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Technological Research Associations and University-Industry Cooperation

Reprint with revisions of the paper "Technological Research Associations and Industry and University Collaboration in Postwar Japan" presented at the symposium "Governing University Research: Historical and Comparative Perspectives" held at Glasgow University, 10–11 September 2004.

The need for more active collaboration between universities and industry has been claimed increasingly in Japan recently. The Japanese version of the Bayh-Dole act was enacted and TLOs were organized at many universities. Such an active promotion of the collaboration today conversely implies the relative inactiveness of their collaboration in the past. The previous chapter discussed a brief history of university-industry collaboration in Japan before and after the war. It has shown that despite an active collaboration between the two sectors in prewar Japan, it was set back after the war, and further subdued by the student protests in the late 1960s. It was only in the early 1980s that perspective regarding their relationship evolved and was actively encouraged from both sides.

In studying the history of this hesitant relationship, a curious question has remained. If the collaboration between universities and industries had been weak and subdued, what kinds of research were academic professors engaged in during the postwar period of Japan? What were the aims and content of academic research up to around 1980? The previous chapter pointed to academic meetings as a forum for both university and corporate engineers as well as to an informal relationship they had that enabled the exchange of technical information. This chapter will call attention to another important forum for their possible collaboration, that is, the technological research associations promoted mainly by MITI, the Ministry of International Trade and Industry.

1. The Ōkōchi Award

For the technological rise of postwar Japan, many crucial technologies were imported from abroad. Corporate engineers created many other important innovations. Academic engineers, on the other hand, rarely appear in postwar stories of Japanese industrial miracles. To examine the contribution of both academic and corporate engineers, it would be convenient to have an overview of major technological achievements in postwar Japan, and for that purpose, a list of awards given to important engineering innovations has been investigated. A list of such awards could possibly serve as an index for major technical innovations in the period. The author has consulted for this purpose the Ōkōchi Award, which was established in 1954 in honor of Masatoshi Ōkōchi, the former director of the Institute of Physical and Chemical Research. The awards were given for the most significant industrial innovations, both basic and practical.

According to the official history of Ōkōchi Award, only about seventeen out of 281 innovations were the outcome of industry and university collaborations.[1] Of these seventeen awarded innovations, some originated from research done by university faculty members, and others from that done by corporate engineers. Several other examples show that the awarded innovations were the outcome of fruitful collaboration from within cooperative research groups, both formal and informal.

2. Technological Research Associations

Of these formal and informal meetings, I have been particularly interested in the group called "kenkyū kumiai" or the Technological Research Association. In 1975, an Ōkōchi award was given for the

1. Ōkōchishō Sanjusshūnen Kinen Shuppan Henshū Iinkai, ed., *Ōkōchishō Sanjūnen no Ayumi: Jushōgo no Tenkai to Hakyū Kōka* (*The Course of Thirty Years of the Ōkōchi Award: Developments and Effects after the Award*) (Tokyo: Ōkōchi Kinenkai, 1987).

development of a measuring device for optical response functions, which was the result of the collaboration between a university professor, corporate engineers, and researchers at a national laboratory as the activity of the Optical Industry Technological Research Association.

The system of technological research associations was formally established with the enactment of the Law on Technological Research Association in Mining and Manufacturing in 1961 with MITI's initiative. According to the law, these research associations could only consist of corporate members, and excluded academic universities, presumably reflecting the discord between the two ministries supervising them. However, its actual procedure permitted active participation of academic engineers as consultants or subcontractors.

The 30 Year History of Technological Research Associations tells us about the origin of the idea of research associations. After the war, Masao Sugimoto, Director of the Mechanical Testing Laboratory under MITI's Agency of Industrial Science and Technology, became interested in the system of research associations created in Britain in 1917. Sugimoto visited and investigated British research associations and wrote a report on it in the mid 1950s.[2] He concluded the report with the necessity to establish such organizations in Japan to promote the R&D activities of smaller companies. Soon after the publication of his paper, several research associations were organized to work on automobile technologies: filters (1956), radiators (1957), air springs (1958), and engine parts (1961), although they did not in fact become formal research associations under the 1961 law, because large automobile corporations were reluctant to follow the rule that required a democratic process of decision-making by all member companies. Behind the establishment of these research associations, there was a large amount of funding for industrial research provided by the Agency of Industrial Science and Technology at MITI. Research associations were considered suitable outlets to receive such public funds. Starting at three million yen in 1949, it grew to 30 mil-

2. Masao Sugimoto, "Eikoku no Kenkyū Seido nitsuite (On the System of Research Associations in Britain)," *Nihon Kikai Gakkaishi* (*Journal of the J.S.M.E.*), 59 (1956): 589–593.

lion yen in 1950 and half a billion yen around 1959.

The 30 Year History of Technological Research Associations lists 94 technological research associations, of which 52 were still active in 1990. [3] The number of associations established during these three decades is as follows: 13 during the first decade from 1961 to 1970; 34 during the second decade from 1971 to 1980; and 47 during the last decade from 1981 to 1990. The areas of technology covered by the associations and the numbers of established associations in respective areas are as follows: machine and electronics industries, 35; chemistry, 24; non iron material, 10; textiles and paper, 6; electric power, 6; steel, 4; others, 9. The tables of technological associations list their member companies and, if any, the universities or university professor who were intended to serve as technical consultants or leaders. Of the 94 research associations, only twelve or so associations explicitly refer to the participation of university faculty.

Among others, the above cited Optical Industrial Technology Research Association particularly fostered active collaboration between industrial and university researchers. It originated in the informal Camera Technology Meeting, which had been organized after the war by engineers of the Machine Testing Laboratory. An Optical Informal Meeting of the Society of Applied Physics followed up on part of the activities of the meeting, and the Industrial Technology Committee of the Japanese Society of the Camera Industry followed up on the more technical part. The latter committee was reorganized as the Technological Research Association of the Camera Industry in 1956 at the initiative of the engineer of the Machine Testing Laboratory and a MITI bureaucrat modeling the system after British research associations, specifically the Scientific Instrument Research Association. This research association tackled several technological topics including a method to prevent lenses from tarnishing, improvements in grinding and polishing techniques, and the development of a measuring method for the response function of lenses. With the enactment of the above Law of Technological Research

3. Kōkōgyō Gijutsu Kenkyūkumiai Kondankai, ed., *Kōkōgyō Gijutsu Kenkyūkumiai 30 Nenno Ayumi* (*30 Year History of Technological Research Associations of Mining and Industry*) (Tokyo: Japan Society for the Promotion of Industrial Technology, 1991).

Associations, it was finally reorganized as the Optical Industrial Technology Research Association, and previous research themes continued to be studied. At all phases of reorganization, it consistently encouraged close and active collaboration among engineers from industry, universities, and government laboratories.

One of the first topics pursued at the Association was on the problem of lenses tarnishing. The problem was originally assigned from the Society of the Camera Industry, and duly studied by members of the Association. Koreo Kinoshita's interim report captured quite well the nature and function of the research association and of university-industry collaboration using this organization. According to Kinoshita, they at first had attempted to find one single best method to prevent the problem, but soon found that the variety of manufacturing procedures of different member companies made it inappropriate to provide only one method. They investigated the causes of tarnish, searched exhaustively for conditions to prevent it, and gave practical preventive advice to the engineers of each participant company. By the time of the publication of the interim report, most companies had already solved the problem of tarnish, aided by research outcomes of this group. The report was therefore intended to provide basic knowledge and techniques to those not attending the committee. In it, he even used single-underlines and double-underlines in order to clarify that experimental findings were "fairly certain" and "definitely certain," respectively. Kinoshita's pedagogical stance was consistent with his formal position as a physics professor at a private university, and his reservation from providing specific and practical advice somehow reflected the role of the technological association. In another case, a university professor who had studied a new technology at an American university played a crucial role in stimulating another research activity at this association.

Although it is not certain that the active collaboration between corporate and academic engineers at the Optical Technology Research Association was a typical case, the authors of the history of these research associations state that it was so. Their statement on the industry and university collaboration in relation to this institutional system is worth full quotation:

We cannot escape to observe that Technological Research Associations became a forum to combine universities and industry, and contributed to promote industry and university collaboration.

After the war, Japanese universities showed a strong refusal to collaborate with industries because it only profits private companies. But university departments of science and engineering recognized the great importance of university and industry collaboration for the improvement of technological standards and industrial development, and both sides have closely collaborated. Therefore, the need for university and industry collaboration was consistently emphasized in postwar Japan.

Technological Associations, being organizations of collaborative research of private companies, were not public organizations like foundations, but *they were regarded to possess a public character, and university researchers were able to cooperate relatively easily on research and development of technological research associations.* When technological research associations received grants-in-aid or money-in-trust from the government, in particular, they were well justified to cooperate with the government and participate in the association, easily and actively. Those from universities took positions as consultants or engineering members, and played important roles in making research plans, leading the execution of plans, and assessing research outcomes.

University researchers were also able to obtain knowledge of advanced technologies through the participation in research and development of cutting-edge technologies. They thankfully recounted that they acquired condensed technological knowledge usually unobtainable by routine attendance at academic meetings.

What is particularly important is the creation of a human network among university and corporate engineers. It seems that these human networks will play an important role for the exchange of technological information after the end of research and development. By the R&D activities of technological research associations, the climate for university and industry collaboration has been created and reluctance of universities to collaborate with private

corporations has been gradually alleviated. [emphasis added] [4]

Their reference to a sociological reason particularly caught my attention. Since they possessed a public character, university researchers could collaborate relatively easily with engineers. As stated above, only 13% of the research associations explicitly refer to the involvement of university professors. But it might be possible that university professors actually worked for research associations that did not explicitly record their participation.

3. Concluding Remarks

In this history of the hesitant relationship between universities and industry in postwar Japan, the role of university engineers for industrial R&D was considered generally rather implicit and indirect. Most of them did not commit themselves to making industrial innovations or selling their technological ideas as they now actively attempt to do. National and university research laboratories, annual meetings and investigative committees of academic societies, and technological research associations—all provided occasions for academic and corporate engineers to exchange important technical information. Such forums for information exchange, in turn, helped construct various forms of a human network. And this human network, all-important in the Japanese cultural context, sometimes played a significant role in charting the technological course of industrial corporations, and cannot be ignored when discussing the present theme.

4. Ibid., pp. 34–35.