A Strategic Method for Obtaining an Enforceable Patent Based on a Product Architecture Analysis

Abstract

It is difficult for most of companies to obtain a usable patent according to statistical results provided by the Japan Patent Office. This would be because the companies hardly can see through a trend of products. This paper discusses an efficient method, which is led from an analysis of product architecture, to obtain the usable patent enabling the company to license other companies. In other words, the product architecture analysis helps the company come up the future trend of its developing product. This is considered that the company can smartly obtain an enforceable patent, prior to obtainments by the other companies, by filing a patent application focusing on the future trend. Consequently, this paper presents the measure for obtaining a patent strategically for the company by using the product architecture.

Keywords: enforceable patent, product architecture, integral, modular

I. Introduction

In Japan, about four hundred thousand patent applications are filed with the Japan Patent Office (JPO) every year and more than one hundred thousand patents are granted after laid-open publications, examination requests, and examinations by the JPO examiners [1]. However, a ratio of using the granted patents is approximately 50% [2]. This means that companies do not use around half of patent rights obtained by the companies themselves. On the other hand, fees for maintaining patent rights paid to the JPO increase according to the passage of maintenance terms. As a result, the companies do not want to have unusable patents but want to get usable patents.

Almost all the companies maintain their patent rights in order to mainly protect their own products from imitating by third parties. This is one aspect of patent use. Yet, if they are commercial company corporations, they want to license their patents to other companies and to earn money. This is another aspect of patent use. Especially for a venture company, license income would be an important source of revenue on the management. However, most of the companies do not acquire a method to file patent applications strategically, expecting future patent licenses to the others, since it would be difficult for them to grasp a precise future trend of technologies where competitors are also going to want to develop.

A strategic theory about manufacture has been set up based on product architecture [3]. Shifts of the product architecture over time have also been studied in the strategic theory [4]. The companies would be able to estimate the future trend of technologies more precisely from reviewing the shifts of the product architecture and also would obtain an enforceable patent efficiently by filing a patent application in the field of the estimated technology.

Therefore, this paper explores a strategic measure for obtaining the enforceable patent through considering the product architecture and its shifts.

II. Definitions

1. Enforceable patent

An “enforceable patent” is defined in this paper as a patent on an invention used by another company. This is because a company having the patent can earn a legally-valid license fee only when the other company uses the patented invention.

2. Product architecture [5]

“Product architecture” is the basic design concept of a product, and it relates to how to allocate each “function” demanded in the product to each “structure” of the product

and how to design an interface between structures. There are two basic patterns of the product architecture: “modular (combination) architecture” and “integral (lapping) architecture”.

The modular architecture is that, in a product, one functional element corresponds to a certain structural element one-to-one through a standardized interface. Because the interface of the component is standardized, bringing the components together allows a company to manufacture a wide variety of products. For example, when a Personal Computer (PC) system includes structures of a PC, printer, and projector, each functional element of computing, printing, and projecting corresponds only to the PC, the printer, and the projector, respectively. This is realized because the printer and projector are connected with the PC through the standardized interfaces.

Meanwhile, the integral architecture is a case where there is a many-to-many or at least one-to-many correspondence between the functional and structural elements of a product. This architecture needs a mutual adjustment of component designs and also needs optimal designs to each component. Taking a car comprising a body, engine and suspensions as an example of the integral architecture, each function of a running stability, a high mileage, and comfort relates to all of structural elements such as the body, engine and suspensions. In short, in order to achieve one function, all structural

elements must be adjusted mutually.

3. Architecture matrix [6]

An “architecture matrix” is a two-by-two matrix as described in Figure 1. The horizontal axis indicates that the inside structure, i.e. its component, of company’s own product is the modular type or integral type. The vertical axis shows that a market of customer’s product where the company’s own product is sold is the modular type or integral type.

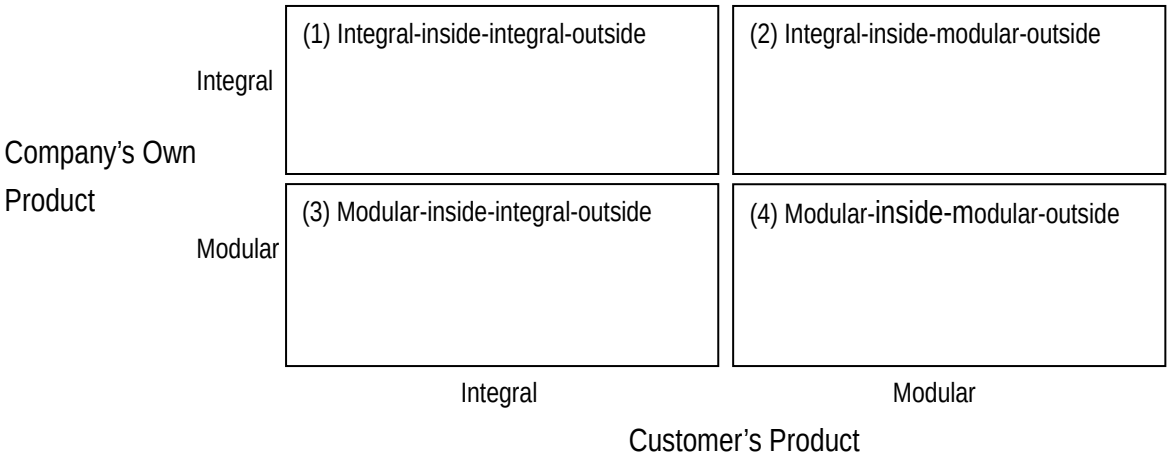

Figure 1

The matrix consists of the following four regions.

(1) Integral-inside-integral-outside

Integral-inside-integral-outside is a position where a company sells a component, such as a car component, consisting of integral-type-structures to a

customer producing an integral product. Namely, the company in this position manufactures and sells the component specially designed for specific customer's needs. In this region, the company needs to propel a thoroughgoing customization strategy in order to survive.

(2) Integral-inside-modular-outside

Integral-inside-modular-outside is a case where a company sells a component, such as an MPU used in a PC, including integral-type-structures to a customer using the component as a modular-type-component. The company can sell its products (components) as standardized goods. In this field, the company has to follow up on a unique commodity having an integral structure that is difficult to imitate.

(3) Modular-inside-integral-outside

Modular-inside-integral-outside is an area in which a company sells a product, such as a built-to-order machine tool, containing a modular-type-structure to a customer making an integral product. In other words, the company is required to manufacture and sell the product composed of standardized component, and the product depends on a customer spec. In this area, it is essential for the company to meet a customization demand by promoting modularization of company's own product.

(4) Modular-inside-modular-outside

Modular-inside-modular-outside is a position where a company sells a product, such as a desktop PC, with a modular-type-structure to a customer using the product as a modular-component. The company in this region has to reduce the production cost by mass production.

III. Shifts of the product architecture and key technologies

1. Shifts of the product architecture over time

Since the product architecture is the concept of design, it is not determined as just one meaning technically. Even though it is the same product, its product architecture changes over time. For instance, it is said that a hard disk drive had integral architecture and was in the position (1), i.e. integral-inside-integral-outside, in the past. However, it progressed into modular architecture with the time and now it is completely in the position (2), i.e. integral-inside-modular-outside. A DVD recorder used to be in the position (2), but currently it is in the position (4) (modular-inside-modular-outside) as a result of the development of its standardized modular-type-components. Commodities such as a PC, and a mobile phone, with which we are familiar in our daily life, are finished products standardized even in their inside structures in open environment. They

currently position themselves in the position (4). However, they were in the position (1), when they commercialized for the first time. They reached to the position (4) via the position (2) or (3), as inside and/or outside standardization progressed. As these examples shown, a product, particularly a digital product, tends to progress into the modular architecture in short bursts if open standardization spreads [7].

Consequently, any product would finally move to the position (4), even if it now positions itself in any other position than (4). In short, the shift of the product architecture happens with the time inevitably. In light of this shift, the next item discusses important key technologies in each position.

2. Key technologies in light of the product architecture

(1) Integral-inside-integral-outside

In this position, the followings are possible important key technologies to be developed: (i) a lapping technology between components, (ii) an interface technology between internal components, (iii) a platform technology for integrating components, (iv) a lapping technology to an external product, (v) an interface technology to an external product, and (vi) a turn-key-solution-type platform technology.

(i) A lapping technology between components

Lapping, i.e. making a lot of trial-and-error adjustment among components, is required to manufacture a product to be sold to the customers. It is essential to adjust components one another preferably in the integral-inside nature, which needs a lot of know-how. This technology would be a core technology for the company.

(ii) An interface technology between internal components

A company needs to develop this internal interface technology sooner than others in order to deal with a modular-inside product in light of the shift to the position (3) in the future, because, in the position (3), it would be essential for most of the companies to use standardized interface technologies to connect their inside components. The interface technology includes a physical form of the interface and signals to connect another component.

(iii) A platform technology for integrating components

Taking into account the shift to the position (3) in the future, a development of a platform-related technology would be desired in order to easily integrate modular-type components to be used in the position (3). This platform technology contains an infrastructural technology to allocate the

components efficiently on the infrastructure.

(iv) A lapping technology to an external product

It is important to customize its components and to adjust the component to customer's product because of integral-outside nature. This technology would usually contain the company's know-how and also would be a core technology for the company similar to technology (i).

(v) An interface technology to an external product

A company needs to develop the external interface technology sooner than competitors in order to treat a modular-outside product in light of a shift to the position (2) in the future, since almost all the companies have to use a standardized interface to connect peripherals in the position (2). The interface technology contains a physical form of the interface connector and a signal to connect to the customer's product.

(vi) A turn-key-solution-type platform technology

Taking into account the shift to the position (2) in the future, it is desirable to develop a platform technology to apply an integral-type component to modular-type customer's product. The turn-key-solution means a system (hardware and/or software) designed for specific use, which can be used without

a unique program or installation. The turn-key-solution-type platform relates to a basic technology such as an automatic adjustment mechanism or program with a variety of customer’s products

(2) Integral-inside-modular-outside

In this position, it is conceivable that key technologies are the followings: (i) a lapping technology between components, (ii) an interface technology between internal components, and (iii) a platform technology for integrating components.

(i) A lapping technology between components

It is essential to adjust components one another precisely in the integral-inside nature as stated above.

(ii) An interface technology between internal components

A company needs to develop this internal interface technology sooner than other companies to deal with a modular-inside product in light of the shift to the position (4) in the future. There is a physical form of the interface or signals to connect with other module in this interface technology.

(iii) A platform technology for integrating components

Taking into account the shift to the position (4) in the future, a platform-related technology having broad utility would be desired in order to

integrate modular-type components using in the position (4).

(3) Modular-inside-integral-outside

In this position, the followings are considered as key technologies: (iv) a lapping technology to an external product, (v) an interface technology to an external product, and (vi) a turn-key-solution-type platform technology.

(iv) A lapping technology to an external product

It is important to adjust the components to customer's product due to the integral-outside nature.

(v) An interface technology to an external product

A company needs to develop this external interface technology sooner than others to deal with a modular-outside product in light of the shift to the position (4) in the future. The interface technology may contain a physical form of the interface and signals to connect the outside device.

(vi) A turn-key-solution-type platform technology

Taking into account the shift to the position (4) in the future, it is desirable to develop this kind of platform technology to apply company's own component to modular-type customer's product.

(4) Modular-inside-modular-outside

A company applies commodity components to standardized customer's product in this position, so that there would be no important key technology in light of product architecture.

Figure 2 shows the relations between the product architecture matrix and the essential key technologies as described above.

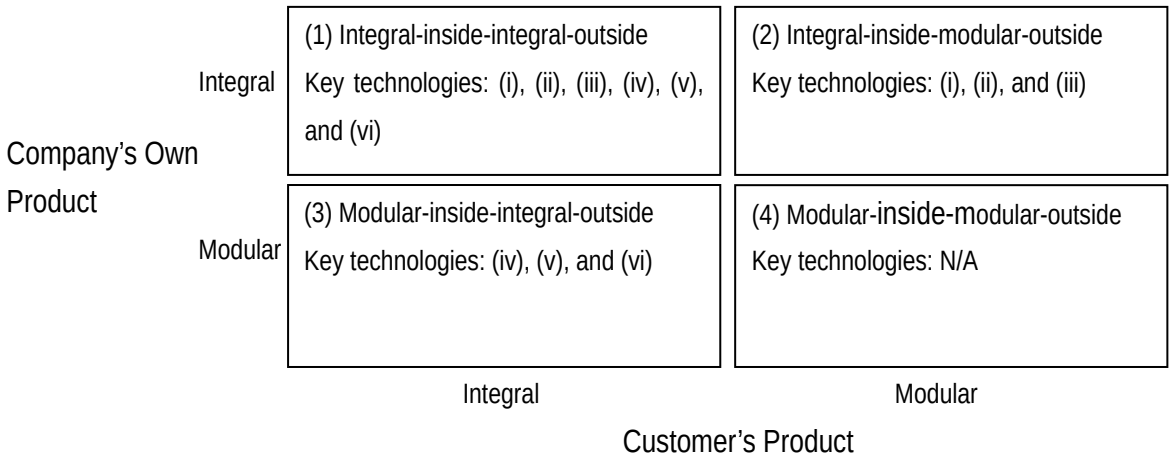

Figure 2

IV. Strategic patent applications

1. Understanding of its position

A company has to recognize where the product under development or to be developed is located on among the positions (1) to (4) in order to file a patent application strategically based on the product architecture analysis. This is because the considerable key technology is different in each position. The company needs to

understand not only internal environment but also external relations in order to find its product position.

2. A patent filing strategy for the key technology

After understanding the position of the company's own product, it is desirable to research and develop the technologies that are considered as the key technologies in each position as mentioned above. Then, the company should file a patent application on an invention made from the research and development. This provides companies with a method for obtaining future enforceable patents because the technology tends to flow in one direction in the modularization process over time, such as the shift from the position (1) to (4) via (2) or (3), especially in the field of digital products.

However, because the patent application is opened to public in 1.5 years after filing date, the company has to be careful to judge whether its patent application is filed, especially in the field of the technology (i) or (iv). The technologies (i) and (iv) can include the company's know-how in many cases, so that the company should accumulate the know-how as its technology knowledge in the inside of the company in case publication of the know-how affects the company profits badly.

On the other hand, the company should file patent applications actively specifically

in the field of the technology (ii) or (v). There is a possibility that those kinds of interface technologies gain a position of a de facto or de jure standard. If the company's technology gets the standard position, competitors are forced to use the patented technology. This means that the company (patent-holder) can usually obtain a license fee without annoying patent negotiations or patent litigations. This kind of patent is called an essential patent. Accordingly, it is desirable for the companies to file patent application intensively in these fields and form a potent patent portfolio. Meanwhile, even if the license-free policy is adopted at stage of standardization, the company having many essential patents can take a high position in the standard group such as a consortium and make the standard to the company's advantage.

Additionally, if the company's developing product is located in the position (4), there is no strategy for filing patent applications because no important technology is in the position (4) based on the product architecture analysis.

V. Conclusion

This paper discussed the method to obtain an enforceable patent based upon the product architecture analysis.

Firstly, a company hoping to get enforceable patent has to understand the concept of

the product architecture because this discussion depends on the architecture theory. Secondly, the company needs to realize where the company's own product is positioned in the product architecture since the field of technology to be developed varies corresponding to the position in the architecture matrix. Finally, the company should develop the technology according to the position and file a patent application.

[2,679 words]

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