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ABSTRACT

International standardization has become a strategic tool for competing firms since the new industrial policies in developed countries in the 1980s, which allows firms to easily form a consortium for setting industry-wide standards. This standardization has created many “consensus standards” that change the distribution of added value internationally, and has induced transformation in the international division of labor among the developed and developing countries. Platform business is most influential in exploiting new international division of labor, and firms need to adjust the scope of their knowledge and to select new business partners for implementing it.

Keywords : consensus standard, anti trust law, open and closed areas, product architecture, platform business

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1. Introduction

This paper explains the importance of international standardization for global business, and discusses the method to establish a competitive business model using international standardization as a strategic tool.

Standardization has been an important factor for industries, and its importance has seemingly shown a rapid increase in recent years. For example, we have often observed that standardization has exerted significant influence on industrial growth in the 1990s, such as on PC, digital mobile phone, and DVD industries. In the PC industry, various interface standards such as PCI and USB standards have made great contributions to create a market for peripheral products. Standards for mobile communication systems such as GSM and CDMA have also promoted market formation internationally. DVD industry has enjoyed remarkable economic growth in the global market with implementation of DVD standards. As has been demonstrated by these examples, international standardization has the capability to rapidly form a huge global market. We observed business models that make full use of standardization to first form a global market and then to profit from that market. This type of business model has played a key role in global competitiveness in many industries since the 1990s.

What is more important is that the aforementioned standardization has a new standard setting process, Consensus standardization. PC, digital mobile communication system, and DVD standards are consensus standards that require formation of consensus of multiple participant companies, while de facto standards are established only by a single company.

Consensus standards are quite different from de facto standards in terms of a business model. With de facto standards, significant profits are promising when a company wins a standards war, although the company has to face keen competition, and it might end up losing with significant losses. If many companies similarly fear that one company might take control of a standard or that they might lose the standards war, they will attempt to form a consortium and have discussions in advance to define industry-wide standards in a cooperative manner. This type of standard setting process, that is, consensus standardization, exposes these companies to a low risk of defeat in the competition. However, the companies still face the problem of low profit opportunity because all of them compete in the same field. From a business model point of view, consensus standards are complicated while de facto standards are simple.

We also have to distinguish consensus standards from de jure standards, which promote standard setting based on defined procedures in the well-established standard developing organization such as

the International Organization for Standardization (ISO). A great deal of confusion exists between consensus and de jure standardizations as they have similar standard-setting process in terms of openness of membership. However, a consensus standard is much more flexible than a de jure standard. In case of consensus standards, companies can form a consortium whenever they feel the need for industry-wide standards, even before the introduction of products, and can easily define the scope of the system to be standardized in a very flexible manner. This is why we often see consensus standards in many products.

Since the 1990s, we have frequently observed the influence of consensus standards on the industry, as mentioned above. The strategic use of consensus standards has made great progress (Shintaku and Eto, 2008). However, it seems that many companies have been experiencing difficulty because of their inability to establish an effective business model using consensus standards. The purpose of this paper is to discuss the impact of consensus standardization and to explore how to establish a business model for global competitiveness.

In the second section, we discuss the historical background regarding why consensus standards have become influential in industries internationally. The third section explains the impact of standardization that changes the international division of labor. We use an architectural framework for analysis of this change. The fourth section discusses the business model and core technology management through standardization. The fifth section summarizes our findings and implications

2. Historical background of the adoption of standardization as a strategic tool

Back in the 1980s, we had new industrial circumstances created by the economic growth of East Asian emerging countries such as Japan and Newly Industrializing Economies (NIEs). Upon the rise of these emerging countries, the United States and Europe (later EU) were compelled to reorganize their global competitiveness to launch new industrial policies, to protect the intellectual property rights, and to relax the anti-trust law. These policies are expected to have encouraged their innovation.

The growing use of consensus standard is deeply associated with the relaxation of the anti-trust law that promotes formation of a consortium of firms for joint research and development (R&D). There are two major reasons for consortia formation. One is the development of new technologies with strategic partners. The other is the development of industry-wide standards that solve issues such as product compatibility and consumer safety. The development of standards in a consortium affected industrial circumstances much more seriously than that of technologies, because standards

have significant procompetitive effects such as increasing price competition since standard products are more readily compared. In addition, countries that are leaders in developing standards have a competitive advantage, and internationally accepted standards are fundamental to global competitiveness.

For this reason, the governments of US and EU in particular have been actively involved in observing, regulating, and promoting the standard-setting process. Below is a more specific explanation.

We start with the US industrial policies active in the 1980s and explain the relationship between the promotion of joint R&D and standardization. The trend of encouragement of joint R&D as an industrial policy gained momentum in the early 1980s. The enforcement of the National Cooperative Research Act (NCRA) of 1984 solidified this trend. Furthermore, the report of the President's Commission on Industrial Competitiveness in 1985 (commonly called Young Report) symbolized US industrial policies that aimed to activate innovation through joint R&D. This report states that the issue of declining international competitiveness of US is not just due to the appreciation of US dollars. Thus, this report suggests that public and private sectors should address the enhancement of industrial competitiveness in a full-fledged manner through new initiatives focusing on the encouragement of joint R&D. The National Cooperative Research Act was revised to the National Cooperative Research and Production Act in 1993 to allow joint production by extending the sphere of joint research. Thus, US implemented industrial policies that emphasized joint R&D based on consortia of firms.

The encouragement of joint R&D and the activation of standardization efforts are tended to be considered separate. In fact, however, these two phenomena are deeply interlinked. With antitrust laws in mind, it is easy to understand the relationship between these two phenomena. Prior to 1980, the antitrust laws hampered joint R&D in the United States. In joint research, multiple companies develop technology in collaboration. Therefore, it is likely that participant companies monopolize the technology. Collaborative activities of firms that are improperly conducted can discourage or even eliminate competition, giving rise to antitrust concerns. For this reason, joint R&D was regulated by antitrust laws and severe penalties were imposed on joint research that violated antitrust laws. For example, if multiple companies had engaged in joint research activities (this case also includes the joint formulation of standard specifications) with participant companies accounting for certain amount of market share, it was possible that this joint research could have violated the antitrust laws. The joint formulation of standard specifications by companies with a certain level of market share

was regarded as possibly exclusive corporate behavior to other market participants (Hirabayashi, 1993).

However, after new industrial policies for joint R&D incentives began in the 1980s, the operation of antitrust laws was mitigated. In 1980, the Department of Justice released the “Antitrust Guide Concerning Research Joint Ventures” to clarify the guidelines for joint research. Most importantly, these guidelines specified that if access of third parties to standard specifications (i.e., joint research results) is guaranteed, antitrust laws will not apply to the formulation of standard specifications through joint R&D by multiple companies with even a certain level of market share.

In 1984, this policy was legislated and specified as the National Cooperative Research Act. In other words, this has made it effectively possible to formulate standards, exerting effects similar to de facto standards, through consensus standards such as consortium before market competition is initiated.

In Europe as well, standardization was recommended after the 1980s in the phase of policy consultations both for reorganization of global competitiveness and for European integration in 1992.

In 1984, the European Commission adopted Regulation No. 418/85 expanding the antitrust treatment of R&D. For firms whose total market share does not exceed 20 percent, this regulation provides blanket exceptions for horizontal R&D agreements. In addition, under Article 85(3), the Commission is authorized to grant exemptions for cooperative efforts, including research, development, and even manufacturing and sales. Firms can easily form a consortium to collaborate for developing industry-wide standards.

In 1985, the European Commission promulgated another important resolution, a New Approach to technical harmonization and the use of standardization. To complete the internal market at the end of 1992, the European commission proposed that the methods and procedures be revised. National standards were established separately in each country at that time, but it was necessary to introduce a uniform standard in the European region. For this reason, standardization initiatives were recommended in Europe in the special form of regional standards, CEN, CENELEC, and ETSI which are positioned between national standards and international standards. Based on New Approach, EC encouraged that European industries join the standard setting process for the regional standards. This concurrently accelerated standardization initiatives and reorganization of industrial capabilities. With the objective of achieving integration of regional economies, standardization progressed in Europe. In this process, European firms built their capability to use standardization as a strategic tool, and established the business model using standardization.

For example, currently GSM is the most widespread mobile phone communication system in the world. The GSM standard is a typical successful example of standards that have been formed through the new standardization process in Europe. Since 1982, the GSM Working Group of European Conference of Postal and Telecommunications Administrations (CEPTⁱ) had formulated standards, however, this process in CEPT took a long time to for standard setting

In 1988, the European Telecommunications Standards Institute (ETSIⁱⁱ) was established and the organization responsible for standard formulation was changed from CEPT to ETSI. This marked a great turning point. Prior to the establishment of ETSI, in the standardization process of CEPT, telecommunications policy officers and Postal Telecom and Telegraph (PPTⁱⁱⁱ) in each country took the initiative in formulating standards. However, once the standardization process was transferred to ETSI, consensus standardization was pursued with the participation of telecommunications facilities and equipment firms although telecommunications policy officers and PPT were also involved in standardization.

With regards to analog mobile phones that were widely diffused at that time, the telecommunications facilities and equipment industry in Europe lagged far behind those in US and Japan on the market. In the digital phone standardization process, Europe faced a sense of risk that it might lose a huge integrated market, which would emerge as a result of standardization, to overseas telecommunications industries. Therefore, unlike traditional standardization processes, telecommunications facilities and equipment firms participated in the standardization process. Thus, a standardization process that allowed the European telecommunications industry to exert competitiveness was build.

Establishment of GSM standards was completed with the influence of the telecommunications facilities industry. For example, specifications for the GSM system are not standardized in detail in several areas, such as interfaces between wireless and control base stations. Hence, it is easy for telecommunications equipment companies to differentiate themselves by leveraging their technical know-how. Moreover, the areas that depended on knowledge and skills possessed by operators such as billing protocols have been standardized as a result of the necessity for international roaming. This has enabled even those operators who have not accumulated much technology to adopt and operate the GSM system. As a result, it has become easy to adopt the GSM system as a standard for new operators and operators in emerging countries that tend to face entry barriers, and have not accumulated much technology among telecommunications equipment companies. In this manner, GSM facilitated the expansion of European telecommunications equipment firms, such as Ericsson

and Nokia, into the global market.

There have been changes in the industrial policies in US and Europe. Consensus standardization has been accepted in conjunction with joint research initiatives and regional economic integration. In consensus standardization, multiple firms build consensus through initiatives such as consortium formation and set industry-wide standards in a flexible manner. The new industrial circumstances made standardization a strategic tool, which significantly influences corporate competition environments. It would be easy to understand this point based on the fact that activities in which multiple companies jointly formulated specifications were previously strictly banned by antitrust laws.

In the next section, we will explain how consensus standards affect competitiveness.

3. Changes in product architecture due to standardization and their impact on the international division of labor

Competitions between standards demonstrate the most significant impact of standardization. In competition between standards, each party having defined standards struggles to acquire a certain scale of a group of users commonly known as a critical mass. This is because the more use a standard has, the more effective the standard becomes. Because of this network externality of standards, once the critical mass is surpassed, an increase in the autonomous cycle of the participants is triggered. It is therefore important to manage the rate at which the standards are diffused before the critical mass is reached.

Strategies to control the diffusion speed of standards in consensus standardization are referred to as the diffusion strategy of standards. It is assumed that the following four factors are effective in accelerating diffusion speed: “degree of architecture openness,” “arrangement of a driving force organization,” “step-by-step expansion,” and “building of a relationship between users and a supplier.” The “degree of architecture openness” is particularly essential (Tatsumoto and Takanashi, 2008). This is because an open architecture not only increases the diffusion speed but also causes a change in the distribution of added values of a whole system to which standard-setting is applied.

In other words, consensus standardization does not simply initiate competition between standards, but it also changes the distribution of added values of a product to which consensus standards are applied, triggered by the conversion of product architecture. The changes of the distribution require a new basis for division of labor. Based on these points, consensus standards result in a new type of competition distinct from competition for traditional de facto standards and de

jure standards. We would like to explain each step in more detail.

First, at the initial stage of consensus standard formulation, related parties gather and form consensus regarding the issue of “which area of a product (system) should be standardized.” There are a variety of possible areas to be standardized. For example, interconnecting areas or areas that need reliability are desirable areas of standardization. Once standard setting is applied to the candidate area, implicit knowledge and know-how in the area are revealed and become explicit, although this implicit technology was used to be a source of differentiation. The standardized area is referred to as an open area.

There is a significant impact on the company whose business domain is in the open area. Technical know-how, implicit knowledge, or industrial contexts are all standardized and become explicit. The open area may attract many manufacturers to join the market so that more users can purchase products with less fear of lock-in, which may in-turn trigger rapid market growth. As standardization becomes more detailed and specific, the entry opportunities available to new companies increase. Even without the knowledge of know-how and industrial contexts of the relevant product, new companies can fully compete in the market as long as they produce components that conform to standard specifications. If components comply with standard specifications, then products are almost identical. Thus, new companies can compete with existing companies under the same conditions from the beginning.

By locating themselves in the open area, existing companies lose the source of competitiveness that they have accumulated so far. Even if standard-setting creates a huge global market, it is very hard to differentiate in the standardized area. Fierce price competition takes place as more manufactures join the market. In order to adapt to this change in the market environment, existing companies are urged to reorganize their capabilities. Moreover, once product architecture becomes open, a new vendor that supplies components for the product may emerge. In addition, it may become easy for new distributors to handle the product. For this reason, existing supply chains and sales channels are destroyed and new industrial structures emerge.

On the contrary, new market entry is difficult in the protected closed area. Added value being created on the market, which has been formed through standardization, converges on this area. For existing companies, the closed area serves as a black box in which implicit knowledge and know-how for differentiation are accumulated. Particularly, in the areas that require high technological capabilities such as core components, a limited number of companies enter the market. Thus, added value converges on these closed areas while the open areas losses added value.

This change in the distribution of added value ultimately leads to a drastic change in the division of international labor. To help us understand the change in the division of international labor, we introduce the aspect of expected return. The expected return for a business in the open area is affected by the degree of standardization. If detailed standard specifications are formulated and the source of differentiation is eliminated, the expected return will become low. In this case, from the standpoint of existing companies, no company wants to lower its profitability. Hence, division of labor through the open area is not realized. However, a large number of new companies including companies from emerging countries have established competitive advantage through low-cost operations. Once detailed standards are formulated, these companies are given opportunities to overcome differences with existing companies in technology, know-how, and industrial context. Standardization offers great business opportunities to new entries from emerging countries.

Generally speaking, companies in emerging countries can produce standardized components or combine components with a standard interface to produce finished products at a lower cost than those in developed countries. Even if these companies engage in the same activities as existing companies at a much lower cost, they can generate sufficient profits because they excel in efficient low-cost operations. For this reason, companies in emerging countries welcome open area by a detailed standardization, although open area is not hailed by existing companies. New companies in emerging countries consider standardization to be a perfect opportunity for market entry.

On the contrary, it is difficult for companies in emerging countries to join the closed area, because they have little technological accumulation in general. The accumulation of technology and knowledge is a barrier that stands up against new companies. The closed area serves as a black box for accumulating technological know-how and implicit knowledge that are sources of differentiation. In the closed area, existing companies in developed countries with a great deal of technology accumulation are able to offer fully differentiated components, and exert competitive advantage over new companies in emerging countries.

The difference of market entry between the open and closed area leads the difference of expected return by which a new mechanism of international division of labor is established. Companies in emerging countries exhibit cost advantage and engage in production in open areas such as manufacturing standard components and assembly of finished products. In closed areas such as core components, companies in developed countries differentiate themselves by leveraging their technological accumulation and implicit knowledge. Thus, in these closed areas, existing companies exhibit technological advantage and engage in production (Shintaku et al., 2006). Through

international division of labor between existing companies in developed countries and new companies in emerging countries, it will become possible to produce finished products at a cost lower than that required when existing companies engage in both the open area and closed area.

Standardization makes it possible for a number of companies in emerging countries to produce finished products and to create a tremendous production capacity with core components by the companies in developed countries. Economic growth of emerging countries accomplishes very quickly with relations of developed countries.

The price of products drops in a short period of time because fierce price competition is repeated in the standardized open area. Then, the product price will decline to a price level that can be accepted in huge emerging markets in a short period of time. Through standardization, International division of labor between developed and developing countries will create a huge global market and a large volume of affordable products will rapidly disseminate over the world (Shintaku et al., 2006; Ogawa, 2008).

In the next section, we will discuss how we would profit from standardization in the establishment of a new basis for international labor division through changes in added value.

4. Standardization and Platform business

First, it should be noted that added value does not always converge on all closed areas simply because these areas have not been standardized. If a closed area remains unchanged before and after the architecture has been made open, the closed area does nothing more than realizing the same added value as it had before the architecture was made open. In order to obtain added value dispersed from the open area and gather it into the closed area, there must be changes after some parts of architecture are converted into open areas by standardization. Being a closed area is a requisite, but not a sufficient condition.

Standardization disperses the added value of the open area. In the closed area that has not been standardized, it is necessary to gather and obtain dispersed added value through reorganization of architecture. This strategy is referred to as positioning strategy of standards (Tatsumoto and Takanashi, 2008). The platform business is the most influential among positioning strategies of standards. The company that takes platform business is called platform leader (Gawer and Cusumano, 2002).

The platform leader supplies its components as a platform to finished product manufactures. The platform is composed of a core component and other peripherals, and has standardized interfaces.

Using standardization strategically, the platform leader builds industrial ecosystem internationally.

For example, in the middle of the 1990s, Intel took the initiative of standardizing each interface in a PC. At the same time, focusing on the CPU, Intel integrated peripheral circuits as a chipset to form a platform. Then, it supplied this platform to motherboard manufacturers and notebook PC manufactures in Taiwan in large quantities. Therefore, not only did Intel make technology open through standardization but it also transformed its business from simply supplying CPU to supplying platform including chipsets. It then decided to supply this platform to companies in emerging countries, and not to existing companies. This allowed Intel to benefit from the added value, which was brought about by the product market that had expanded through standardization (Tatsumoto et al., 2009).

Similar examples are also observed in the field of DVD players. After the standardization of DVD specifications in the middle of the 1990s, Sanyo Electric arose from the standalone optical pickup (OPU) business that was the core component of a DVD player. Sanyo Electric integrated components such as an actuator, base deck, and loader to evolve into a business that supplied this integrated platform. Sanyo Electric supplied this platform mainly to emerging companies in countries such as China. Similar to the example of Intel, Sanyo Electric reorganized its OPU business upon standardization and enabling it to obtain increased added value from the product market that had expanded through standardization.

These corporate behaviors illustrate the intrinsic and basic concept of the platform: to control the open area from the standpoint of the closed area (Ogawa, 2008b). As is discussed above, differentiation is easier in the closed area than in open areas. However, if the closed area is not influential over the open area, the closed is not a sustainable source of profit. In order to establish the influence over the open area, a company makes a platform to integrate a core component with other peripherals and establishes its own business model that gathers and obtains added value dispersed from the open area.

Intel created influence over motherboards and notebook PCs by dealing with the platform composed of not only core component, i.e., CPU, but also peripherals, i.e., chipset. Many new Taiwanese companies successfully joined the market and rapidly expanded their production with Intel's platform. Behind this example, there is a mechanism by which the incorporation of knowledge into the platform facilitates the entry of new companies into the open area. With the use of platform supplied by Intel, even companies with little technological knowledge accumulation such as emerging companies in Taiwan were able to manufacture products.

We would like to summarize the aforementioned examples from the viewpoint of profiting from technology. “Controlling the open area from the closed area” can be divided into the following two factors: “exclusive possession of the closed area” and “selection of partner companies in the open area.”

Exclusive possession of the closed area is to prevent the entry of any other companies into the closed area, which is a business domain of the company. Implicit knowledge and intellectual property play an important role in exclusively possessing the closed area (Teece, 1986). In the aforementioned examples, in addition to core components, Intel and Sanyo Electric also integrated peripheral areas to expand the area of implicit knowledge. Interface information between core components and peripheral components is originally explicit information. However, if peripheral components are integrated into core components, this explicit information of interface changes to implicit information. Furthermore, upon integration, dependency occurs between elements. This dependency information is also accumulated as implicit information in the company that supplies the platform. This type of implicit knowledge is made available to another company only if it pays a tremendous cost to the company providing the platform. Companies providing platforms can build an entry barrier to the closed area with integration of core and peripherals.

Similarly, intellectual property, and particularly patents that are accumulated in the platform, create a barrier against new companies. For example, Qualcomm made a great contribution to the development of the CDMA system of the digital mobile phone, and possesses a number of essential patents. Qualcomm has integrated baseband processing, power management processing, and encoding processing that are necessary for the CDMA method into ICs. Qualcomm offers this integrated IC as a platform. The platform that is built with the chipset of Qualcomm contains a multitude of essential patents has set up a major barrier against other companies that attempt to offer chipsets for the CDMA system. In other words, intellectual property has greatly enhanced the possibility of proprietary possession.

Next, we explain “selection of partner companies in the open area.” It is necessary to create demand for this type of an established platform. In other words, it is necessary for the company that built the platform to find a new partner company in the open area that will use platform provided by the platform leader. Partner companies in the open area tend to be new companies, including companies in emerging country, rather than existing companies for the following two reasons.

First, companies with high technological capabilities do not utilize the platform. Instead, companies with little technological accumulation utilize the platform. Companies with high

technological capabilities dislike the provision of a platform. Companies with capabilities tend to dislike components in the black box, which contain a great deal of implicit knowledge such as a platform, and refuse to use a platform that is provided by external companies. This is because the use of black-box components exposes them to a risk of the loss of their technological advantage. However, new companies with little technological accumulation do not have this idea. These companies regard the platform as a convenient mode for using new technologies. For this reason, in many cases, new companies with little technical accumulation become partners of the platform companies in the open area to use the platform. Companies in emerging country often fully exploit this opportunity.

Second, profitability in the open area is low. As is discussed above, new entry is easier in the open area than in the closed area and this often makes profitability low. Hence, new companies in emerging countries tend to be the main partners of the company that provides the platform because new companies can manage low profitability through low-cost operations.

From the viewpoint of international division of labor, companies in emerging countries tend to be main partners of platforms with their superior low-cost operations. Moreover, in many emerging countries, institutional promotion measures are implemented to access the platform (Tatsumoto, 2009) and this makes low-cost operations feasible. For these reasons, partnership between companies in developed countries and those in emerging countries has been built through the platform in various fields such as PCs, DVD players, and the CDMA system.

5. Summary and implications

The platform business is a typical business model that utilizes consensus standards as we have mentioned above. Behind this business, there exists an international division of labor between companies in developed countries that are responsible for advanced technological development and those in emerging countries that aspire for growth. This is why this business model is robust and universal. We suggest two implications in this paper: “adjustment of the knowledge and business scope” and the “selection of partners in the open area.”

Adjustment of the knowledge and business scope: Consensus standardization divides a product into open and closed areas. For developed country companies that promote standardization, it is critical to establish a business model for the new environment caused by standardization. They have to focus their business on closed area and reduce their business in open area. The business strategy for these companies is to boost its influence of the closed area over the open area by widening the

knowledge scope rather than the business scope (Ogawa, 2008b; Tatsumoto and Takanashi, 2008).

For example, Intel has paid a tremendous cost to run Intel Architecture Laboratory (IAL) to gain knowledge of whole systems, PCs, even though its business has been focusing on just only supplying core components, CPUs (Gawer and Cusumano, 2002). Exploiting knowledge of systems, Intel has been bringing innovations to PCs through its CPU business. If PCs need to play music, Intel incorporates multimedia functions into its CPUs and sells them to all PC manufactures. If more battery life is needed for notebook PCs, Intel develops battery management solution with the most use of CPU functions and provides it as a turn-key solution. It is a key for competitive edge to cover a wider scope of knowledge than that of business.

In case of fully integrated companies, the reorganization means that they have to reorganize their business scope from a whole system to a core component with keeping their knowledge scope covers the whole system. Fully integrated companies contain complete knowledge about the entire product including core components. These integrated companies have a potential to get a strong competitive advantage by selling their core components to other companies that manufacture the finished product. Their knowledge of a finished product must contribute to the success of their core component business. However the finished product business and the core component sales business are incompatible for most integrated firms. The core component department would like to sell the most advanced component to their customers. In contrast the finished product department should oppose that business because the most advanced core component is the source of their competitive advantage and the customers of component business are also their competitors of finished product business. Thus, the integrated company encounters the dilemma (Sakakibara, 2005). This has created a barrier that discourages integrated companies from launching the platform business.

We can learn from Sanyo Electric how fully integrated firms reorganize the knowledge and business scope. Forming a platform focusing on OPU in the DVD player, Sanyo Electric has the large-scale core component business, OPU, that manages the small-scale finished product business of DVD players. Based on the knowledge of finished products, Sanyo Electric has completed the platform in which peripheral components are integrated into OPU, and has successfully established the platform business to supply the platform to Chinese firms. This strategy shows that the platform business needs the capability to manage the knowledge flow from finished products to core components and to keep a good balance of multi-business function of finished products and core components.

Selection of partners in the open area: In the platform business, the scope of knowledge that is

necessary for the platform greatly depends on the technological accumulation of partner companies in the open area. Companies in emerging countries are not selected as partners simply because these companies are good at low-cost operations.

For example, in the competition for standards for the second-generation mobile communication system, the GSM system was adopted by China and the CDMA system was adopted by Korea. European telecommunications equipment companies aimed to integrate the overall telecommunications system that enabled the GSM communication system into the platform and to provide the platform. In this case, industrial situations in China were appropriate for the launching of a fully integrated platform. In 1994 when the adoption of the GSM system was decided upon, no mature company existed that could develop and produce reliable telecommunication equipment in China. Therefore, it was necessary for European telecommunications equipment companies to provide the platform of telecommunications equipment that encompassed the entire communication system. This enabled China Mobile, the world's largest operator, to utilize the platform provided by European telecommunications equipment companies to launch digital mobile communication services as early as in 1995.

On the other hand, Korea introduced the CDMA system. Korea lacked only radio technology in mobile communication after it implemented the digital switching facility in the domestic production project of 1988. Qualcomm, which provided the CDMA method, was originally a radio communication company. Qualcomm did not have experience in public communication facilities and lagged behind in digital switching technology. For Qualcomm, the Korean industries were perfect partners. Equipped with radio technology for the CDMA system, Qualcomm provided a platform that consisted of chipsets, which incorporated various technologies such as baseband processing. In this manner, Korea has currently become the world's largest CDMA handset exporting country. As is demonstrated by the fact that Samsung and LG rank second and fourth in the world handset market respectively, Korea has achieved an amazing success using the platform provided by Qualcomm.

Thus, it is necessary for platform companies to not only focus on emerging countries but also select partners or platforms to be provided depending on the level of the technological accumulation of the partner. In future, advanced industrial countries may provide platforms to industries in countries with much lower technological accumulation rather than to countries in which technology has already been accumulated such as China, Korea, and Taiwan.

Standardization creates a huge global market, promotes international division of labor, and contributes to economies in developing as well as developed countries for the welfare of human

beings. New industrial circumstances of US and EU in 1980s proposed the new type of standardization, Consensus standardization, and raised the importance of standardization as a strategic tool. Companies who want to acquire global competitiveness cannot do their business without standardization.

From the global economy viewpoint, studies on standardization are not yet sufficient with respect to both theory and practice. Companies are strongly urged for the global competitiveness to establish organizational capabilities to deeply incorporate international standardization as business strategies into a practical business. We would be pleased if this paper contributes to this purpose.

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Note

ⁱ European Conference of Postal and Telecommunications Administration.

ⁱⁱ European Telecommunications Standards Institute.

ⁱⁱⁱ Postal Telecom and Telegraph.