# 8 Application Behavior, etc. of Companies toward Sustainable Economic Growth of Japan(*)

*Intellectual activities have come to play an increasing role and to have more importance in the development of the industry and economy in recent years. Along with that, people have come to recognize the importance of knowledge and environmental improvement in industrializing intellectual property created through intellectual activities. It is very important, in considering future intellectual property policies and measures, to empirically analyze with what intent companies, etc. use the systems to protect intellectual property and what effects they achieve.*

*In this study, we conducted eight kinds of empirical analysis in total, specifically, analysis of the influence of changes to the requirements for accelerated examination, analysis of the possession of unused patents, analysis of changes in patent filing strategies, analysis of the meaning of filing foreign applications, analysis of companies' intellectual property strategies such as the utilization of the information provision system/objection/request for a trial against an examiner's decision/request for a trial for invalidation, analysis of the trends of filing of patent applications by universities, analysis of the relationships between software companies and ownership of patents, and analysis of the development of panel data on the Survey on Intellectual Property Activities, taking advantage of the Survey on Intellectual Property Activities implemented by the JPO and database such as PATSTAT, while taking into account the study results that have been accumulated so far. In addition, we also considered the review of the design of the Survey on Intellectual Property Activities.*

## Ⅰ Introduction

The intellectual property system is a basic infrastructure in promoting innovation, and its way of being has great economic impact. In addition, companies' research and development and intellectual property activities have significantly changed in recent years due to the globalization of corporate activities, changes in competitive structure, progress of industry-university cooperation, and strengthening of intellectual property protection across the world. At the same time, the development of electronic data, including the Survey on Intellectual Property Activities, PATSTAT, IIP Patent Database, and NBER Patent Database, has advanced. Thereby, there has been a significantly increasing possibility of policy analysis based on evidence through objective understanding of intellectual property activities.

In light of the aforementioned circumstances, in Part II, the following eight empirical analyses were conducted for the purpose of contributing to materials to be considered in developing the patent system and formulating policies toward establishing an intellectual property system that promotes the creation and industrialization of inventions, by empirically analyzing patent-filing behaviors and intellectual property strategies of Japanese companies, etc. under the current patent system: (1) statistical analysis of requests for accelerated examination, (2) statistical analysis of unused patents, (3) analysis of changes in the patent filing strategies of companies, etc., (4) statistical analysis of patent applications filed by universities, (5) statistical analysis of foreign applications filed by global companies, (6) economic analysis of the information provision system, objection, request for a trial against an examiner's decision, and request for a trial for invalidation, (7) relationships between software companies' ownership structure and ownership of patents, and (8) study on the development of panel data on the Survey on Intellectual Property Activities. Furthermore, in Part III, two analyses, specifically, (1) consideration of targets of the Survey on Intellectual Property Activities and (2) consideration of items of the Survey on Intellectual Property Activities, were conducted for the purpose of considering a desirable future design of the Survey on Intellectual Property Activities, which has been used in formulating intellectual property policies.

We hope that the aforementioned analyses

(*) This is an English translation of the summary of the report published under FY2010 study commissioned by the Japan Patent Office. IIP is entirely responsible for any errors in expression or description of the translation. When any ambiguity is found in the English translation, the original Japanese text shall be prevailing.

will contribute to further improving intellectual property systems, including the accelerated examination system and trial for invalidation, and will be utilized as basic data in formulating intellectual property strategies, etc. of companies and universities.

(Sadao Nagaoka)

## Ⅱ Survey on the Patent-Filing Behaviors and Intellectual Property Strategies of Japanese Companies, etc.

### 1 Statistical analysis of requests for accelerated examination

The accelerated examination system is an important system that is designed to meet applicants' need for early establishment of rights by giving priority to examinations on inventions for which the right must be established at an early date and to effectively utilize the examination resources of the JPO for the promotion of innovation.

However, no detailed analysis has been conducted on the way that this system is actually used. Therefore, in this study, we intend to gain an understanding of the trends of use of the accelerated examination system in Japan after its establishment in 1986 and to reveal the actual conditions of the use thereof (actual method of use). In doing so, we conduct an analysis while focusing on working-related requirements, foreign country-related requirements, and SME requirements, out of the requirements for the use of the accelerated examination system.

As a result of the analysis, it was indicated that working-related demand for accelerated examination has been declining since the middle of the 1990s due to a significant decrease in the period and variability of examination at the JPO while relevance to foreign applications has been growing. The causes of growing relevance to foreign applications require further analysis. However, as far as the situation up to 2005 is concerned, analysis revealed the possibility that the growing relevance is reflecting the fact that foreign applications have come to be filed for important inventions rather than the fact that emphasis has come to be put on the system's capability to shorten the examination period in foreign countries. In addition, as the users of the accelerated examination system, the number of requests for accelerated examination filed by large companies is overwhelmingly high compared to the number of requests for accelerated examination filed by SMEs and universities/TLOs. Although a preferential treatment is available for SMEs, the rate of registration of patent applications for which SMEs have used the accelerated examination system and the average number of patents that are cited in subsequent patents are high, which reveals that the system is being used for high-quality patents.

It was revealed that the purpose of using the accelerated examination system has undergone significant changes since the system was established in 1986, due to accelerated speed of patent examination, internationalization of patent applications, expansion of the accelerated examination system, growing importance of application of Article 30, and other reasons.

(Isamu Yamauchi/Sadao Nagaoka)

### 2 Statistical analysis of unused patents

This report has revealed the characteristics of companies for which the in-house working rate is high and those of companies for which the in-house working rate is low, focusing attention on the in-house working rate that is the other side of the unused patent possession rate. The report's major conclusions are as follows.

(i) The in-house working rate and the unused patent possession rate differ depending on the type of business (in particular, it is necessary to analyze manufacturing businesses and non-manufacturing businesses separately). Companies in the same industry differ in the in-house working rate and the unused patent possession rate.

(ii) The bigger a company is, the lower the level of the in-house working rate. That is, the bigger a company is, the higher the level of the unused patent possession rate. This result matches the result indicated by Nagaoka and Nishimura in 2005 and Nishimura in 2006.

(iii) The more competitive the industry in which a company is operating is, the higher the level of the in-house working rate and the lower the level of the unused patent possession rate. This indicates that the more intensive the competition in the market is, the more efficiently companies conduct intellectual property management as well as business management and the more they avoid possessing unused patents that are unemployed resources.

(iv) The hypothesis concerning the quality of inventions was supported through both

cross-section analysis and panel analysis. That is, for a company that creates inventions of which the quality is normally high, most of its patented inventions will lead to the implementation of business owing to the high quality. On the other hand, for a company that creates inventions of which the quality is normally low, most of its patented inventions will lead to the occurrence of unused patents due to the low quality.

(v) If estimation is conducted while including variables that are used to verify hypothesis 3 in the panel analysis, the significance of other variables ceases to exist. According to this fact, it seems that as factors, such as the quality of inventions, are connected more directly with the implementation of business by companies than companies' characteristics and industrial characteristics, secular changes in terms of the quality of inventions have a greater influence on the in-house working rate than secular changes in companies' characteristics and industrial characteristics.

(Yoichiro Nishimura)

## 3 Analysis of changes in the patent-filing strategies of companies

In this report, we have considered factors that influence the filing strategies of companies from the perspective of the attributions of applicants and industrial characteristics and the factors that influence secular changes in the filing strategies of companies, paying attention to inventions that have been reported to an intellectual property department, etc. but for which no application has been filed. The major conclusions are as follows.

(i) Theoretical analysis revealed that there are certain relationships between a company's inclination to non-patent (or inclination to patent) and (1) original value of inventions created by the company, (2) characteristics of inventions created by the company, (3) progress of globalization of the company, (4) position of the company in technological competition, and (5) size of the company.

(ii) We verified the hypotheses derived through the theoretical analysis by mainly using the JPO's Survey on Intellectual Property Activities. According to the verification, first, the level of inclination to non-patent (or inclination to patent) differs significantly depending on the industry. Furthermore, the verification also revealed that the level differs depending on the company. However, comparing the quantitative analysis by industry and quantitative analysis by company, the former had more power of explanation. That is, this result indicates that the filing strategies of companies are highly likely to be affected more by the factors of the industry in which they operate than by the companies' characteristics. Thirdly, with regard to the characteristics of inventions created by companies, the progress of globalization of companies, and the size of companies, the following consistent relevance was discovered through quantitative analysis: (1) The inclination not to patent is at a higher level in industries in which companies create inventions of process or complicated inventions; (2) (a) The more globalized the industry is, the higher the level of inclination not to patent, and (b) the more progress the company has made in globalization compared to the level in the past, the higher the company's level of inclination not to patent is; (3) The larger the company is, the higher its level of inclination not to patent is.

However, as we did not exactly analyze which has a greater influence on the filing strategies of companies, industrial characteristics or companies' characteristics, (in particular, contribution rate) in this study, we only point out the possibility. In addition, we point out in the end that the conclusion of this report includes many provisional elements.

(Yoichiro Nishimura)

## 4 Statistical analysis of patent applications filed by universities

This report took a look at the trends of filing of patent applications by universities and the quality of patents in the respective countries and region, using patent data for Japan, the United States, and Europe, mainly PATSTAT. With regard to the analysis of trends of universities' patents, empirical studies have been progressing from the perspective of evaluation of the Bayh-Dole Act in the United States. These are in response to the indication that although the number of universities' patents has rapidly increased under said Act, which was enacted in 1980, the quality of patents has probably deteriorated. Summing up past empirical studies, according to the results of analysis using data up to the first half of the 1990s, the quality of patents deteriorated seen from the perspective of the number of patents that are cited in subsequent patents. However, such indication is not correct taking into account data for the subsequent period. Here, it is possible to

conclude that although the number of patents which are cited in subsequent patents, which is controlled by the year of filing or technical field, declined until the first half of the 1990s, it has been on the increase thereafter. This conclusion matches the aforementioned observation.

On the other hand, in Japan, attribution of patents to organization at national universities has been liberalized since the incorporation of national universities in 2004, and the number of patent applications filed by universities has rapidly increased in said year and thereafter. However, there has been no sign of deterioration in the quality of patents incidental to the increase in the number of applications. Behind this is probably the following fact: Companies had independently filed patent applications for the results of industry-university cooperation even before the incorporation of national universities, and the research content has not changed much even though patents for inventions created jointly by industry and university were replaced by patents for which an application has been jointly filed (University of Tokyo, 2010).

In Europe, countries have different systems for universities' patents. However, except for the United Kingdom where attribution of patents to organization at universities has been recognized for years, attribution of patents to organization at universities was put into practice in 2000 and thereafter in many countries. The representative of such countries is Germany, where the professor privilege (researchers' right to possess patent rights) of university researchers was abolished in 2002 and the number of patents possessed by universities started to increase. Incidentally, in Germany, the quality of universities' patents has hovered stably over the average since the latter half of the 1990s, and there has been no influence of the reform of the system.

(Kazuyuki Motohashi)

## 5 Statistical analysis of foreign applications filed by global companies

The number of patent applications has been on the increase around the world since the 1990s. The number of applications increased 1.5 times for ten years, from 1.2 million in 1998 to 1.85 million in 2007. In particular, such increase is remarkable for applications filed from other countries. The number of applications filed by non-residents in each country increased 1.6 times for the ten years. Those applications ended up with accounting for 40% of all patent applications in fiscal 2007. This study empirically revealed the causes of filing of foreign applications by companies with the use of panel data on multinational companies. In the estimation, we tried hard to achieve the better precision of analysis than prior studies by conducting estimation by company, year, and region, with the use of microdata, such as data on the number of applications filed by companies with each country's patent office in each year and data on advance. The results of the estimation are as follows: (1) Companies' direct investment increases the number of patent applications filed in the investing country; (2) On this occasion, the number of patent applications increases more in the case of joint investment with local companies; (3) The strengthening of the intellectual property system in countries causes an increase in the number of applications filed by multinational companies in the countries.

(Koichiro Onishi/Naotoshi Tsukada)

## 6 Economic analysis of the information provision system, objection, request for a trial against an examiner's decision, and request for a trial for invalidation

In this study, with regard to the information provision system that has been used increasingly frequently in recent years and the objection system in the past, the system of trial against an examiner's decision, and the system of trial for invalidation, we empirically analyzed the use of those systems and determining factors for the results of the use, as well as the consequences of changes to the systems, with the use of company-level and patent-level data as well as technical field-level data. The authors received the provision of large-scale data from the JPO, and have conducted comprehensive studies on these systems (Kenta Nakamura, Tomoyuki Shimbo, and Sadao Nagaoka (2010), "Tokkyo no shinpan oyobi igimoshitate ni kansuru keizaigakutekibunseki" (Economic analysis of patent trials and objections), Institute of Intellectual Property, ed., Heisei 21 nendo wagakuni no jizokuteki na keizaiseicho ni muketa kigyo to no shutsugankodo to ni kansuru chosahokokusho (FY 2009 Report of Study on Application Behavior, etc. of Companies, etc. for Sustainable Economic Growth in Japan)). This study is an extension of the aforementioned study, and we developed a patent-level analysis and technical field-level analysis for the purpose of obtaining more connotations of desirable patent

examination and desirable intellectual property strategies of companies, etc.

In the patent-level analysis (Sections 2 and 3), we considered how attributions of an applicant (attributions of a right holder), such as the status of possession of complementary assets and the degree of concentration of research and development, affect the filing and establishment of a trial against an examiner's decision, an objection, and a trial for invalidation, by linking patent data concerning information provision, trials against an examiner's decision, objections, and trials for invalidation with the Survey on Intellectual Property Activities (JPO). The major results of the analysis are as follows.

With regard to trial against an examiner's decision, the more complementary assets the company has, the more incentive to file a request for a trial against an examiner's decision the company has. This is because profits from the relevant application are likely to be bigger for such companies. However, the existence of complementary assets does not increase the probability of establishment of a trial (instead, a trial is hard to establish as the bar to filing of a request for a trial is low).

In addition, no effect of complementary assets on objections was confirmed. That is, it is possible to say that, for a company that raises the objection, the extent to which the company's own business is bound by the continued establishment of a patent with a high technical value is of primary importance, and the size of profits gained by another company from the patent does not necessarily serve as an incentive to raise an objection. Moreover, for trial for invalidation, the hypothesis of complementary assets was not supported, and it was rather indicated that the patents of companies of which size measured by sales or possessed patents is large have a low risk of becoming subject to a trial for invalidation. This indicates that where a company intends to invalidate a patent of a large company, the large company is likely to take actions, such as filing an infringement lawsuit against the company that has filed a request for a trial and filing a request for a trial for invalidation of a patent possessed by the company that has filed a request for a trial, and is consequently highly likely to avoid the trial for invalidation through cross-licensing, etc. Needless to say, the source of such situation is non-existence of anonymity of the invalidation system. This result is in contrast to the fact that the attribution of an applicant (size of complementary assets) had no influence on the raising and establishment of an objection for which anonymity is secured.

In addition, in the technical field-level analysis (Section 4), we verified whether information provision substituted for the objection and in what technical fields information provision easily substituted for the objection, from the perspective of the eligibility for a demandant of an opposition, a trial for invalidation, or information provision and the period for requesting such. As a result, it was revealed that the degree of substitution between objection and pre-grant information provision is small for technical fields for which anonymity is important. The possible reason thereof is that the number of cases of pre-grant information provision did not increase after the abolition of the objection system since companies had already been actively utilizing pre-grant information provision in the technical fields for which anonymity is important. On the other hand, we could not reveal uncertainty in the commercialization of inventions and the existence of the deadline effect that is expected to be related to the speed of R&D competition.

(Kenta Nakamura/ Tomoyuki Shimbo /Sadao Nagaoka)

## 7 Relationships between software companies' ownership structure and patent ownership

In this study, we analyze the relationships between the ownership structure of capital and patents with regard to software companies. Japanese software companies are classified based on the background of their establishment, and differ in the ownership structure of capital. "Group" companies that have gained independence from major computer manufacturers or the types of businesses that utilize the computer system for business activities are invested by their parent companies. On the other hand, the capital of "independent" companies that have been started up by venture entrepreneurs with their own capital, which do not belong to such a corporate group, are possessed by their business managers. The former have the advantage of being able to stably receive orders from other companies in the group to which they belong and also have the advantage of being able to utilize the technology of their parent companies. On the other hand, the latter need to secure profits by raising capital, taking advantage of their own technologies as they do

not have the kind of technical background that "group" companies have. A possible means of raising capital is the utilization of the patent system. It can be said that, for software companies, the broadening of patents for software from the latter half of the 1990s onward expanded the possibility of utilization of the patent system. This study verifies the influence of difference in the ownership structure of capital on the utilization of the patent system in the IT services industry that has such characteristics.

Then, software companies are roughly divided into the following three categories in terms of their ownership structure: independent companies based on investments only by individuals (= "only individuals: family/executive"), group companies of a juridical person which collaborate with other companies in the group in terms of capital/business/technology while receiving investment from the parent company (= "only juridical person: 100% subsidiary" and "only juridical person: joint venture/group company"), and independent companies for which investors include juridical persons (= "only juridical person: independent" and "individuals + juridical person: independent"). As a result of comparing the status of filing applications based on the ownership structure of capital and analysis of the influence of differences in the ownership structure of capital on applications and joint applications in consideration of the size and the content of business of companies, the following three points were indicated in this study. (1) Companies in which the representative invests and which also raise capital from outside have a higher incentive to file applications compared to companies that fall under other ownership categories. (2) 100% subsidiaries do not have a high incentive to file applications, and 100% subsidiaries which have filed applications are highly likely to have filed joint applications. (3) The number of applications filed by companies invested by juridical persons is more than the number of applications filed by companies invested by individuals, even after eliminating the influence of such factors as the size and content of business of the companies on the number of applications.

As subsidiaries and group companies can get support from their parent companies in terms of capital/business/technology, they do not have a high incentive to file applications by themselves. However, if such companies have filed applications, they are highly likely to have filed joint applications. On the other hand, for independent companies, independent companies based on investments only by individuals and independent companies that also raise funds from juridical persons differ in the utilization of the patent system. It was indicated that independent companies which receive investments from juridical persons have a high incentive to file applications.

(Kazuyuki Motohashi/Masayo Kani)

## 8 Study on the development of panel data on the Survey on Intellectual Property Activities

In this report, we discussed problems with the Survey on Intellectual Property Activities (hereinafter called the IP Survey) and precautions for the use of the IP Survey through panelizing of the IP Survey. The IP Survey provides extremely valuable statistical data with no peer in other countries in terms of the scale of the survey and the diversity of the content of the survey. Moreover, due to a recent progress in the accumulation of data on the IP Survey, the needs for the Survey are expected to grow more and more in policy planning and research studies. Therefore, this study aimed at enhancing the convenience of the IP Survey by panelizing all items of the Survey based on the applicant number, and also aimed at providing information that is useful in considering the design of the questionnaire and the desirable primary tabulation of collected data. The detailed arrangement of changes of the survey items (Section 4) and the consideration of the content of revision of classification of types of business and the influence of the revision (Section 5) are cited as the major contributions of this study. The content thereof is briefly stated below.

The questionnaire for the IP Survey is revised every year for the purpose of considering survey needs and reduction of burden on respondents. Although the content of the questionnaire has remained considerably stable from the survey in fiscal 2007 onward, considerable revisions have been made in the past. Therefore, in Section 4, we summed up the track record of revisions of the questionnaire items and the possibility of obtaining data (continuity of data). As responding companies have been given applicant numbers, it is not technically difficult to link the survey of each year using the numbers. However, it was revealed that there are many cases in which definition slightly differs depending on the year of the survey, even

for items on which the survey seems to have been continuously conducted.

In addition, it is necessary to note that the type of business numbers used for the survey until fiscal 2007 and those used for the survey thereafter lack continuity since the classification of types of business was revised in the fiscal 2008 survey. Therefore, in Section 5, we prepared a concordance between the new classification of types of business and the old classification of types of business. Moreover, we checked movements between the types of business, targeting companies which answered the questionnaire for two consecutive years, in order to confirm the influence of the changes of the classification of types of business on the respondents' selection of types of business. As a result, the rate of movements between the types of business was 15.6% for comparison between fiscal 2006 and fiscal 2007 and 16.0% for comparison between fiscal 2008 and fiscal 2009, for both of which there was no change of the type of business codes, while the rate for comparison between fiscal 2007 and fiscal 2008 was 25.5%. Furthermore, out of 535 companies of which the type of business changed in fiscal 2008 from that in fiscal 2007, 82 entered the same type-of-business number even after the revision of the type-of-business codes. As there is no clear standard for selection of a type-of-business number in the IP Survey, the selection is largely attributable to the subjective determination of the respondents. However, it was revealed that sufficient attention is required in tabulating and analyzing the survey results by the type of business.

(Kenta Nakamura)

## Ⅲ Consideration of Review of Design of the Survey on Intellectual Property Activities

### 1 Consideration of targets of the Survey on Intellectual Property Activities

In this study, we considered what would be a desirable parent population and sampling method for the Survey on Intellectual Property Activities in the future by examining the advantages of using parent population and conducting sampling based on data on right holders, compared to the case of using patent population and conducting sampling based on the annual record of filing applications, which is currently adopted. As data on right holders, we used data on the number of rights at the end of each year. In addition, the supposed scope of complete enumeration cover right holders who possess five or more rights under any four laws, for the reason of compliance with the current survey method.

As a result of this study, it was revealed that, for the current method, the composition of companies has significantly changed every year in terms of both parent population and companies subject to the complete enumeration. On the other hand, there have been smaller changes in parent population and companies subject to the complete enumeration, which were newly prepared this time based on data on right holders, compared to those based on the current method. In particular, it was revealed that the method based on data on right holders is effective in preparing panel data to be used for seeing secular changes.

The rate of coverage of all applications by applications filed by companies subject to the complete enumeration is high for patent applications (87.2% on the average of years for which the companies filled in the questionnaire) and design applications (75.8%) on the basis of the current complete enumeration method, showing that there is no negative effect on the prediction of applications and expanded estimation. On the other hand, the average rates of coverage for utility models and trademarks are 16.5% and 46.4%, respectively, for years for which companies filled in the questionnaire. Compared to the method based on data on right holders, the rate of coverage is higher for the right holder-based method for all four laws during years for which companies filled in the questionnaire (88.8% for patents, 23.1% for utility models, 80.7% for designs, and 57.5% for trademarks on the average of years for which companies filled in the questionnaire). In particular, there is a big gap for utility models and designs. However, it was also revealed that it is necessary to pay attention to the point that the rate of coverage is still low for utility models and trademarks.

(Koichiro Onishi/Takahiro Tsuchiya)

### 2 Consideration of items of the Survey on Intellectual Property Activities

As represented by the term "open innovation," license agreements between companies are expected to become increasingly active in the future. In order to contribute to the facilitation of negotiations between companies

under such circumstances, we considered whether it is possible to obtain data, which gives an indication of license royalty rates, through the Survey on Intellectual Property Activities. We adopted the interview survey as the main survey method.

The results of this study revealed that the forms of license agreements and the methods of calculating license royalty rates significantly differ depending on the type of business and individual agreement. This revealed that it is necessary to prepare a questionnaire that can be used for surveying individual agreements, in order to conduct a survey on license royalty rates in consideration of the types of business and the characteristics, etc. of individual agreements. In this study, we prepared, just for reference, a questionnaire to be used for surveying the specific details of individual representative licenses, including the form of licensing, the type of business of other party to the agreement, location of other party to the agreement, the period, royalty rate, and the total amount of royalty. However, such a questionnaire also has the following problems.

First, there is the undeniable possibility that the response rate actually remains at a low level due to contractual confidentiality obligation. A possible means of avoiding the problem of confidentiality obligation is to conduct the survey by delimiting the range. However, even in the case of adopting this survey method, to what extent the problem can be actually avoided will depend on the determination of the respondents. Secondly, there is a tabulation problem. “License agreements with a high royalty” are highly likely to be selected as “representative agreements.” In that case, the tabulation results may overestimate the actual conditions. In addition, tabulation results become more convenient if the results are classified in greater detail by the form of licensing, type of business, region, and difference in the methods of calculating royalty rates; but the more the results are classified in detail, the more difficult the securing of the number of samples for individual tabulation is. However, it is impossible to determine an appropriate method of classification before seeing the number of actual responses.

Moreover, it is also necessary to note the possibility that adding difficult-to-answer questionnaire items to the items of the Survey on Intellectual Property Activities may cause a decline in the response rate for the entire survey.

Based on the above, it is possible to say that further discussion will be necessary for introducing a survey on license royalty rates to the Survey on Intellectual Property Activities.

(Koichiro Onishi/Tsuyoshi Uchida)

(Researcher: Tsuyoshi Uchida)