processes. We oppose the attitude that criticizes a part of the university-industry collaboration and denies it altogether. We have to maintain the present state of collaboration and push forward a new organization and

15. Quoted in *Chūkyōshin to Kyōiku Kaikaku*, op.cit., pp. 246–64

> rule to correct present errors. The question will arise as to the financial distribution between technological areas relating to production and humanities areas relating to the national and traditional culture and values. This question will be solved by the redistribution of a specific proportion of funding from industry to the latter research areas or by establishing large multi-purpose foundations.[16]

After stating its view on university-industry cooperation, Keizai Dōyūkai proposed a plan to reform the university organization, including the recommendation to recruit on a contractual basis and reorganize all universities as non-profit corporations.

In contrast to the industrialists' statement, a statement from the university community clearly showed its more restrictive view on university-industry cooperation. The following is an excerpt from the first report of the Investigative Committee for the Preparation of University Reform at the University of Tokyo, concerned with the university-industry relationship. It told readers that universities were expected to distance themselves from industry, and probably contributed to the further alienation of university researchers from industrial needs:

> In relation to the research at the University of Tokyo, there is the problem of so-called “university-industry cooperation.” Although the concept of "university-industry cooperation" is not necessarily clear, it would be defined here in the following relatively limited sense: that a university does research through official or unofficial contracts with private corporations, governmental agencies, foundations, and the like for certain commissioned researches and receives financial assistance for research.
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> University-industry cooperation in this sense has been performed at the University of Tokyo, but the details are not clearly known and are to be duly investigated. At the discussion of the present special committee, the following points have been proposed for university-industry cooperation.

16. Ibid., p. 255.

First, the issues of university-industry cooperation lie in the danger that scholarly research would be subservient to the interest of the investor. It is felt, for instance, that the publication of data and research results might be restricted, and that the preconditions of research and, in an extreme case, the conclusion itself might be circumscribed. In other cases, the content of research is regarded as secondary, and the commissioned research is utilized for authorization under the name of the University of Tokyo. To avoid such misconduct, the plan and results of the research and its accounting data should be open for various commissioned research.

Second, how to place emphasis among various topics during research (and education) at universities is clearly influenced by the prosecution of commissioned research and the like. But we should absolutely avoid the possibility that the selection of research planning be determined by the factor in conflict with the prerequisites of academic pursuits. It is certainly desirable that university research receive stimulation from the practical needs of society and play an active role as an intellectual center of society. … But if such factors as the interest of a specific corporation, which are in conflict with the prerequisites of academic research, influence the policy and planning of research and education, it would result that the autonomy of scholarship is lost. For university-industry cooperation, therefore, careful consideration and institutional regulation are needed to protect academic freedom. Furthermore, if university-industry cooperation is done over a long period and a close connection emerges between commissioned faculty and such investors as corporations and governments, the autonomy of researchers would be lost without their being aware. This is the problem of "the decadence of a researcher," and each faculty member must always be careful.

And third, one of the reasons large-scale university-industry cooperation is under way in certain specific departments is that the expenditures of the government for research and education are very low. It must be said, for instance, that because of extremely meager financial conditions at universities, it is necessary to rely on commissioned research fees and others from corporations in order to guide and educate graduate research. In other words, because university

> faculty are able to receive such commissioned research fees from industry, … the meager financial situation of the universities is covered up. It is necessary to improve the financial situation of the universities drastically in order for them to perform scholarly research and education in an autonomous way.[17]

The statement seems to have accurately represented the thinking of the faculty of national universities. It constituted the formal stance of a leading national university toward collaboration with industry. Despite the strong requests and demands from industry, Japanese universities tended toward restriction of collaboration with industry in the 1970s. These restrictions began to be moderated only in the 1980s; as the editors of an educational journal put it, in a special issue on university-industry collaboration, "the allergic response to the universities-and-industry collaboration is recently diminished."[18]

In this history of the hesitant relationship between universities and industry in postwar Japan, the role of university engineers in industrial development was in general rather implicit and indirect. Most of them did not commit themselves to making industrial innovations or selling their technological ideas. Perhaps one of their important roles was to mediate technological ideas between academic and industrial engineers or among industrial engineers. National and university research laboratories as well as annual meetings of academic societies provided occasions for such engineers to exchange important technical information. On a less formal level, university professors took the initiative in constructing a network of academic and industrial engineers, and made information on new technological ideas flow through that network.[19]

17. "Daigaku Kaikaku Junbi Chōsakai Daiichiji Hōkokusho (The First Report of the Investigative Committee for the Preparation of the University Reform)" (October 1969), on pp. 99–100. It is an unpublished report preserved at the Centenary History Archival Center of the University of Tokyo. I am grateful to the late archivist Minoru Nakano of the Center for having informed me of this document.

18. *IDE*, no. 244, p. 5.

19. Nikkei Sangyo Shimbun, ed., *Nihon Gijutsu Jinmyaku* (*Human Networks of Technologies in Japan*) (Tokyo: Nihon Keizai Shimbunsha, 1989) recounts some fifty such networks in various technological and bio-medical fields.

The history of an instrument manufacturer shows the ways in which such networking worked in an almost ideal manner. This company, Murata Seisakusho, developed from being a small ceramics manufacturer into a leading high-tech electronics instrument company. In the process of its postwar development, its president, Akira Murata, received pivotal advice from Tetsurō Tanaka, a member of the engineering faculty at Kyoto University. Tanaka knew the interesting dielectric characteristic of a certain titanium alloy, and at a meeting of the *Kenkyū Tonarigumi* he recommended that Murata manufacture some products using this material. Murata followed advice and produced a titanium alloy condenser with the close collaboration of Tanaka's laboratory at Kyoto University.[20] When Murata was later at a loss as to what other products might use the piezo-electric characteristics of this titanium alloy, Tanaka again gave him the crucial advice that it could be used as a filter for radio waves; Murata Seisakusho became a leading manufacturer of radio wave filters, which eventually has led to their production for mobile telephones.[21] The history of Murata Seisakusho tells us that one of its managerial philosophies was "to borrow wisdom from experts," and that such a policy has worked throughout its history.[22]

The fruitful collaboration between Murata and Tanaka may not be a typical case in the history of university-industry collaboration in postwar Japan. But their give-and-take relationship seems to reflect well the postwar situation of university-industry cooperation.

8. Conclusion

The year 1945 marked a watershed in the history of university-industry cooperation in Japan. In prewar Japan, such a cooperative

20. Murata Seisakusho Gojūnenshi Hensan Iinkai, *Fushigi na Ishikoro no Hanseiki: Murata Seisakusho Gojūnenshi* (*A Half Century of Wonderful Stones: The Fifty Year History of Murata Seisakusho*) (Kyoto: Murata Seisakusho, 1996), pp. 15–20.

21. Ibid., p. 60. The professor and the manager had, however, conflict over whether the filter be applied to expensive high-performance receivers or economical radios.

22. Ibid., p. 47.

relationship was encouraged by the government and enhanced by the nationalistic environment. Not only those corporations that had made fortunes through war-related transactions but also those beneficent industrialists who succeeded in business were potential sources for prewar Japanese universities in expanding their research facilities and organizations. Large corporations donated money to establish foundations whose mission was to promote academic research activities, but did not establish their own research laboratories. As Barkhausen noted, there was no industrial laboratories at firms under Mitsubishi or Sumitomo. Many research efforts necessary for industrial innovation were, consequently, conducted at university laboratories.

The close prewar relationship between universities and industry was broken in 1945, and a new relationship was constructed. GHQ, most of whose influential members were Americans, attempted to disband the old university system and to implement a more democratic one. Although there were some discrepancies in their views of the role of the university in postwar Japanese society, university researchers lost their corporate patrons and had to continue their scientific investigations in extremely poor facilities for more than a decade. During that period, Japanese industrial corporations vigorously imported foreign technologies, bypassing Japanese university researchers. Large corporations began to establish their own central research laboratories and even recruited competent engineers from universities.

In the decade after Sputnik, the need for university-industry cooperation was increasingly recognized and budgets for scientific and engineering departments were greatly increased in order to remedy the material and institutional deficiencies at universities. University faculty began to receive financial support from industrial firms through the conduit of nonprofit organizations. However, the university reform caused by student protests in the late 1960s again restricted the cooperative relationship between university faculty and industry. It was only in the 1980s that the close cooperation between the universities and industries was generally encouraged by government agencies, including the Ministry of Education.

Behind this formal history of weak university-industry collaboration, there seems to have existed informal collaborations between university faculty and corporation in postwar Japan. Industrial firms offer experimental equipment or research funds to university faculty, who in return offer industry crucial technical information which may eventually lead to marketable products. Such symbiosis based on an informal give-and-take relationship seems to have existed and worked fairly well in at least at some quarters of postwar Japanese industry. The informal but nonetheless significant give-and-take relationship of Japanese universities and industrial firms are certainly worth for a more extensive investigation.