How the Japanese Electrical Industry Reduced Licensing Costs after World War II

Koji NAKANO

Abstract: This paper reexamines product development in the Japanese electrical industry after WWII from the perspective of strategies for reducing licensing costs. Immediately after the war, Japanese electronics manufacturers raised their own level of technology by introducing technology from abroad. However, in their effort to arrive at corporate policies enabling them to provide products at as low a price as possible, there was a limit to the sheer amount of licensing costs they could bear to carry out licensed production. Japanese electronics manufacturers, in many cases, engaged in cross-licensing based on their own patents in order to offset licensing fees and keep costs down. To further control licensing costs, manufacturers had no choice but to produce products based on licenses already in hand; each electronics manufacturer established a central R&D laboratory. Up until the early 1990s, “Not Invented Here” was a widely adopted philosophy which, as it turns out, was a historically

a) Faculty of Business Administration, Toyo University, 5-28-20, Hakusan, Bunkyo-ku, Tokyo, Japan, nakano@toyo.jp

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Introduction

During WWII, Japanese companies’ R&D activities were specialized toward technology with military applications, which resulted in a period with little development of technology for civilian use. In contrast, the development of technology for use by civilians had become extremely advanced in the USA, and the question of “how much superior American technology we can introduce” became directly connected to competitive dominance in the Japanese market. Therefore, in the post-WWII electronics industry of Japan, Japanese manufacturers actively introduced technology from their counterparts in America and Europe (Goto, 1996). In particular, the period from the latter half of the 1950s through the mid-1960s was an era in which Japanese manufacturers competed to acquire technology to introduce in Japan (Nakano & Wakumoto, 2007).

During that period, technology introduction was regulated under the framework of the Foreign Investment Law (1950–1980); therefore, the introduction of technology was considered to be a type of foreign investment. With regard to the problem of selecting whether to accept capital investments from abroad and create manufacturers backed with foreign capital or to introduce technology instead of capital, Japan opted for an approach of severely restricting the inflows of capital investments from abroad, while aggressively opening the country to the introduction of new technology.

This paper systematically reexamines this form of product development in the Japanese electrical industry after WWII from the
perspective of strategies for reducing licensing costs.

**What Is a Licensing Agreement?**

To begin with, in common, everyday usage, the term “license” (or licence) refers to control over concepts such as permission, consent, and authorization. The following three forms of licensing agreements constitute the main forms of licenses used between companies, especially when reaching agreements with foreign firms.

1. Contracts granting consent to the practice of a patented invention or the use of other intellectual property (IP)
2. Contracts including technology transfers and disclosures of trade secrets
3. Sales agreements as technical data transactions

Among these, the IP licensing agreements of (1) are contracts that are backed legally by patent law, copyright law, etc., whereas the agreements of (2) and (3) do not necessarily need to be backed by statutory law. As an example of this, fees charged for the loan of things such as schematics are considered to be license fees, and these types of “patent right non-assertion contract,” “technology transfer contract not including the consent to practice inventions,” etc., therefore also entail the same type of negotiations as (1).

Internal corporate departments for handling licensing contract negotiations are sometimes set up as separate organizations in a company, such as: (a) “patent departments” or “IP departments” for confirming an invention’s value in order to submit an application to obtain effective patent rights, as well as preserving those rights (and performing other important patent research work); and (b) “contract departments” or “licensing departments” for evaluating technological transactions and negotiating the corresponding contracts.

Corporate IP departments referred to in (a) perform tasks that have
been accorded importance regarding IP, such as seeking out inventions that have been developed within the company; drafting a specification of the scope of the claims of inventions for which protection may be sought while making a determination as to whether the inventions are patentable; and determining whether to actually file an application or not (the actual claims of the invention are subsequently drafted by a patent attorney at a patent law firm). Operational strategy is not emphasized after the registration of a patent.

Licensing departments in (b) mainly carry out tasks such as determining the manner of handling (introducing, provisioning, etc.) technology contracts, including issues related to patent rights, or determining the manner in which to resolve the problem when a warning is received from another company about patent infringement.

Many large corporations in the Japanese electronics and heavy equipment industries have similar organizational structures; for example, in the case of Toshiba, after WWII, their (a)-type patent department (later, IP department) has handled all IP-related matters in an integrated manner. In the past, negotiations for international licenses or in relation to antitrust law were handled by their (b)-styled international cooperation department (later, international department, international main office, etc.), while general legal matter, contracts, etc., were handled by the general affairs division. However, in the 1990s, when the legal affairs department became independent of the general affairs division, the responsibility of managing work related to international cooperation was also transferred to the legal affairs department, increasing the relative importance of the position of the head of the first-generation legal affairs department, as if they were also representing the international cooperation department. In fact, if the trade department found a partner company that wanted to export technology and a business
division found an entity within the company that wanted to introduce technology, the head of international cooperation would not only carry out negotiations and coordinate legal matters with the overseas company but also function as the contract integrator (Wakumoto & Nakano, 2003). This is where the licensing department comes in.

**Straight License**

A straight license is a one-way agreement formed when the licenser grants consent to the licensee to use a patented invention and is constituted when the right to use a patent or other IP rights are “sold” to another company. A famous example is that of Radio Corporation of America (RCA). RCA was an electronics device manufacturer formed by General Electric (GE) at the behest of the government of the USA in 1919 and was under the direction of David Sarnoff for more than 50 years from 1920. Its business results included pioneering innovations in fields such as radio, TV, communications, broadcasting, satellites, military technology, etc.; however, the patents that RCA held in each country were licensed using a “unit fee chart” prepared specifying an amount in cents for the licensing fee per year—in effect, selling the rights like a product. In fact, immediately after WWII, Toshiba engaged in negotiations with RCA on the basis of the unit fee chart.

Strictly speaking, the licensing fee corresponding to the licensing contract was divided into two types: (a) royalties (license fees and compensation); and (b) technical service fees (technical assistance fees and technical guidance fees); however, there were slight differences in the way that each company referred to them. GE strictly distinguished between the terms it used for fees associated with contracts, including technology provision; fees for contracts including patent rights and rights to practice inventions were referred to as “technical guidance fees,” whereas the fees charged in
contract for cases in which only patent rights were involved were referred to as “royalties.” In contrast, RCA did not discriminate between fees in that manner, referring to all of them as “royalties.” In this paper, we follow the model used by RCA.

Advantages of Licensed Production

One advantage of introducing technology and carrying out licensed production is that R&D costs can be reduced by introducing preexisting technology. In the case of independently developed technology, the costs incurred from the start of development through testing to ascertain whether the expected effects have been achieved are enormous. Moreover, there is always the risk that the expected performance results may not be achieved in the end, and the incurred R&D expenses will be for naught. On the other hand, when technology is introduced, the technology brought into the company has already been tested. When the “already tested” technology introduced is a “limited portion” of the technology, because the costs incurred for licensing the technology are extremely small when compared with the costs of developing technology independently, that can make the difference between winning and losing in the short term in a limited market. While it is true that the usable range becomes narrower, saving time and money is a big advantage for certain businesses that only target specific applications.

In the case of power generation, there were cases in which orders were placed by customers insisting that the product used already tested technology. In the 1950s, GE’s customer Tokyo Electric Power Co., Inc. (TEPCO), received orders from Japanese companies specifying that they “build power generation plants using technology already tested by GE.” Meanwhile, at the same time, TEPCO was negotiating with GE regarding power generators and seeking an arrangement in which “we will buy the first unit from GE, but please
provide the technology to us so that we can have Toshiba or Hitachi produce the units from the second unit on” (Wakumoto & Nakano, 2003). In this manner, such Japanese heavy electric machinery manufacturers acquired and introduced production technology by receiving plans that allowed them to produce already tested technology. This possibility presented a risk to the American or European company that was the licenser, and it is likely that the licenser would not have provided technical assistance to a powerful customer like TEPCO if TEPCO did not ensure that the other Japanese companies that were involved also requested licenses from the licenser as a condition of purchasing the final products.

Disadvantages of Licensed Production

However, there are also disadvantages to this sort of licensed production. Here, we will go over about three points (Nakano & Wakumoto, 2007).

The first point is that introduced technology can only be used within an extremely narrow scope. When independently developing technology, if your development efforts succeed, you can of course use all of the resulting technology in whatever manner you please. However, in the case of introduced technology, the licensee cannot use the technology in the same manner as the licenser (Ogami, 2016). The conditions under which the technology can be used are extremely restricted, enabling use within only an extremely limited range. For example, it is almost always the case that introduced technology cannot be used in overseas production. In relation to exports, although export prohibition clauses are not recognized under antitrust law, because exclusivity of patent rights is compliant with other law, the licenser can exclude importing and sales in a destination country, thereby making exporting impossible in practice.
The second point is that it is difficult for the licensee to reverse the relationship of technological superiority existing between the licensor and the licensee. Typically, the contract will be such that the licensee grants the licensor the right to use any improvements on the technology developed by the licensee (Ogami, 2015), so it is difficult to reverse this sort of technological superiority. Furthermore, in the case of computer software, there are cases in which the contract will prohibit the licensee from engaging in the production of derivative products.

The third point is that in-house business plans may become distorted. Because sizable financial resources are invested to introduce technology, there is a possibility that other plans for facilities, etc., may be sacrificed. Also, if resources are not concentrated in that area of a business, the investment will have been completely useless; therefore, when allocating resources across the company, some other areas of the business may be sacrificed. In addition, technologies that neighbor the introduced technology but are not included in that scope may be claimed by the counterparty as their own, and that sort of restriction can also result in disrupted business plans.

**Cross-license**

In light of these sorts of disadvantages, even Japanese companies, which had until then been one-way introducers of technology immediately after WWII, at long last started developing and selling products based on their own technology. Nonetheless, when it seems likely that other companies’ patents will be infringed upon, or when warnings are received about patent infringement from other companies, it is necessary to examine whether it is possible to dispute the validity of the patent (whether the patent can be invalidated) and whether the claim of infringement can be disputed,
among other issues. If there is no option but to seek a license agreement to use the infringed invention, then the licensing department comes into the picture to start negotiations. However, with a straight license, if royalties become too expensive, it is impossible to generate profit. In this type of case, opposing patents should be prepared to offset royalties by negotiating a cross-licensing agreement.

A cross-license means that two or more parties consent to grant consent bilaterally between each other for the use of rights held by each party, and technology (patents/know-how) is generally the subject matter of such agreements. However, cross-licenses are also said to be characterized by having the properties of (a) a nonaggression pact enabling free development of products without being constrained by another company’s patent in technical fields where the technology is complicated and (b) a ceasefire deal after infringing acts have been discovered (Goto, 1996).

According to Goto (1996), from the start of the period around when Japanese electronics manufacturers were introducing semiconductor manufacturing technology from American companies in the 1950s and 1960s, contracts signed by American companies at the time were already predominantly cross-licensing agreements. Japanese companies followed suit, forming cross-licensing agreements with Western Electric for basic patents as well as with GE for manufacturing patents. Although technology development had advanced to a certain degree within Japanese industry, because awareness of rights enforcement at the time was weak, Japanese companies were not able to make full use of the technology they owned. As a result, the Japanese companies ended up paying a tremendous amount in royalties. However, the reason for which the American companies still opted for cross-licensing agreements is that if licensing agreements were unilateral, should the drafting party (i.e., licensor) happen to infringe a patent of the
counterparty (i.e., licensee), there would be no defense measures in place for the licensor. In other words, the American side implemented the agreements in the form of cross-licensing agreements as a defensive measure in case they were sued by their Japanese counterparts. However, since the Japanese firms could not generate any profits as a result of excessively high royalties, in due time, they also started to seek to offset royalties during negotiations regarding patents and are said to have reduced the amount of royalties paid in that manner (Goto, 1996).

**How to Avoid License Negotiating Costs?**

However, even in cases of patent rights infringement, it is not necessarily a given that a company will be required to pay royalties as a result. For example, there are cases in which technology can be developed in-house to avoid the need to license another company’s technology (Takahashi, 2014), and it is also possible to buy another company that holds patents that competes with a contested patent, thereby enabling the competing patent to be used in cross-licensing negotiations to offset the royalties. If the size of the company acquired is small, it can be cheaper to do so than incurring the cost of infringement and royalties, and this approach is occasionally taken in countries such as the United States.

In addition, negotiations for cross-licensing also involve costs of their own, and there are some cases in which the negotiating costs themselves have been avoided (Nakano & Wakumoto, 2007). In the 1980s, basic patents associated with magnetic resonance imaging (MRI) technology were held by EMI, GE, and other companies. However, EMI did not fare well in trying to commercially exploit the patents and had already withdrawn from that business, and the number of companies doing business in the MRI industry is limited. Toshiba has achieved a leading position among the world’s
producers of medical instruments, with GE and Siemens seen as their primary rivals. In the MRI business, too, GE and Toshiba are competitors, and there was a time when GE sought to absorb Toshiba’s MRI business.

At the time, Toshiba was not holding any licenses from GE, and there had been no warnings of infringement or the like from GE, but there was a fear that Toshiba’s MRI business could face a predicament if GE were to send a warning of infringement or file a suit. During this period, Toshiba needed to strengthen its MRI business in the USA, and was considering acquiring American companies to that end. At that time, they were also focused on patents, and the company that held important basic patents for MRI that could be used to oppose GE’s basic patents was Diasonics. That company had problems in its MRI Division, and if the MRI had been its only business, it would have been small enough for Toshiba to acquire. In the end, after several years of negotiations, in 1989, Toshiba acquired Diasonics’ MRI Division, along with its R&D department, through Toshiba’s American subsidiary, Toshiba America Medical Systems, and established Toshiba America Medical, Inc.

As a result of this acquisition, Toshiba came to hold a strong patent portfolio, which was so because even if GE were to issue an infringement warning, Toshiba could also issue a warning to GE and move toward negotiating a cross-license. In the end, GE did not issue an infringement warning as they were aware that both GE and Toshiba might be violating each other’s patents, which effectively brought them to a deadlock, leading to no further action. The reason was because with each having business of an equivalent scale, there would be no profit to gain for either by negotiating a cross-license. Nevertheless, it would be possible for one side to issue an infringement warning and attempt to have the other’s patent invalidated in a patent invalidation trial, but that would obviously
incurred costs associated with the court case. In addition, even if they were to opt to enter a cross-licensing agreement, that would entail putting the cross-licensing agreements of Toshiba’s US subsidiary in order, making the tasks of carrying them over into a new cross-licensing agreement extremely complicated, incurring excessive costs. In other words, this shows the reality that under the given conditions, even if an infringement warning were issued, there would be nothing to gain.

**Discussion**

This way, Japanese electronics manufacturers introduced technology from American and European companies after WWII, raising the level of their technology. Eventually, the Japanese side came to sense the restrictions and see the limits of technology introduction through licensed production. Realizing that they should extract themselves from that scenario, in order to develop their own technology independently, many Japanese electronics manufacturers established a “Central R&D Facility” from the 1950s through the 1960s. The result was that their independent product development efforts finally came to fruition in the 1980s, by paying a part in reducing licensing costs.

However, with the collapse of the bubble economy in 1991, many Japanese companies growth rates stagnated, and Japanese electronics manufacturers, which had been operating their own centralized R&D facilities conducting basic research independently, also accelerated efforts to have basic research performed at universities or public R&D facilities and to incorporate the fruits of those efforts into applied R&D conducted in the form of university–industry collaboration. That is to say, it was the end of the “era of the central R&D facility” (Nishimura, 2003).

At the same time, the government had been carrying out regulatory
reforms. First, each government agency created a system for supporting venture enterprises. In 1995 the Law Concerning Measures for the Promotion of the Creative Business Activities of Small and Medium Enterprises was passed, in 1997 venture foundations were set up in each region, and 1997 saw the introduction of a stock options system, along with a prohibition on the trading of unlisted stocks, a relaxing of the prohibition of professors at national universities holding concurrent positions, and the passage of formal legislation on investment limited partnerships. In addition, in 1998, the establishment of the Technology Licensing Organization (TLO) was propelled by the Act on the Promotion of Technology Transfer from Universities to Private Business Operators, and with the passage of measures such as the 1999 Act on Special Measures for Industrial Revitalization and Innovation (the so-called Japanese Bayh-Dole Act), from the standpoint of government policies, too, the movement toward university–industry collaboration was being promoted (Nakano, 2017).

As part of this trend, the electronics industry, which had up until then embraced self-reliance, created a foundation for collaborative development with university-launched venture companies and startups. At present, large Japanese corporations are seeking new forms of collaboration (Kuwashima, 2018) to incorporate various types of external knowledge, under the name of open innovation (Chesbrough, 2003a, 2003b, 2006), and forming partnerships with external companies.

Conclusion

The style of technology development introduced in the electronics industry until about the mid-1970s can be seen to have some commonality with the collaborative development forms that have
emerged since the late 1990s between small- and medium-sized firms and venture companies. At the same time, although it has been said that R&D in large Japanese corporations has been traditionally based on a philosophy of self-reliance (Goto, 2016; Hasegawa, 2019; Nishimura, 2003), that can also be said to have been a temporary phenomenon of a special type.

However, it might be possible to say that the Japanese electronics industry as a whole adopted a systematic strategic approach from the standpoint of reducing licensing costs. During the period when the costs incurred by introducing technology from the USA or Europe were far lower than developing the technology on one’s own, Japanese companies developed products mainly by introducing technology from abroad. During the period when introducing technology from large European and American corporations restricted expansion to overseas markets and increased opportunity costs, development was carried out independently. In that manner, product development cycles become shorter and collaborative development license costs with small- and medium-sized companies or venture companies from within and without Japan become comparatively cheaper, heralding open innovation. That posture is not something that has just started to happen now, but is a product development scenario that Japanese electronics manufacturers saw as the obvious approach shortly after the war.

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