

Patent Analyses in the New Legal Regime of the US Patent Law

Ulrich Schmoch,¹ Rainer Frietsch

Fraunhofer ISI, Karlsruhe, Germany

Introduction

Many patent analyses are performed on the basis of US data, as the US market is the most important technology market in the world. Therefore substantial changes in the technological activities in the US, such as the end of the new economy boom, have a considerable worldwide impact (Legler et al. 2008). A further reason for the frequent reference to US patents traces back to the fact that the first electronic patent data bases were available for US patents (see e.g. Campell and Nieves 1979 or Carpenter et al. 1980), so there is a well-established tradition of patent analysis of US data.

Until the year 2000, one of the major differences of the US patent system compared to most other ones was the specific regulation of publication of documents. Patent applications at the United States Patent and Trademark Office (USPTO) were only published, if they were successfully granted. This legal regime was different to most other patent systems where applications are published 18 months after their application. As consequence of the old US system for patent analyses, a large share of the applications at the USPTO was never published and most investigations were made on the basis of grant years with a substantial delay to the years of invention which are relevant in the context of innovation. Since 2000, applications at the USPTO must be published after 18 months, if they are also applied at a foreign patent office, or they can be published on request of the applicant. So at least a substantial share of the domestic applications of US inventors is published quite early. On this basis, it should be possible to analyse the patenting strategies of US inventors in an improved way. In addition, the application strategies of non-US inventors at the USPTO may be considered in a more detailed way.

However, the publication of applications at the USPTO is still restricted, so that it is not clear whether new approaches of patent analysis at the USPTO can be really implemented. The topic of this paper is to show to what extent the publications of

¹ Corresponding author: ulrich.schmoch@isi.fraunhofer.de

applications have changed within the new legal regime and which types of analyses are feasible for US and non-US inventors.

Appropriate reference of timescales

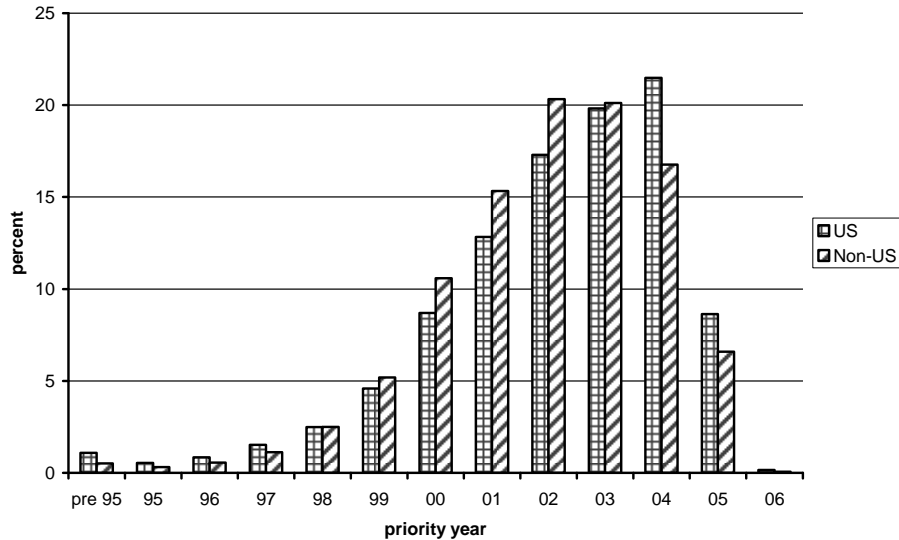
The old publication regime in the US is based on the principle that only inventions should be published which are protected by a granted patent. This convention is advantageous for the inventor, but is linked to various problems. As the grant process can take a long time, other firms find out quite late whether they infringe a patent or not, and the incentives of patent documents to generate alternatives and thus to push innovation are provided with substantial delay.

As to statistical patent analyses, the old publication regime induced the analysts to refer to the grant year as reference of time, as most data of the USPTO were based on grant years. A welcome side-effect was that all statistics appear to be very topical, for instance, in the first half of 2008, all granted patents for 2007 are available. However, the patent indicators should refer to the date of the first application, the so-called priority date, because it must be possible to refer patent indicators to other innovation indicators such as R&D expenditures or foreign trade with R&D-intensive products with an appropriate timescale (Hinze and Schmoch 2004). The priority date is close to the time of invention, as according to the legal regulations, an immediate protection is important to avoid severe restrictions.

A frequent argument for using grant years is that in other patent systems, the applications are published with a delay of 18 months after the priority date to allow for a withdrawal of an application before its publication. So at the German Patent and Trademark Office about 20 percent of all applications are withdrawn within the first 10 months and are never published. At the USPTO, most grant procedures are concluded within the first 2 years, so the differences between the US and other regimes seem to be negligible. However, a closer look at the priority years with reference to grant years reveals the problems of the old analysis. For instance, a large share of the patents granted in 2006 is published in the first two years after the applications, thus in the period of 2004 to 2006, but many applications refer to earlier years, sometimes even before 1995. In the case of non-US inventors, the time lag of publication is even a bit longer, because a relevant share of the foreign inventions is not directly registered in the US, but first filed as international application (PCT application) and then transferred to the USPTO with a delay of 24 months O.²

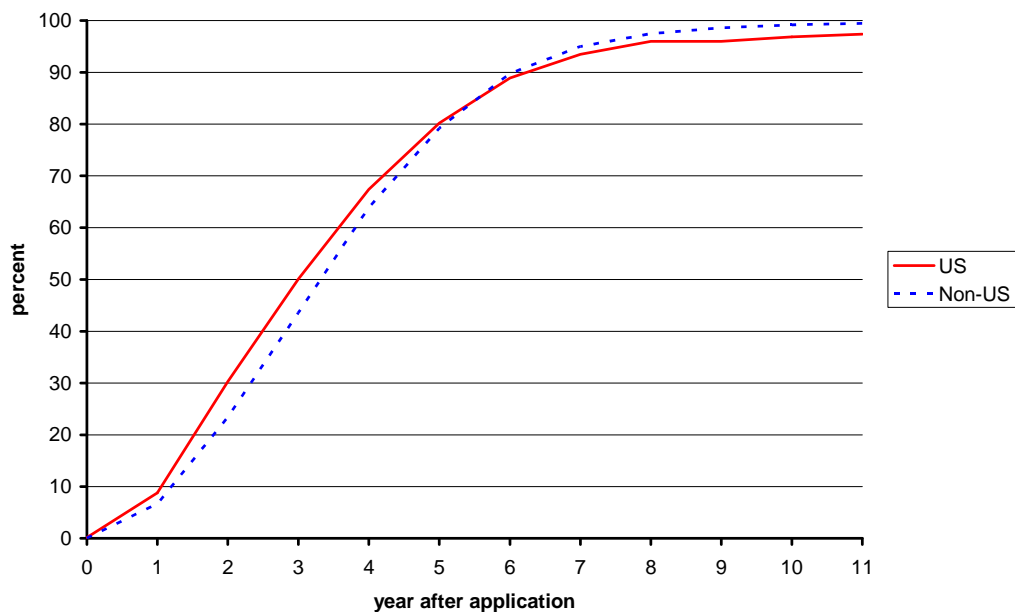
² For further details as to the procedure of PCT applications see Schmoch (1999).

Figure 1: Distribution of patent applications at the USPTO of the grant year 2006 on priority years by US and non-US inventors (Update: May 12, 2008)



Source: INPADOCDB (STN), computation of the author

Figure 2: Cumulated shares of publications at the USPTO with reference to the original application year by US and non-US inventors (sample: patents granted in 2006, (Update: May 12, 2008)



Source: INPADOCDB (STN), computation of the author

The delay of application and publication in the old regime implies that 80 percent of the applications of a specific year are available only five years later (Figure 2). In

consequence, the publications of a grant year are linked to a broad set of priority years, and if, for instance, a correlation between R&D expenditures and patents is found based on grant years, it is not clear whether this is a real effect or an artefact due to a non-visible distribution of priority years.

A further methodological problem is the specific regulation of the priority regime in the US compared to the international standard. According to the so-called Paris Convention, all follow-up applications referring to the first application of an invention must be filed within the so-called priority year. This regulation is based on the "first-to-file" principle where the date of application is relevant for definition of prior art in the examination. Also in case of domestic applications, every amendment/improvement of the original application is exclusively accepted within the priority year. In case of the US law, the "first-to-invent" principle is still valid. In this regime, the time of invention is documented by laboratory books or similar documents and the time of invention is legally relevant, e.g., in case of conflict with parallel applications of competitors. As to domestic applications, the priority year is not relevant. Furthermore, the so-called continuation-in-part (CIP) and other institutions (reissue etc.) allow for amendments after the end of the priority year.³

As consequence of this situation, the time reference of non-US applications at the USPTO is clearly defined. For instance, applications of 2006 refer to the priority years 2006 and 2005. 14 percent of these applications have a multiple assignment of priority years (2005 and 2006). In the case of applications with US origin, 63 percent have a multiple assignment and, e. g., still 6 percent have a priority date in 2003. So the determination of the priority year is quite fuzzy in the case of applications with US origin. The pragmatic solution for this problem is the reference to the first priority year to avoid double counting.

To summarize, patent analysis should be made with reference to the first years of application, i.e., priority years, to achieve an appropriate link to other innovation indicators.

Quantitative effects of the new publication regime

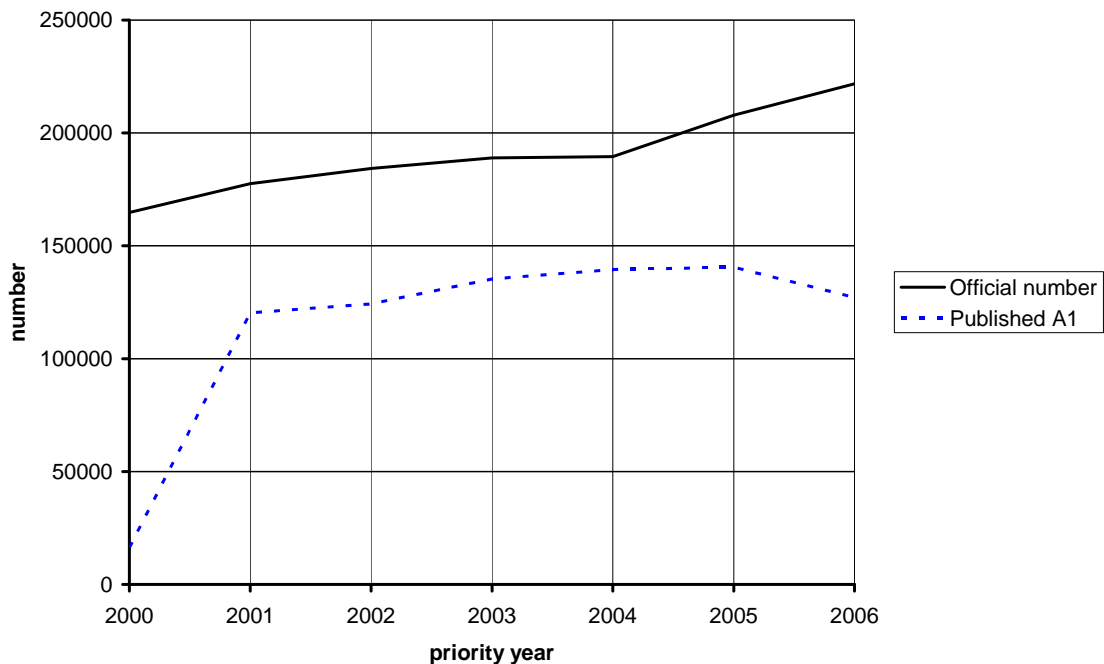
The change of the US publication regime has to be seen in the context of the so called TRIPS agreement (Trade-Related Aspects of Intellectual Property Rights) of the 1990ies which aims at unifying the IPR regulations as part of the general efforts of the WTO (World Trade Organisation) to remove barriers of international trade (Adams

³ For a broader overview see OECD (2008).

2006: 203 ff.). In order to push other trade-related rules, the US accepted a certain change of their IPR regime, in particular an amendment of the publication procedures, although this change was controversial. Against this background, the requirement of early publication 18 months after the application was limited to applications for which an application in other countries is projected. If this regulation is strictly followed, a patent analysis at the USPTO for US inventors would lead to results identical to those at other major foreign offices such as the European Patent Office (EPO).

The analysis of pre-grant publications of US inventors at the USPTO illustrates the substantial change of the regime after 2000 (Figure 3); a longer transition phase cannot be observed. Furthermore the share of pre-grant publications is surprisingly high with about 70 percent of the officially applied inventions according to the USPTO statistics. With regard to the high withdrawal rates at other national patent offices, the share of pre-grant publications is solely a little bit lower than at other offices.

Figure 3: Official number of all patent applications of US inventors and number of pre-grant publications (A1 publications) (Update: May 12, 2008)

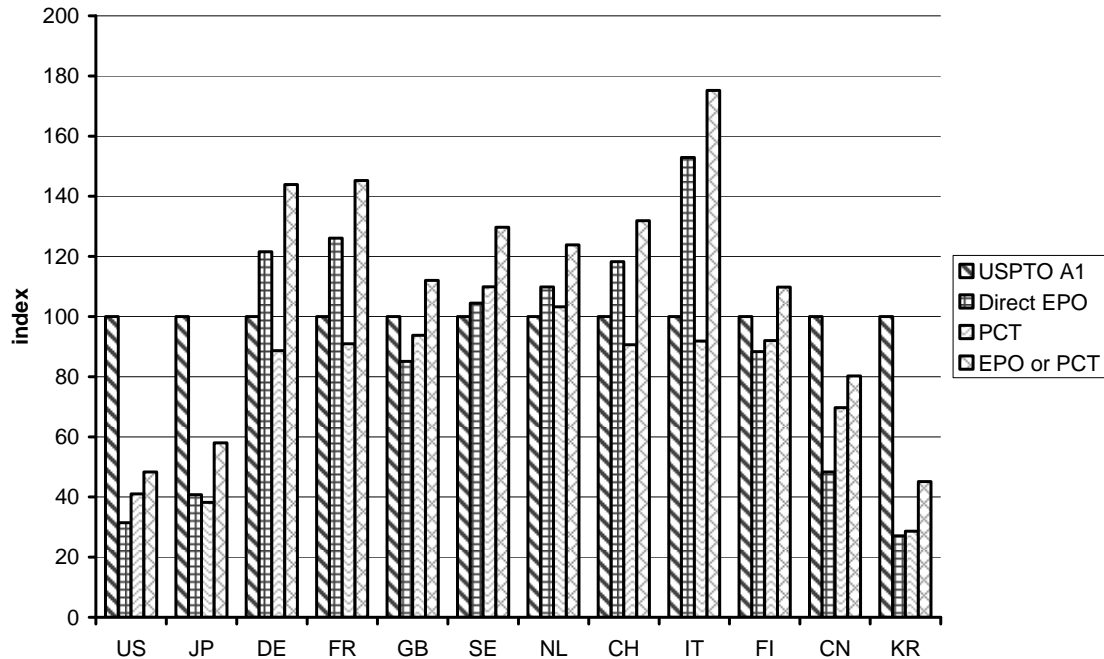


Source: USAPPS (Questel-Orbit), USPTO (2007), computation of the author

Due to the publication delay of 18 months, the priority applications of the year 2005 should be complete in May 2008, the applications of 2006 at the beginning of July 2008. However, the applications of 2005 are obviously still not totally covered. One

reason may be the delayed transfer of information to the database providers, but also the fuzzy time reference in the US system has an impact on these data.

Figure 4: Applications of the priority year 2003 at different patent offices by different countries of origin (number of A1 applications at the USPTO = 100)
(Update May 9, 2008)



Source: FAMPAT (Questel-Orbit), computation of the author

In any case, it is important for patent analyses that the first priority year is used as time reference and that only pre-grant publications are considered. By including grants without pre-publication the analysed samples can be increased, but the consequence is a decrease of application numbers in recent years which cannot be interpreted in a rational way.

Against the background of the substantial number of pre-publications at the USPTO, it is interesting to see whether patent analyses at the USPTO can build on higher application numbers than analyses at other major offices, in particular the European patent office and the World Intellectual Property Organisation (WIPO). The WIPO is officially responsible for international applications according to the Patent Cooperation Treaty (PCT).

In the case of US inventors, the number of A1 publications at the USPTO is much higher than EPO or PCT applications. Compared to A1 publications in the US, the share of all EPO applications is 48 percent; the sample of applications of US origin is

enlarged considerably. Of course, a large share of the A1 publications are pure domestic applications and the value may be lower than that of EPO or PCT applications. Nevertheless, it is possible to analyse more aspects than exclusively on the basis of international data.

For the A1 publications of US origin, many relevant details are available such as priority date, inventor, US Classification (USPOC), International Classification (IPC) or title. However, the US regulations allows for not indicating the applicant a possibility which is used quite often by US applicants. For instance in 2004, 65 percent of the A1 documents do not record the applicant.

For the interpretation of the EPO and PCT data, some legal structures must be explained. It is possible to apply patents directly at the EPO, or the applications can be filed as international applications (PCT) and then transferred to the EPO with a delay of 24 months after the priority year (Guellec and Pottelsberghe 2007: 155 ff.). The transfer to the EPO is not compulsory; only a part of all PCT applications is finally transferred to the EPO. In Figure 4, the EPO data comprise direct filings and indirect transferred ones. The year 2003 is taken as reference to be sure that the transfer process from PCT to EPO is completed. The final bar with EPO and PCT applications represents the union of EPO and PCT applications, thus the sum of both types without double counting.

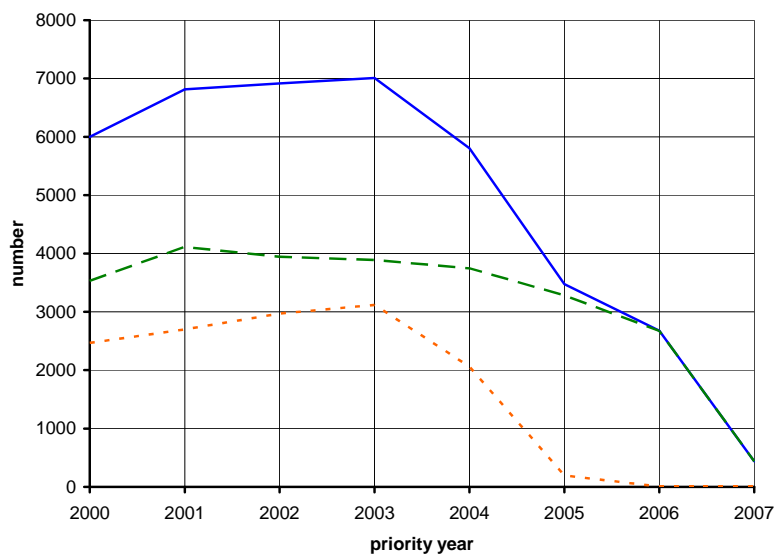
For most countries of origin, the number of EPO and PCT applications is higher than that of the A1 publications at the USPTO. The major exceptions are the Southeast Asian countries Japan, South Korea and China. In the perspective of these countries, applications at the USPTO are foreign applications, and thus applications of higher value than domestic ones. For these countries, the analysis of A1 documents at the USPTO offers really new interesting perspectives. For instance, the number of EPO/PCT application of Japanese origin for 2003 is about 31,000, the number of USPTO A1 publications about 53,000.

The increasing use of the PCT route for achieving patent protection in the US has immediate consequences for the statistical analysis. In a typical database for US patents such as USAPPS, the fact of a previous PCT application is documented in a separate field where the PCT application date is generally about one year after the priority date, mostly the original domestic application. Then the application at the USPTO is registered about 2 ½ years after the priority date.

The impact can be illustrated by the example of applications with French origin. As all these applications have a foreign equivalent they must be in the category of pre-grant publications (A1). The total number of applications displays a distinct decrease in 2004,

due to the delayed transfer of PCT applications to the USPTO (Figure 5). The direct applications are fully available until 2005; the steady decrease since 2001 is linked to the increasing use of the PCT route by French applicants. Theoretically, the year 2004 should be complete also for applications with intermediate PCT phase. However, the registered applications are still not fully available. The reason is administration delays at the WIPO and the USPTO leading to an additional delay of about 6 months, such delays can be observed at the transfer from PCT to the EPO in a similar way.

Figure 5: Applications with French origin at the USPTO (Update May 20, 2008)



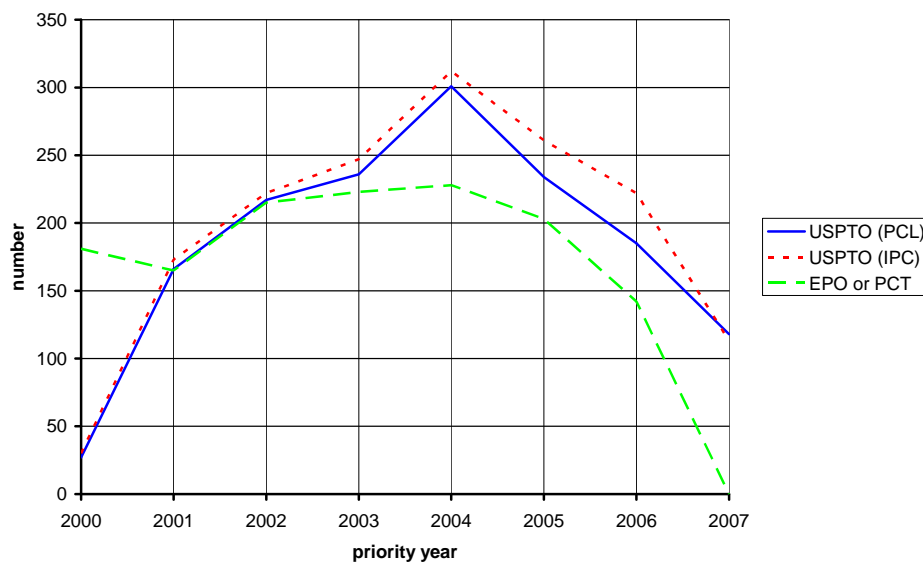
Source: USAPPS (Questel-Orbit), computation of the author

Analysis on the level of specific technologies

The improved availability of domestic applications with US origin can be used for the analysis of specific technological fields on a lower level of aggregation. For instance, by the high number of domestic applications compared to PCT or EPO applications, more technical details may be analysed. This may be illustrated by the example of “diagnosis by ultrasonic waves” with the IPC code is A61B-008. Compared to the PCT or EPO application combined, the number of domestic applications is not much higher, a frequent observation for research-intensive fields. In less research-intensive fields such as furniture the difference would be much larger. However, also in ultrasonic diagnosis, a peak of the applications appears in 2004 which is not visible on the basis of the EPO/PCT data. As to 2005, it is not really clear whether there is a decrease compared to 2004 or whether the data are still incomplete (see Figure 3). The EPO/PCT data confirm the downward trend. In any case, data for the years 2006 and 2007 are not fully available due to the normal publication delays.

As further observation the results at the USPTO are nearly equivalent for searches based on IPC or USPOC codes. On this quite high level of aggregation (IPC subclass level), the concordance between USPOC and IPC is obviously appropriate. At the USPTO, all applications are first manually classified by codes of the USPOC, thus the national classification. Then the documents are also classified by IPC codes on the basis of a concordance between the USPOC and the IPC. This classification in terms of IPC is performed automatically and not manually by patent examiners. The last update of the concordance table was performed for the seventh edition of the IPC which was valid until 2005.

Figure 6: Applications in the field of “ultrasonic diagnosis” of US origin



Source: USAPPS (Questel-Orbit), FAMPAT (Questel-Orbit), computation of the author

The use of IPC codes for searches at the USPTO gets problematic, when really topical fields shall be examined. For instance, a new code for the field “measuring characteristics of blood in vivo by enzyme electrodes (A61B-005/1486) was introduced in the eighth version of the IPC. Searches with this new code yield no results in US documents, as the concordance between USPOC and IPC does not include the new codes of the eighth version of IPC. It is possible to identify ten PCT applications in this very new field, thereof four with US origin. Two of these four applications are also available as A1 documents at the USPTO, but classified in areas showing no link to enzyme electrodes. This is owed to the fact that the classification logic as regards content is completely different in the USPOC and the IPC. An equivalent code to A61B-005/1486 does not exist in the USPOC, so even after an update of the USPOC-IPC concordance, the search would not identify any document.

On a low level of aggregation it is always better to perform USPOC-based searches instead of using IPC codes. The USPOC is updated quite often, so that it is possible to analyse the trends of really topical fields. Due to the new regime of pre-grant publications, this is promising for applications with US origin but also for Southeast Asian countries.

Conclusions

To summarize, the possibility of pre-grant publications is used more intensively than expected and allows for a much more detailed analysis in particular of patent applications with US origin. A special advantage is the opportunity to use priority years as clear time reference alternatively to the more fuzzy grant years. A certain shortcoming is the limited availability of applicant names for pre-grant applications. However, this problem has created new jobs for specific service providers who identify the missing applicants on behalf of US enterprises by identifying of PCT or EPO equivalents or the link of inventor teams to enterprises or universities.

On the relatively high aggregation level of IPC subclasses, it is generally possible to perform IPV-based searches in US databases. But on a lower level of aggregation, the match between nation US codes and international ones is generally not satisfactory and not up-to-date. Therefore, codes of the national USPOC should be used for getting access to the improved opportunities of pre-grant publications at the USPTO.

Literature

Adams, S.R. (2006): *Information Sources in Patents*. München: KG Saur.

Campbell, R.S.; Nieves, A.L. (1979): *Technology indicators based on patent data: the case of catalytic converters*. Richland: Battelle Pacific Northwest.

Carpenter, M.P.; Cooper, M.; Narin, F. (1980): *Linkage between basic research literature and patents*, in: *Research Management*, vol. 13, pp. 3-33.

Guellec, D.; Pottelsberghe de la Potterie, B. v. (2007): *The Economics of the European Patent System*. Oxford/New York: Oxford University Press.

Hinze, S.; Schmoch, U. (2004): *Opening the black box. Analytical approaches and their impact on the outcome of statistical patent analyses*, in: Glänzel, W.; Moed, H.; Schmoch, U. (eds.): *Handbook of Quantitative Science and Technology Research. The Use of Publication and Patent Statistics in Studies on R&D Systems*. Dordrecht / Norwell / New York / London: Kluwer Academic Publishers, pp. 215-235.

OECD (ed.) (2008): OECD Patent Manual 2008. Paris: OECD, forthcoming.

Schmoch, U. (1999): Impact of International Patent Applications on Patent Indicators, in: Research Evaluation, Vol. 8, No. 2, pp. 119-131.

US Patent and Trademark Office (USPTO) (2007): Number of utility patent applications filed in the United States, by country of origin, calendar year 1965 to present.

Alexandria, VA: USPTO.