

Patents – an important added value for economy and science

AGATA TYCZEWSKA

Institute of Bioorganic Chemistry, Polish Academy of Sciences, Poznań, Poland

e-mail: agatat@ibch.poznan.pl

Abstract

Economists and policymakers recognize the importance of having well-defined and strongly protected intellectual property rights. Intellectual Property (e.g.: patentable technology, designs, copyrights) have therefore become the most important assets for large companies, small and medium-sized ones, as well as for inventors. Patents are legal instruments that encourage innovation. The property protection system gives individuals an exclusive right to use their resources as they see fit. Securing exclusive rights to inventors is given in return for the disclosure of the invention. Unfortunately, in terms of innovation, Poland has not improved significantly in past decades. In this report I present recent accomplishments in the field of patenting in Poland.

Key words: intellectual property, innovation, invention, exclusive rights, patents

Innovations

Innovation viewed as the application of better solutions that meet new requirements, unarticulated needs, or existing market needs is a key force behind economic growth and national and international competitiveness. It is the process through which new ideas are generated and put into commercial practice. The development of competitive and innovative economy is inseparably connected with the creation and implementation of new inventions, utility models, industrial designs and trademarks. Innovation has a positive pervasive effect on the entire economy, and the benefits flow to its every sector. An important way to help encourage and promote innovation and creativity is through the protection of intellectual property (IP). It is an essential element of market-based system. Patents, trademarks, and copyrights are the principal means used to establish ownership of inventions and creative ideas in their various forms. They provide a legal foundation to generate tangible benefits from intangible ideas for companies, workers, and consumers. In a world of widely distributed knowledge, companies cannot afford to rely entirely on their own research, but should instead buy or license processes or inventions (i.e. patents) from other companies. IP protection affects the economy by protecting innovators from unauthorized copying, facilitating vertical speciali-

zation in technology markets, creating a platform for financial investments in innovation, making licensing-based technology business models possible and enabling a more efficient market for technology transfer and trading in technology and ideas (Intellectual Property and the US Economy: Industries in Focus 2012; WIPO Intellectual Property Handbook: Policy, Law and Use, 2004).

For the evaluation of the innovative performance of European nations the European Commission uses the Innovation Union Scoreboard (IUS). It provides a comparative assessment of the research and innovation performance of the EU Member States. The IUS has been created to help countries and regions identify the relative strengths and weaknesses of their research and innovation systems and areas they need to address and to improve (European Innovation Scoreboard 2013). Among the group of leading innovators in R&D Sweden and Denmark are placed ahead of German and Finland in the IUS ranking. Poland is located at the very bottom of this ranking list (Fig. 1).

The average performance is measured using a composite indicator building on the data for 25 indicators going from a lowest possible performance of 0 to a maximum possible performance of 1. It was calculated for 2011/2012. Among others, public and private R&D outlay, the education level, and the proportion of patent

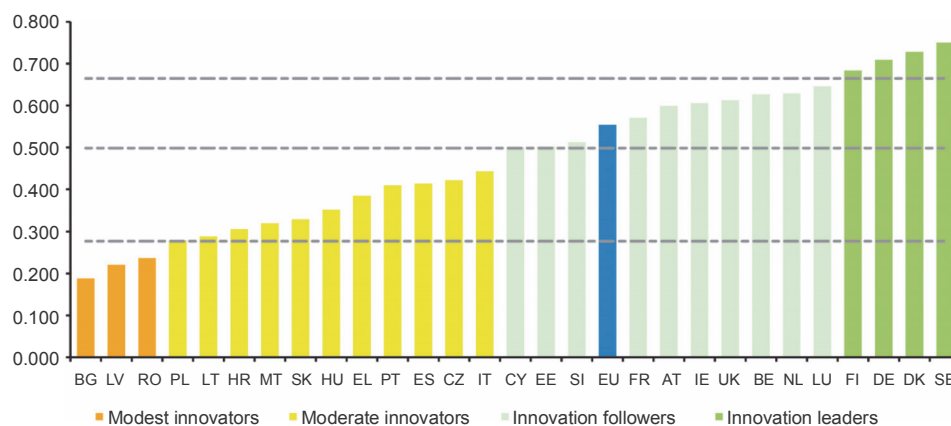


Fig. 1. EU Member States' innovation performance

grants at the international patent offices per million inhabitants are considered. The Innovation Union Scoreboard (IUS) was developed in the scope of the Lisbon strategy and is an instrument of the European Commission (source: Innovation Union Scoreboard 2014, Regional Innovation Scoreboard, 2014).

Sadly, Poland is performing below the average of the EU for most indicators. The innovation performance of Poland has only marginally improved between 2006 and 2013, it has been quite elusive within a relatively narrow range. The relative performance ratio of Poland to the EU declined from 54% in 2007 to about 50% in 2013, which was due to a more rapidly increasing performance of the EU Member States. Poland's weaknesses include, among others, a small number of PCT patent applications (Innovation Union Scoreboard, 2014).

Intellectual property rights protection

The World Trade Organization (WTO) estimates that approximately 80% of the world business transactions is based on intellectual property rights. The legal protection of inventions, utility models, industrial designs, trademarks and other objects of industrial property constitute the basis for efficient knowledge management in technology and economy. It also allows the growth of entrepreneurship in a modern information society. Ownerships of inventions provide not only protection for the proprietor but also valuable information and inspiration for future generations of researchers and inventors. By that means an ever-increasing body of public knowledge promotes further creativity and innovation in others (What is intellectual property? WIPO Publication No. 450(E)) – Figure 2.

A patent is an exclusive right given by law to inventors to make use of, and exploit, their inventions for a limited period of time, generally 20 years, on a specified territory for professional purposes or for profit. Importantly, patent protection given in a particular country does not extend to other countries. If inventors want their patent to be effective in many countries they must file an application in each territory separately. Obtaining patent protection in Europe is possible either by domestic patents awarded by the National Patent Office, and/or by a European patent granted by the European Patent Office (EPO European Patent Office) in the area of one or more of the signatory states of the European Patent Convention (signed in 1973) (WIPO Intellectual Property Handbook: Policy, Law and Use, 2004; Waszkowska, 2014a; Waszkowska, 2014b).

Patent protection means that the invention cannot be commercially made, used, distributed or sold without the patent owner's approval therefore it helps protect authors, inventors, and traders of goods and services from diminishing their benefits. To maintain the validity of a patent, the owner needs to pay fees to appropriate patent authorities; failure to do so causes the patent rights to lapse. In return for ownership rights patent owners are obliged to publicly disclose information on their invention in order to enrich the total body of technical knowledge in the world. These include: background information (the "state of the art"), the nature of any technical problems solved by the invention, a detailed description of the invention and how it works and illustrations of the invention where appropriate.

An invention is a unique or novel device, method, composition or process. Specifically, patented inventions

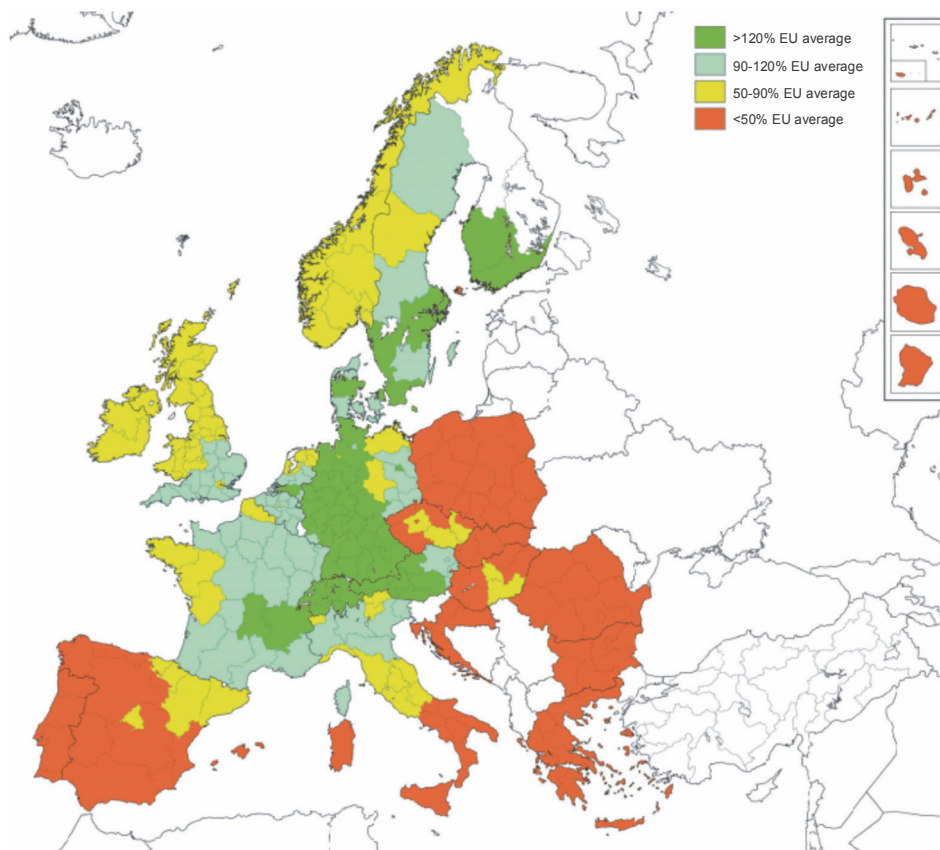


Fig. 2. European Patent Office patent applications per billion regional Gross Domestic Product. The best performance is observed in Austria, Germany and Switzerland, partly in Denmark, Finland, France, the Netherlands and Sweden. The worst performance is observed in Eastern and Southern Europe (source: Regional Innovation Scoreboard 2014)

must meet three characteristics. First, the invention must be new, which means that there is some characteristic which is not known in the body of existing knowledge in the technical field. Inventions that already exist or have been published in any form previously to patent application cannot be patented. The new use has to be truly novel and unrelated to the original use. Secondly, the invention must also be useful, meaning that it has an industrial application. The last but not least an invention must not be obvious. It must show an inventive step which could not be deduced by a person with average knowledge of the technical field.

Once a patent is granted, a patent owner has the right to decide who may, or may not, use the patented invention and may give permission or license the use of the invention on mutually agreed terms to other parties. The owner may also sell the right to the invention to someone who will then become the new owner of the patent. Once a patent expires, the protection ends and the owner no longer holds exclusive rights to the invention.

An invention enters then the public domain and becomes available to commercial exploitation by others (WIPO Intellectual Property Handbook: Policy, Law and Use, 2004; Waszkowska, 2014a; Waszkowska, 2014b).

Patents in Poland

According to the World Intellectual Property Organization (WIPO), in terms of the number of patent applications filed under the national procedure, as well as in terms of the total number of granted patents, Poland, among all the countries of the world, ranks 17th and 15th, respectively. It should be, however, remembered that not all new technical solutions are filed for patent protection, often as a result of insufficient awareness of the creators regarding the advantages of obtaining exclusive rights. Therefore the above data may not fully reflect the creative capabilities of the Polish society. In 2013 only 95 patents were granted by the EPO to Polish patentees (Fig. 3).

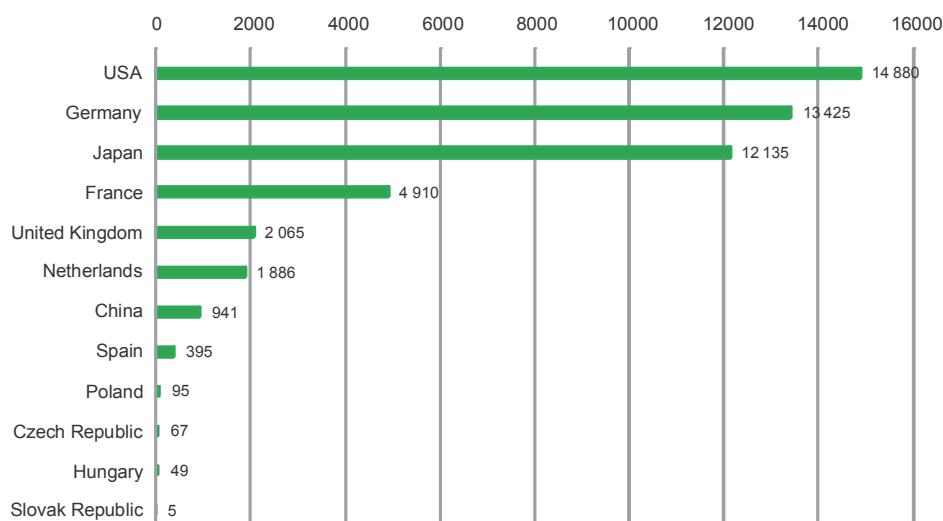


Fig. 3. Patents granted by the European Patent Office (for chosen countries). Reference year 2013 (data in absolute figures), source: European Patent Office

Table 1. Exclusive rights conferred by the Patent Office of the Republic of Poland (Patent Office of the Republic of Poland, annual report 2013)

Object of industrial property	Exclusive right granted by the Patent Office of the Republic of Poland	Maximum protection period
Invention	patent	up to 20 years
Utility model	right of protection	up to 10 years
Industrial design	right in registration	up to 25 years
Trademark	right of protection	10 years with the possibility of extending the protection to further 10 year periods
Medicinal product or plant protection product based on patented invention	supplementary protection certificate	up to 5 years
Geographical indication	right in registration	unlimited protection
Topography of integrated circuits	right in registration	up to 10 years

A national authority granting patents for inventions in Poland is Patent Office of the Republic of Poland. One of the statutory responsibilities of this institution is the receiving and processing applications filed to obtain legal protection. The decisions are issued by independent examiners. There are several forms of protection for inventors (summarized in Table 1.)

According to the Patent Office of the Republic of Poland in 2013, 21 024 of industrial property applications (inventions, utility models, trademarks, industrial designs and topographies of integrated circuits) were filed for protection under the national procedure, 21 013 in 2012 and 21 673 in 2011. The number of cases decided

with reference to IP objects filed for protection in which the proceedings were completed increased from 22 815 in 2011, through 27 170 in 2012 up to 27 675 in 2013.

When divided into the type of applicant (among domestic entities), last year business entities filed 40.13% of all patent and utility model applications, followed by universities (26.46%), natural persons (19.66%), research centers (11.10%) and Polish Academy of Sciences scientific units (2.64%) (Patent Office of the Republic of Poland, 2013 annual report) – Figure 4.

Over the past years, there is observed in Poland an increase in patent and utility model applications filed in the Patent Office of the Republic of Poland by domestic

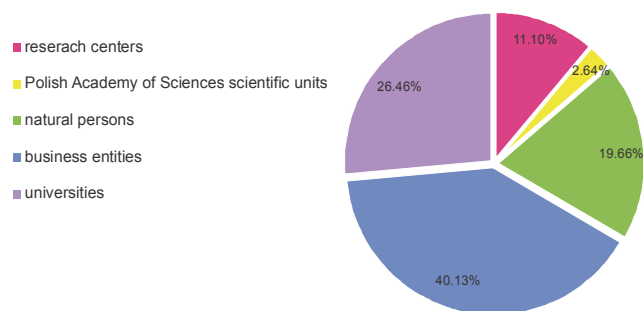


Fig. 4. Patent applications and utility model applications filed in 2013 with the Patent Office of the Republic of Poland by domestic entities under national and international procedure broken down by the type of applicant (source: Patent Office of the Republic of Poland, 2013 annual report)

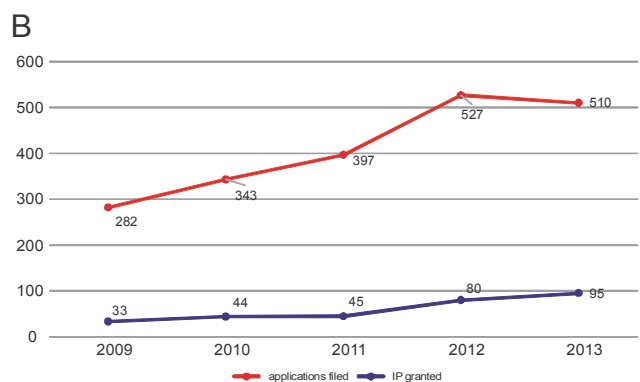
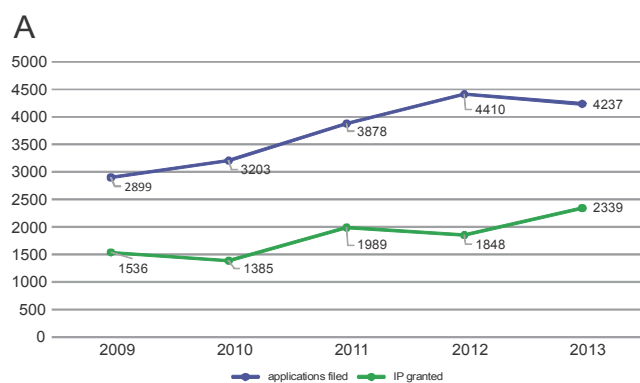


Fig. 5. A) Patent applications and utility model applications filed as well as patents granted in the Patent Office of the Republic of Poland by domestic entities under national and international procedure (blue – patent applications filed by domestic entities; green – patents granted to domestic entities); B) Applications filed with the European Patent Office (EPO) by Polish applicants and European patents granted by the EPO to Polish applicants (red – applications filed with the EPO by Polish applicants; purple – European patents granted by the EPO to Polish applicants); source: Patent Office of the Republic of Poland, 2013 annual report

entities under national as well as international procedure (from 2899 in 2009 up to 4237 in 2013 – Fig. 5).

A similar tendency can be seen for patents and rights of protection for utility models granted (from 1536 in 2009 up to 2339 in 2013 – Fig. 5) (Patent Office of the Republic of Poland, 2013 annual report).

When it comes to patents and rights of protection for utility models granted by the Patent Office of the Republic of Poland to domestic entities broken down by the type of right holder, most of it (35.51%) was given to universities, followed by business entities (35.44%), research institutes (14.32%), natural persons (13.48%) and Polish Academy of Sciences scientific units (1.25%) (Patent Office of the Republic of Poland, 2013 annual report) – Figure 6.

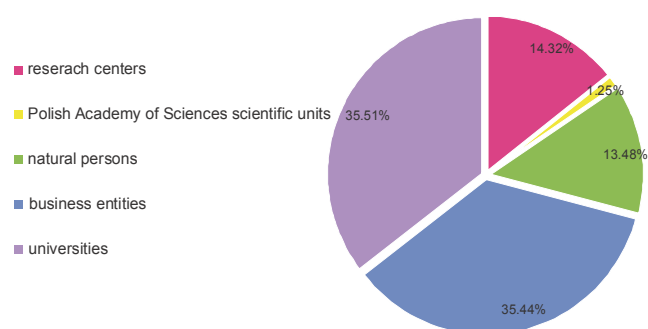


Fig. 6. Patents and rights of protection for utility models granted by the Patent Office of the Republic of Poland in 2013 to domestic entities broken down by the type of right holder (source: Patent Office of the Republic of Poland, 2013 annual report)

When we look more closely on domestic entities that were granted by the Patent Office of the Republic of Poland the highest number of patents and rights of protection for utility models in 2013 we can see that the vast majority of those are research institutes. The leader is Wrocław University of Technology with almost 200 patents and rights of protection (Fig. 7). Interestingly there is only one business entity among the top 20 in this category (Patent Office of the Republic of Poland, 2013 annual report).

These numbers, however, do not take into account indicators other than the number of patents/patent applications and rights of protection for utility models/utility model applications. Therefore it is difficult to compare those entities simply based on those indicators.

On the other hand, the SCImago Institutions Rankings (González-Pereira et al. 2010; Moya-Anegón et al. 2013) is a characterization of institutions based on re-

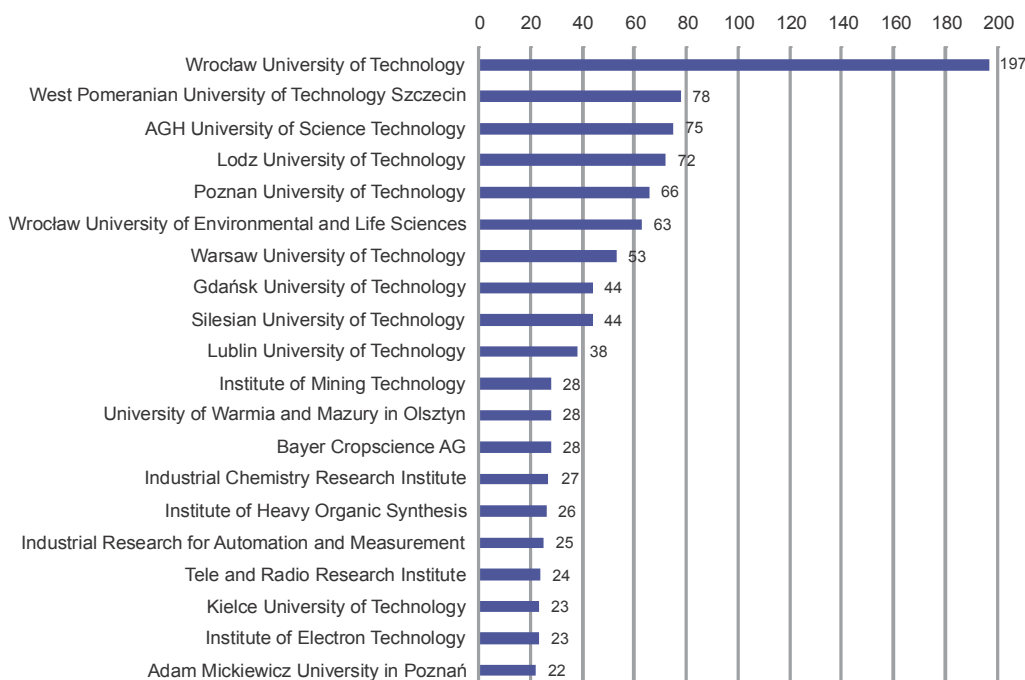


Fig. 7. 20 entities with the highest number of patents and rights of protection for utility models obtained in the Patent Office of the Republic of Poland in 2013 by the first right holder (source: Patent Office of the Republic of Poland, 2013 annual report)

search. The SIR World Reports are published annually. The goal of these reports is to characterize research outcomes of organizations in order to provide useful scientific information to institutions, policymakers and research managers for the analysis, evaluation and improvement of their research results. These reports contain an international ranking of more than 2000 research institutions and organizations. The indicator values are based on publication and citation data from Scopus (Elsevier) for research-devoted institutions with at least 100 papers published within the year under study. Currently, the SIR World Reports are the most comprehensive characterization of research institutions among those dedicated to the worldwide analysis of research results.

The Technological Impact (<http://www.scimagoir.com/methodology.php>) – one of SCImago indicators, takes under account innovations. It is the percentage of the scientific publication output cited in patents. What is important – this indicator is institution size-independent. The areas covered by this ranking are among others: *Agricultural and Biological Sciences; Biochemistry, Genetics and Molecular Biology; Chemical Engineering; Computer Science; Earth and Planetary Sciences; Energy; Engineering; Environmental Science; Immuno-*

logy and Microbiology; Materials Science; Mathematics; Medicine; Toxicology and Pharmaceutics; Physics and Astronomy; Social Sciences.

In 2013 among all institutions ranked in Technological Impact ranking (4692 total, Table 2) only 2 were from Poland. These were:

- 1) the Institute of Biochemistry and Biophysics Polish Academy of Sciences (PAS) on 312th position with Technological Impact score value 14.82,
- 2) the Institute of Bioorganic Chemistry Polish Academy of Sciences (PAS) with Technological Impact score value 11.77 on 481th position.

The highest scores belong to Fraunhofer-Institut für Integrierte Schaltungen (FRAGES) – 100.00, followed by Whitehead Institute for Biomedical Research – 68.44 and Microsoft Research Asia – 60.81 (<http://www.scimagoir.com/methodology.php>).

Conclusions

It is clear that Intellectual Property rights are one of fundamentals of modern economy as they help promote creativity that results in the implementation of new inventions. IP in the form of patentable technology, legally protectable trademarks and designs, copyright and others, has increasingly become the most important

Table 2. The Technological Impact ranking (2013), source: <http://www.scimagoir.com>

Rank	Institution	Country	Sector	Technological impact
1	Fraunhofer-Institut für Integrierte Schaltungen (FRAGES)	DEU	Government	100.00
2	Whitehead Institute for Biomedical Research	USA	Health	68.44
3	Microsoft Research Asia	CHN	Private	60.81
4	Institute of Bioengineering & Nanotechnology (ASTAR)	SGP	Government	60.37
5	Fraunhofer Institut für Nachrichtentechnik Heinrich Hertz Institut (FRAGES)	DEU	Government	59.55
6	Novartis Farma, S.p.A., Italy (NOVARTISML)	ITA	Private	53.53
7	Nokia	multinational	Private	52.79
8	MedImmune, LLC.	USA	Private	51.61
9	Biogen Idec	multinational	Private	50.39
10	Broad Institute of MIT and Harvard	USA	Health	49.87
11	AT&T Labs Research	USA	Private	48.26
12	Centocor, Incorporated	USA	Private	47.73
13	Genzyme Corporation	USA	Private	47.30
14	Philips Research Eindhoven	NLD	Private	47.21
15	Genentech Inc.	USA	Private	46.86
16	Novartis Institutes for Biomedical Research, United States (NOVARTISML)	USA	Private	46.38
17	Deutsche Telekom AG	DEU	Private	46.34
18	Yahoo Labs	multinational	Private	46.25
19	Institut Eurecom	FRA	Higher educ.	45.07
20	Baker Hughes	USA	Private	44.81
21	France Telecom, S.A.	FRA	Private	44.33
22	Hoffmann-La Roche, Inc., United States (HOFFMANMLT)	USA	Private	43.59
23	Qualcomm Incorporated	USA	Private	43.07
24	NEC Corporation of America	USA	Private	42.72
25	Institute for Systems Biology	USA	Health	41.06
26	Translational Genomics Research Institute	USA	Health	38.19
27	F. Hoffmann-La Roche *	multinational	Private	37.49
28	Wellcome Trust Sanger Institute	GBR	Health	37.49
29	Broadcom Corporation	USA	Private	36.84
30	Cold Spring Harbor Laboratory	USA	Health	36.84
31	GlaxoSmithKline, Belgium (GLAXOMLT)	BEL	Private	36.27
32	Johnson & Johnson, United States (JOHNSONMLT)	USA	Private	35.92
33	Fraunhofer Institut für Solare Energiesysteme (FRAGES)	DEU	Government	35.57
34	Harvard-MIT Division of Health Sciences and Technology	USA	Higher educ.	35.22
35	NXP Semiconductors	NLD	Private	34.92

asset, not only for many of the world's largest companies, but also for small and medium-sized companies. It turns out that small patentees (individuals, non-profits and firms with fewer than 500 employees) have patent values that are far smaller than the values of patents owned by large firms and these differences persist across technologies, industries, and assignee types. This is due to the fact that for small patentees the main constrain and obstacle is the cost of patenting inventions and duration of the procedure. The primary cost component is the translation to individual languages of countries where a patent has been applied (patent law states that the patent should be made in accordance with the legal standard and language of the country in which it is filed).

The progress of science and technology exceeds most frequently advancements in legislation and the proposed legislative solutions. In a situation when the Europeans seek to create a single economic system without borders within the EU, the situation of intellectual property rights has become very complicated, and critical to economic development. The unification of patenting procedures combined with the cost reduction can significantly contribute to an increase in the number of patent applications by economic entities in developing countries like Poland.

References

- European Innovation Scoreboard (2013), http://ec.europa.eu/growth/industry/innovation/facts-figures/scoreboards/index_en.htm.
- González-Pereira B., Guerrero-Bote V., Moya-Anegón F. (2010) *A new approach to the metric of journal's scientific prestige: The SJR indicator*. *J.Informetr.* 4(3): 379-391.
- Hollanders H., Es-Sadki N. (2014) *Innovation Union Scoreboard 2014*. http://ec.europa.eu/growth/industry/innovation/facts-figures/scoreboards/index_en.htm.
- Hollanders H., Es-Sadki N., Buligescu B., Leon L.R., Griniece E., Roman L. (2014) *Regional Innovation Scoreboard 2014*, http://ec.europa.eu/growth/industry/innovation/facts-figures/scoreboards/index_en.htm.
- Intellectual Property and the U.S. Economy: Industries in Focus* (2012) prepared by the Economics and Statistics Administration and the United States Patent and Trademark Office http://www.uspto.gov/sites/default/files/news/publications/IP_Report_March_2012.pdf.
- Moya-Anegón F., Guerrero-Bote V.P., Bornmann L., Moed H.F. (2013) *The research guarantors of scientific papers and the output counting: A promising new approach*. *Scientometrics*, 97(2): 421-434. <http://www.scimagoir.com/methodology.php>.
- Patent Office of the Republic of Poland, annual report 2013, <http://www.uprp.pl/raport-roczny-uprp/Lead03,68,3909,1,index,pl,text/>.
- Waszkowska E. (2014a) *Patentability of plant's inventions on example of the Fabaceae family in Poland, Germany and European Patent Office*, <http://www.prolegumes.eu/wp-content/uploads/2014/04/Patentability-of-plants-inventions.pdf>.
- Waszkowska E. (2014b) *Zdolność patentowa wynalazków angażujących rośliny na przykładzie rodziny motylkowatych, w Polsce, Niemczech i Europejskim Urzędzie Patentowym 2014*.
- What is intellectual property?* WIPO Publication No. 450(E), ISBN 978-92-805-1555-0.
- WIPO Intellectual Property Handbook: Policy, Law and Use, WIPO PUBLICATION NO. 489 (E), ISBN 92-805-1291-7, WIPO 2004.