

9 Application Behavior, etc. of Companies, etc. for Sustainable Economic Growth in Japan

It is extremely important for realizing sustainable economic growth in Japan to establish an intellectual property system in which the research and development results of a company, etc. are protected and used effectively as intellectual properties, thereby promoting technological innovation and stimulating economic activities. For that reason, it is essential for planning measures concerning Japanese intellectual properties to share a common awareness based on statistical data analysis and to deepen discussions of the intellectual property system.

Based on these circumstances, the following six empirical analyses were conducted in this research: (1) effects of law amendments on the employee invention system; (2) patterns related to the application behavior of companies, etc. in the high-tech sectors; (3) whether the application behavior of companies, etc. is changing from quantity to quality; (4) the impact of system change on software patents; (5) the determining factor of patent trials and filing objections; and (6) the relationship between company secrets (know-how) and profitability or the sustainable competitive advantage of companies. Revisions of the Survey of Intellectual Property-Related Activities are also reviewed.

I Introduction

The importance of intellectual property is increasing rapidly with the increasing international competitiveness of Japan. In order to break out of the worldwide recession that began in the financial crisis of 2008 and to realize sustainable economic growth, it is extremely important to establish an intellectual property system in which the research and development results of a company, etc. are protected and used effectively as intellectual properties and generate economic value, thereby promoting technological innovation and stimulating economic activities. Based on this perspective, for planning measures on intellectual properties in Japan, it is essential to establish a theoretical foundation based on statistical data analyses and to deepen discussion of the intellectual property system with awareness of both the government and private sectors based on its theoretical foundation. Moreover, there is a worldwide emphasis on analyzing the effect, etc. of measures for intellectual properties based on the data.

Based on the status of these issues, the following six empirical analyses are carried out in this report in order to establish a theoretical foundation for the intellectual property strategy of companies, etc. in making intellectual properties into economic values; at the same time, to establish criteria and indices that contribute to the planning of measures for intellectual properties by future governments to ensure sustainable economic growth in Japan; and to review the impacts in Japan of the intellectual

property system and related measures: (1) effects of law amendments on the employee invention system; (2) patterns concerning behavior related to the application behavior of companies, etc. in high-tech sectors; (3) whether the application behavior by companies, etc. is changing from quantity to quality; (4) impact from the system changes to of software patents on the structure of the software industry; (5) determining factors for patent trials and filing objections; and (6) the relationship between company secrets (know-how) and profitability or the sustainable competitive advantage of companies.

In addition, revisions of the Intellectual Property Activity Research are examined in order to improve the accuracy of the Intellectual Property Activity Research data that is an essential base material for the planning of intellectual property measures and the establishment of intellectual property strategy in companies, etc.

It is expected in the future that the results of this research and study can be used as base material for planning the examination and trial system at the Patent Office and become valuable information for supporting the planning of application strategies for industrial property rights at companies, etc. by sharing the information.

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the European Patent Office (EPO) for coming to Japan and providing useful comments.

(Sadao Nagaoka)

II Research on the application behavior, etc. of Japanese companies, etc.

1 Statistical analyses of the employee invention system

The environment surrounding the invention award system has drastically changed due to the increasing number of lawsuits recently claiming remuneration for employee inventions and the amendment of Article 35 of the Patent Act in 2004 (enforcement on April 1, 2005). Under these circumstances, first, this research performed a quantitative analysis on the impact the lawsuits claiming remuneration for employee inventions and amendment of Article 35 of the Patent Act had on the employee invention award system of companies. Second, by returning to more fundamental problems, it analyzed how the employee invention award system that has been introduced into companies relates to the characteristics of their business, and thereby examined whether the employee invention award system has a role as an incentive agreement. The analysis gave the following results. First, the awards tended to increase significantly for a certain time before and after the amendment of the Patent Act. Based on the estimated results, it has become obvious that this increase is not an increase of payment due to the performance award system, but can be explained by an increase of payments due to the award system for application. In concrete terms, the award payment per application increased on average by 32,000 yen. After the amendment of Article 35 of the Patent Act, it increased by 45,000 yen, an additional increase of 13,000 yen. According to the results of this research, there were no distinct correlations between business characteristics and award payment, except for business size or intensity of research and development. Based on this result, the possibility that award payments by companies are established to obtain effects from incentives was not clearly indicated.

(Koichiro Onishi, Hideo Owan)

2 Statistical analyses of the application related behavior, etc. of companies, etc. in high-tech sectors

In this report, research data on the trends in patent application strategy in four high-tech sectors are connected with PATSTAT and PATR and characteristics of their application behaviors are analyzed statistically. According to the analysis results, the importance of the U.S.A. market is high in the high-tech sectors and there are many international applications filed in the U.S.A. compared with other countries. The usage situation of the systems of internal priority, provisional application, or continuous application, etc. in high-tech sectors varies widely by country. These systems are used in the U.S.A. much more than Japan and the frequency of usage in Europe situates it between Japan and the U.S.A. In most of cases in Japan, a specific invention ends up being protected by a single patent, while in Europe and the U.S.A, particularly in the U.S.A., it is normal to be protected by multiple patents and the concept of patent family has also become important for patents in Japan. As causes of these differences, the difference in the systems established by country is the most important. It is found that the nationality of applicants is also a major cause. For example, in the United States Patent and Trademark Office, European applicants use the provisional application system much more often than Japanese applicants. U.S. universities seek out various patent protection strategies like the U.S. companies; however, Japanese universities have no such tendencies.

In addition, as a comparison between fields, particularly the field of biotechnology, it is confirmed that the importance of systems of continuous application or provisional application, etc. comes primarily from the high level of uncertainty of research and development and the wait for the request for review becomes long due to its long lead time.

Moreover, in the high-tech sectors, it was found that an application for an invention that is considered to be an important patent is filed more globally than other patents, and various systems are frequently used for important patents. In other words, it is possible to say that systems, such as internal priority and divisional application, have important roles in protecting valuable inventions in high-tech sectors.

Finally, the analysis results indicated the high importance of science and technology documents as prior art document in high-tech sectors and

how capabilities for searching and evaluating these documents become important for patent examinations.

For the analysis of this research, PATSTAT, which has been making significant progress in recent years, was used as data source; however, it was found that PATSTAT had various problems in the analysis process (see the supplementary report). One significance of this research is considered to be as a contribution to improving database accuracy by feeding back the problems. By doing so, it is expected that future research using the patent data will be able to show greater progress. In particular, this research indicates that the patent database will contribute greatly to discussions of measures based on evidence. At the same time, the analysis of this report is limited due to the current situation of the database. It is necessary to state that the analysis therefore contains provisional elements.

This research also indicates how the analysis can be used by each patent family and the possibilities for their development.

However, due to time and database limits, rigorous empirical analyses using econometric models were not able to be implemented in this report. When analyzing the determining factors of the system usage situation, it is necessary to control various factors in addition to the difference between the systems by country or the attributes of applicants. By using econometric models, it is possible to identify the extent of the effect of the differences in nationality, organization category, etc. respectively. These matters will be future issues.

(Naotoshi Tsukada, Isamu Yamauchi, and Sadao Nagaoka)

3 Statistical analysis of the patent application behavior of companies, etc. – Changes from quantity to quality –

The purpose of this report is to clarify from a statistical perspective, in terms of the patent application behavior of companies, whether there are alternative behaviors to claims that increase the number of claims per patent application and reduce the number of patent applications and to investigate whether these behaviors mean “changes from quantity to quality” in patent applications. In the results of the statistical analyses, distinctive alternative behaviors to claims were seen and it was verified that patents with more claims have a higher value. These results indicate that “changes from quantity to

quality” are occurring with companies’ patent application behaviors. In addition, a “multiplier of multiclaim system” was estimated in order to investigate whether the introduction of a revised multiple claim system has allowed the creation of patent value that cannot be obtained under the single claim system. The multiplier of multiclaim system means a numerical value that is obtained by dividing the total patent value of the applications that companies have filed under the multiple claim system by the total patent value that would have been realized in cases where the divided applications for the same number of inventions that generate the patent value under the multiple claim system are filed as one claim. The multiplier of multiclaim system is estimated by the claim elasticity and the claim discount rate of patent value. When the premium of the multiple claim system multiplier is over 1, a positive economic significance can be found in the introduction of a revised multiple claim system. In the overall estimation results of the sample companies, a slight premium is found, but the value was not statistically significant. However, some technology fields have considerably large claim elasticity. In these fields, a distinctive premium may be found.

(Setsuo Yamada)

4 Analysis of the impact of software patents on the structure of the software industry

In this report, an experimental study concerning the system reform of software patents and patent applications by software companies by using data connecting a field survey of specific services (information service industry) and patent data (IIP patent database). In analyzing the application structure of software companies, applicants before the system reform were also performing manufacturing business; however, the possibility of filing applications was expanded to pure-software companies after the system reform. The empirical results concerning this point indicated the following: (1) after the system reform, the number of minor applicants, who file 5 applications or less in one year, increased; and (2) software companies which also perform manufacturing business but for which the percentage of their manufacturing business is small (companies that are closer to pure-software companies) filed more patent applications after the system reform by regression analysis. Moreover, we reviewed whether it is possible to

extract software patents from the technology category to which pure-software companies (a company for which the percentage of software sales is 80% or more) apply. As a result, it was found that many of the patents for which applications were filed before the system reform in 1997 and applications by pure-software companies included a considerable number of patents concerning hardware. Therefore, it is necessary in specifying software patents to extract them by a method such as doing a search using the text of the invention's name or claims.

(Kazuyuki Motohashi and Masayo Kani)

5 Economic analysis of patent trails and objections

The purpose of this report was to conduct empirical analyses of the patent attribute, technology field attribute, or applicant attribute through which information statements, appeals against an examiner's decision, objections, or trials for invalidation are filed or accepted and thereby to contribute to the review of examinations, the trial system, or the objection system in order to improve the stability of patent rights. We also focused on the anonymity of objections and the effect of deadlines and investigated why trials for invalidation did not take place in the objection system. The major conclusions are as follows.

The information statement system fulfills an important role for making patent rights a stable system at an early stage. According to this empirical analysis, the percentage of final rejections of applications with information statements is significantly high (based on the estimated result, the marginal effect of the rejection rate with information statements is approximately 16%), and, in case of such applications, the percentage of acceptances of appeal against an examiner's decision on rejection was significantly low, as well. The effect on the percentage of acceptances of objections was also negative, but there was no strong relationship. Based on the number of citations, the information statement system targets patent applications with high technological value. It is possible to say that the system effectively screens patents which have a large impact in cases where the patent is granted by mistake.

With regard to the determining factors of requests and acceptances of appeal against an examiner's decision, the analysis showed the

following results that basically support the assumptions.

- Based on the number of citations and the timing of requests for examination, if the invention has a higher technical value, the possibility of acceptance of the appeal against an examiner's decision becomes higher.

- In cases where an appeal against an examiner's decision is accepted, the profit to the patent holder becomes larger the higher the technical value of the invention. Therefore, the frequency of requests for appeal against an examiner's decision becomes higher the higher the technical value of the invention.

- With regard to an invention with high uncertainty and an asymmetry of information (index: the examination period from the request of patent examination is long), an appeal against an examiner's decision will be filed more often; however, there is a low probability that patent for these inventions will be granted as a result of the appeal against an examiner's decision. This indicates that in cases where an appeal against an examiner's decision is accepted, the patents in question have great value.

With regard to the determining factors of objections and requests for trials for invalidation, the following results were obtained that also support the assumptions.

- Both objections and requests for trials for invalidation primarily concern issues of the novelty and inventive step of the invention in question. Therefore, it is difficult for them to be accepted if the technical value of the invention is high.

- On the other hand, the economic profit to the petitioner, etc. from cases where the objection, etc. is accepted exists only when the invention's technical value is high. Therefore, if the impact from the latter is more important, the frequency of objections and requests for trials for invalidation becomes higher when the invention's technical value is high.

- With regard to an invention with high uncertainty and an asymmetry of information (index: the examination period from the request for patent examination is long) and a patent for which examination by the Patent Office is more difficult, if an objection or request for trial for invalidation is filed once, it is easily accepted. On the other hand, if the patent is granted, it is still uncertain whether the patent can restrict other companies. Therefore, the frequency of filing objections and requests for trials is low.

- Reflecting that the objection system is anonymous, while requests for trials for invalidation are not always anonymous, in cases of companies with large volume of applications that enables cross licensing, etc., the frequency of their requests for trials for invalidation becomes low compared to their objections. In cases of requests for trials for invalidation, the cost is higher and the proceedings are likely to be public. Therefore, the threshold of an invention's economical value as to whether a trial for invalidation should be requested becomes high. As a result, it is difficult for patents of companies with a large volume of applications to be a subject to requests for trials for invalidation; and if the patents are granted, only a few patents with very high value become subject to the request.

In the end, the percentage of listed companies among the petitioners of objections is at the low level of 28%, while the percentage of individual persons is 57%. A majority of the petitioners is individual persons. On the other hand, the share of the individual persons among applicants of trials for invalidation was only 3% before the objection system was abolished. After the abolishment of the objection system, it increased to 17%; however, the share of individual persons was very small compared to the cases of petitioners of objections. Based on the abovementioned, we assumed that if the percentage of individual persons in objections is higher, it is difficult for objections to be alternated with trials for invalidation since anonymity is important in this field. The class level estimation of IPC resulted in supporting the assumption.

(Kenta Nakamura, Tomoyuki Shimbo, and Sadao Nagaoka)

6 Relationship between company secrets (know-how) and the profitability or sustainable competitive advantage of companies

This research will clarify empirically how much the method to keep inventions secret as company secrets (know-how) will contribute to the profitability or sustainable competitive advantage of companies by comparing it with the method of using the intellectual property right system, such as patent rights.

There are two kinds of methods for a company to carry out business and gain profit from the business or establish sustainable competitive advantage: the method to keep its

inventions secret as company secrets (know-how) and the method of being legally protected by the ideological right, the patent right. Therefore, it is considered that companies compare and balance the advantages and disadvantages of making inventions secret as company secrets (know-how) and then use the technologies and inventions that become the foundation of their business as company secrets (know-how) or as patent rights. When reviewing past research, as far as I know, it has not always been clear how much the method of keeping company secrets (know-how) secret and using them for business contributes to the profitability of the company or to its sustainable competitive advantage in comparison with the method of using intellectual property rights system, such as the patent right. Therefore, this research clarified these issues empirically. The major results are as follows.

(i) Japanese companies do not autonomously consider their own sustainable competitive advantage or profitability. In other words, they do not keep their inventions as patents nor keep them secret as company secrets (know-how) from a strategic perspective. In other words, they assume to make inventions as patents first. Then, with regard to inventions with characteristics that do not conform to being patented, it is highly possible that they keep their inventions secret as company secrets (know-how) as an exception.

(ii) Since inventions are kept in secret as company secrets (know-how) under this concept, it was impossible to find evidence that concealment by making inventions into company secrets (know-how) leads to the sustainable competitive advantage of a company or to its profitability. Rather, the result was found that making an invention into a patent is more connected with a company's sustainable competitive advantage and profitability. This conforms to the results of past research.

(Yoichiro Nishimura)

7 Discussion with international invited guests

In order to verify the analysis results of this research and seek the possibility of new patent statistics and economic analysis in which international comparisons are possible, we invited two intellectuals who have been studying advanced patent statistics and economic analysis or have abundant knowledge of patent statistics databases from overseas and held a discussion with this Committee.

In concrete terms, we invited Mr. Dominique Guellec, senior economist of the Organization for Economic Co-operation and Development (OECD) and Mr. James Rollinson, administrator of the European Patent Office (EPO). We held a discussion with a total of 21 participants on the following three themes: (i) statistical analysis on the application related behaviors, etc. of companies in high-tech sectors; (ii) statistical analysis of the patent application behavior of companies, etc. – changes from quantity to quality --; and (iii) an analysis of the impact of software patents on the structure of the software industry.

In recent years, a large amount of economic and statistical research that use patent statistics, PATSTAT, has been presented in Europe. PATSTAT is a massive and globally renown database provided by the European Patent Office, in which patents that were applied for in the Patent Offices of more than 170 countries and published are recorded. This database, in which various kinds of patent information are recorded, is provided at low price and can be used even by general university students in a computer environment without high specialization. In the future, research using these helpful patent statistics will be implemented actively and competitively.

Different from the situation of academic society, patent offices in the world have not placed sufficient value on research that uses patent statistics. The cause of this situation in patent offices is considered to be that researchers have not always responded to the needs of policymakers and also that policymakers have not paid full attention to research that uses patent statistics. Given this situation, it is very notable that the Japanese Patent Office quickly became aware of their importance. The invited international guests indicated that it is important and necessary for both researchers and policymakers to cooperate through various opportunities.

(Yoichiro Nishimura)

III Investigation of the “Survey of Intellectual Property-Related Activities”

1 Reviewing the overall estimation method

(1) Investigation into the categorization of industries for reviewing intellectual property activities

In order to increase the usability of statistics on intellectual property activity, it is necessary to

define and categorize the industry clearly in accordance with appropriate standards. In view of situations where the industry categories of companies have not been established, if the view point of an industry category is to identify the actual situation of economic activities more accurately, with regard to an industry category pertaining to intellectual property activities, it is important to have a view point to identify its actual situation appropriately especially by focusing on its activities, such as research and development, etc.

We have investigated industry categories based on individual data from the “Survey of Intellectual Property-Related Activities”; however, we have not categorized similar companies with regard to research and development activities since there are a limited number of companies in the survey that can be used and there are many unanswered survey items concerning research and development activities. It is necessary to expand data that can be used for analysis to the categorization of industries from any approach, such as grouping companies deductively in accordance with the abovementioned similarity standards and then examining their appropriateness, or grouping companies by the similarity of their indices of research activity results and then extracting category standards inductively.

The conditions have recently been developed. First, there is information on the names and addresses, etc. of juridical corporations from the commercial registration of the Ministry of Justice that were used for the “Economic Census – basic survey” in July 2009. By matching applicant companies’ names with a company database that is generated based on the “Economic Census –basic survey,” it enables a combination with other statistical survey results and a comprehensive analysis of intellectual property activities.

The value of industrial property rights or the profit from acquired know-how, etc. can be considered in the intellectual property activities as reference to added value that is a result of economic activities. With regard to industry categories, it is considered that useful categories can be formulated by establishing category items based on the size of the indices.

Moreover, industry categories for intellectual property activities are in the units of a company. Therefore, it is necessary to investigate from the perspective of regulations in the legal system that the difference of a company’s management

organization causes differences in its intellectual property activity. The business size of a company also affects the categorization of industries; however, , it is important to examine also the treatment of the company that is positioned at the top of a business group, such as an operating holding company, etc., when investigating industry categories.

It is strongly required to start matching applicant companies' codes with uniform company codes that are generated from the Economic Consensus promptly.

(Fumio Funaoka)

(2) Reviewing the estimation method for small-sized applicants

In this report, a calibration estimation was implemented with regard to small-sized applicants and its appropriateness was examined by comparing it with the actual population value. As a result, the following is indicated: if an applicant is categorized as a small-sized applicant in the year of the survey, it does not have to be a small-sized applicant in subsequent years; therefore, if the estimation for years subsequent to the year of the survey is implemented by using all of the collected data for small-sized applicants in the year of the survey, it is possible to cause a big error. When estimating for years other than the year of the survey by using the collected data of small-sized applicants, it is necessary to conduct additional operations, such as selecting the appropriate applicants' data in light of population information.

(Takahiro Tsuchiya)

2 Reviewing questionnaire for the Survey of Intellectual Property-Related Activities

The "Survey of Intellectual Property-Related Activities" is a statistical survey conducted by the Japanese Patent Office since 2002 in order to develop base material for planning Japanese intellectual property measures and for the purpose of assessing the actual conditions of the intellectual property activities of individual persons, juridical persons, and public research organizations, such as universities, etc. in Japan.

The "Survey of Intellectual Property-Related Activities" provides much useful information, such as (i) the activity conditions of intellectual property departments; (ii) the usage situation of the industrial property right system; (iii) the work conditions of industrial property rights, etc., for analyzing intellectual property activities of

individual persons, juridical persons, and public research organizations, such as universities, etc. in Japan.

With regard to the survey items, estimation method, etc. of the "Survey of Intellectual Property-Related Activities," the Japanese Patent Office or a research committee established by the Patent Office has investigated them for the past several years. The Committee for this survey started by first organizing the problems, and then, investigated plans for improvements for small-sized applicants (applicants who filed less than five applications in a year under any of the four Acts (Patent Act, Utility Model Act, Design Act, and Trademark Act)) in order to reduce their burden for response, increase the response ratio, and thereby improve the accuracy of the survey.

(Yoichiro Nishimura)

(Resercher: Yoichiro NISHIMURA)