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Patent law and innovations of the Polish economy: Analysis of the current situation and recommendations for the future

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Abstract

One of the key elements of modern economies is their innovation, measured in many ways. The measures of innovation most often include R&D expenditure (expenditure side) and patents (effects side). Undoubtedly, the level of expenditure on research activities is important, but the true picture of an innovative economy is provided by the side of the achieved results, i.e. patents. The purpose of the article is to analyze the impact of patent law (organizational, financial, and legal conditions, and thus the number of filed and patented solutions) on the level of innovativeness on the example of the Polish economy. The analysis was based on a review of domestic and foreign literature and legal acts on patent protection at the national, regional (European) and international levels on the one hand, and innovation in Poland and European countries on the other. To assess the level of innovativeness data from the Global Innovation Index, the Central Statistical Office (GUS) and the European Innovation Scoreboard were used. Comparison of these data made it possible to articulate several conclusions. First, patent law is considered too complex and unclear for research applicants. Moreover, the awareness of patent applicants in Poland is still quite low, especially if the entity is a small enterprise. An undoubted barriers to the patent activity are also the costs that must be borne during

the entire patent procedure and the waiting time for the procedure to be completed. Future research should focus on surveying businesses in Poland about their views on patent law and possible changes to improve its operation, allowing for a more detailed analysis of the issue.

Introduction

The problem of innovation is one of the key issues discussed in sociological research, as well as connected to the Polish economy. On the one hand, the analysis of said issue involves the effects of innovative activity performed by economic entities in the form of innovative solutions (product, process, or organizational) and, on the other hand, the potential to absorb innovation from external entities.

It is worth noting that keeping a competitive advantage necessitates implementing innovations. This, in turn, means the necessity of scientific and development research, which brings various technical and immaterial solutions as an effect. Inventors, however, need to consider not only the ways of creating new solutions but also their protection against the competition (patent).

The following article focuses on the issue of patented innovation which quantity is one of the measures of the innovativeness of economies (Funk, 2018). Patent laws (organizational, financial, and legal conditions) directly affect the number of patented solutions, which then affects the level of innovativeness.

1. Theoretical framework of the research

Protection of inventions, designs and trademarks, i.e. broadly understood patent law, is part of industrial property law. The first legal acts on this subject appeared in Poland as early as 1918 (Dekret tymczasowy o Urzędzie Patentowym z dnia 13 grudnia 1918 roku, Dz.P.P.P. Nr 21, poz. 66), and then they were repeatedly modified and added to (Dolata, 2018). Currently, issues related to the legal protection of inventions and utility models are regulated by the Act of June 30, 2000. Industrial property law (Dz.U. z 2017 r., poz. 776 ze zm.) and the ordinance of the Prime Minister of September 17, 2001 on filing and examination of applications for inventions and utility models (Dz.U. z 2001 r. Nr 102, poz. 1119, z 2005 r. Nr 109, poz. 910 z 2015 r., poz. 366 oraz z 2016 r. poz. 1840). Patent law in Poland and other countries is very extensive, and in many cases, it effectively protects intellectual property. However, practice shows that in many cases, this protection is difficult to enforce. This situation has occurred since the beginning of the protection in the form of patents (Kaczmarska, Gierulski, Kwapisz and Michta, 2018).

In the literature on the subject, many authors emphasize the importance of patent protection of emerging innovations and the legal conditions of this process (Dereń, 2014; Mazu, 2016; Traple, 2017; Michalak, 2016). However, the effective

use of the tools of the patent system seems to be also crucial from the perspective of the course of the innovation process (development, implementation, and diffusion of innovation). These include the following tools: patent information (examination of, among others, competition and the state of technology), legal (procedures and scope of obtained protection), patent strategies and policies, assessment (e.g. risk, economic, entity's innovation, the purposefulness of protection) (Kacprzak, 2018).

Contemporary patent systems can be divided according to their protective power, i.e. systems with strong and weak patent protection. The first is used by countries which want to increase breakthrough innovation and provide strong incentives to create it. It is used by the so-called Invention Leaders. It is possible to determine the value of the protection rights, which favors the possibility of opposition by third parties to the proposed invention. In turn, the weak protection system is aimed at stimulating the spread and imitation of inventions already made by limiting fees to the benefit of the inventor only to people who consciously use this solution and a narrow scope of protection (usually concerning individual elements of the entire design solution). Patent protection may also hamper further innovation, especially when it limits access to essential knowledge, as may be the case in emerging technological areas when innovation has a marked cumulative character and patents protect foundational inventions (OECD, 2004). It is used in underdeveloped countries (Niklewicz-Pijaczyńska and Wachowska, 2012, 23–24).

2. Research methodology

The methodology of the study of the research problem was based on a broad review of domestic and foreign literature on patent protection at the national, regional (European) and international levels on the one hand, and innovation in Poland and European countries on the other. Analyses of patent protection were based mainly on a review of domestic and foreign literature and legal acts. In addition, the part of the study presented in the paper was carried out in the form of secondary research, based on available patent information databases, in particular:

— databases of the Patent Office of the Republic of Poland;
— databases of the European Patent Office (EPO)
— databases of the World Intellectual Property Organization (WIPO).

On this basis, three examples of patent procedure at different levels of territorial scope were presented, concerning the comparison of time and cost of the whole procedure in three specific situations: narrow territorial scope (national procedure), moderate territorial scope (EPO regional procedure) and broad territorial scope (PCT international procedure). To assess the level of innovativeness data from the Global Innovation Index, the Central Statistical Office (GUS) and the European Innovation Scoreboard were used. On the basis of the cited

data, an attempt was made to demonstrate a cause-and-effect relationship between the studied phenomena.

3. The innovativeness of the Polish economy

The innovativeness of organizations is the ability to absorb, i.e. constantly seek, implement and disseminate innovations. The innovativeness of the economy is defined as "a development process in which the ability to create changes results from previously accumulated knowledge and experience" (Weresa, 2000). The innovativeness of the economy is an effect of the innovative activity. It is regarded as one of the most important qualities of an enterprise, having a key impact on its competitiveness and market status. What is important is the application of the created ideas and the dynamics of changes introduced in the process of commercialization of innovations (Barańska-Fischer and Blażlak, 2016).

Among the indicators used to measure the innovativeness of economies, it is necessary to distinguish indirect indicators based on the amount of expenditure and effects related to R&D activity (e.g. patents, technological intensity) and direct innovation indicators (expenditure on R&D) (Archibugi and Pianta, 1996).

The next important indicator is the Global Innovation Index, published by the Cornell University in collaboration with, among others, the World Intellectual Property Organization (WIPO), a specialized agency of the United Nations, calculated as the average of the factors describing the environment suitable to innovation and the results measuring implementation in terms of innovation. On the one hand, it takes into account: institutions, human capital and research, infrastructure, market differentiation, and the diversification of the enterprise sector. On the other hand, it examines the effects of innovative activity: creating new knowledge and creative results (Rószkiewicz, 2015). In 2020, Poland took the 38th position among 129 countries (after holding the 39th position in the previous year), thanks to high scores in the following areas: students' scores in the PISA test (9th position), exports of creative goods (12) or trade, competitiveness and market size (22). On the other hand, the following was reported as below the average: ease of setting up a company (99th position) cooperation between universities and business (87), or gross accumulation as % of GDP (89) (Dutta, Lanvin and Wunsch-Vincent, 2020).

In the context of this article, attention should be directed to the values of the index elements relating to patent activity. The categories related to the creation, influence and diffusion of knowledge received the following values: 35, 31 and 31, respectively. They include patents by origin (27), citation (25), and utility models (27). The number of scientific publications with Polish affiliations published in 2019 and recorded in the interdisciplinary Scopus database was 50.3 thousand, which places Poland in 17th place in the ranking of countries, i.e. in the same position as in the previous year. In the European Union, in 2019, there were 0.54 publications per 1 researcher post. In Poland, this ratio was 0.42 and was the same as

in the previous year. In Germany, where the expenditure on research and development per researcher is four times higher than in Poland, the indicator decreased and amounted to 0.41. Of the 50.3 thousand publications affiliated with Polish authors published in 2019, there were 34.7 thousand. citations, of which 30.9% were self-citations. The number of quotations per publication for Poland was 0.7, which is slightly above the rate for the entire Eastern Europe (GUS, 2021).

One of the main indicators used in measuring the innovativeness of the economies in the European Union is the European Innovation Scoreboard. Ultimately, the Summary Innovation Index divides the Member States into four groups: Innovation Leaders, Strong Innovators, Moderate Innovators, and Modest Innovators.

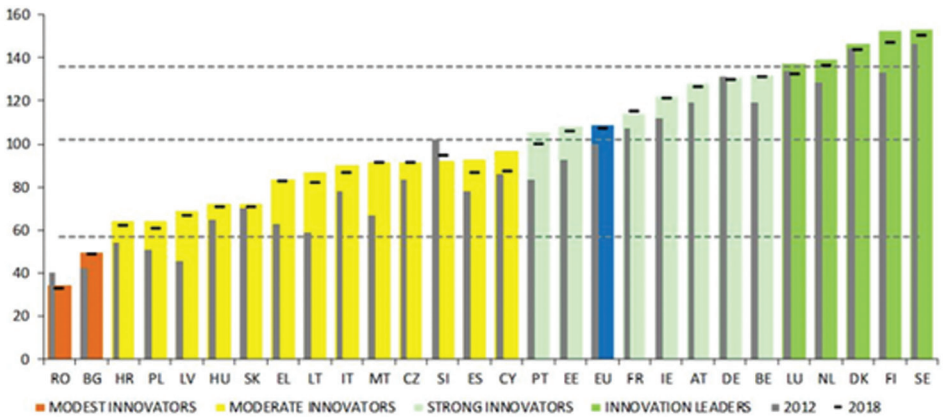


Figure 1. Results of EU Member States in terms of innovation systems based on the European Innovation Scoreboard 2019

Source: European Innovation Scoreboard 2020, https://ec.europa.eu/commission/presscorner/detail/en/QANDA_20_1150 (accessed 31.05.2021). The figure shows the performance of the Member States in 2019 compared to the performance of the EU in 2012. The small horizontal dashes represent the country levels for 2018. The narrow dark bars show the performance of the Member States in 2012 compared to the EU performance in 2012. The dashed lines show the threshold values between the groups in 2019. The same measurement method is used for all years.

The results in 2019 are presented in Figure 1, which shows that Poland (next to Croatia, Cyprus, the Czech Republic, Greece, Hungary, Italy, Lithuania, Latvia, Malta, Slovakia, Slovenia, and Spain) is below the European Union average, and is ranked among Moderate Innovators. Innovation Leaders include Luxembourg, Denmark, Finland, the Netherlands, and Sweden, whose innovation performance is well above the EU average. In turn, only countries such as Bulgaria and Romania (Modest Innovators) recorded worse results than Poland, as well as Hungary in the group of Moderate Innovators.

Poland is one of the countries with a relatively medium technological level. Almost the entire Polish industry uses foreign scientific achievements. No Polish invention, even an uncomplicated one, has been recognized as a world patent. In addition, very few inventions from Poland obtain international protection. It often

happens that foreign entities buy patents in Poland and provide them with appropriate protection on their own markets, which makes competition for domestic entities even more difficult.

Therefore, it should be considered what causes Polish entities to obtain so few patents, especially those of a strategic nature on the international and regional arena since it is such an important factor in the innovation of the economy.

4. Patent law in Poland

A patent is a time-limited right to the exclusive use of a technical solution (invention) for commercial or professional purposes in the territory of the state that granted the patent. This right belongs to the owner of the technical solution, i.e. the entity or natural person, applying to the patent office with an appropriate application. A patent in Poland is valid for 20 years from the date of filing the invention, provided that the required fees are paid. After this period, if the owner does not extend the protection period, the right expires and the invention is transferred to the public domain, where there is no restriction of use. The utility model is also the right to the exclusive use of the technical solution, but it only applies to the shape, structure, and combination of objects ensuring a complete form. The term of protection law for utility models in Poland is 10 years. Patents and utility models protected in Poland are granted by the Patent Office of the Republic of Poland. They may also be granted by the European Patent Office after indicating Poland as the area of validity in the application form (https://uprp.gov.pl; Pyrża, Tadeusiak, Adelt, Jakubaszek and Piskorska, 2006).

The invention must meet the so-called patentability criteria, which include novelty (the solution cannot be a part of the state of the art), inventive step, and the ability to be used industrially (Du Vall, 2008; Adamczak and Gędłek, 2012). Confirmation of the fulfillment of the above-mentioned criteria is obtainable by conducting appropriate tests, which are carried out as part of the procedures for granting patent protection in individual countries and international patent organizations (Kacprzak and Kotarba, 2018).

It should be noted that under the Act, inventions are not (Pyrża, 2005; Pyrża, 2008):

— scientific discoveries, theories and scientific methods,
— products of purely aesthetic nature,
— programs for digital machines,
— products that cannot be used in the light of generally accepted and recognized principles of science,
— plans, rules and methods for intellectual or business activities and games,
— presentation of information,
— solutions contrary to public order,
— varieties of plants and animals,
— Methods of treating humans and animals by surgical or therapeutic means.

The patent procedure can be initiated by the person who is the inventor, or by the employer, providing the invention was created as a result of an employment relationship or other civil law contract.

There are three possible patent procedures in Poland (Pawłowski, 2019):

1. Domestic procedure — applying for a patent in the country.
2. Regional procedure — procedure conducted by the patent office granting the patent based on an agreement between many countries. For this article, this is the European Patent Office (EPO). After a patent is granted in one office, only validation in other selected countries is required.
3. International procedure (PCT) — the application is filed within 12 months of the first application for the invention. As a result, an international report which gives information on the possibility of obtaining a patent is issued. Subsequently, national or regional notifications are made.

However, it should be remembered that the obtained patent is valid only in the territory of the country in which it was applied for, under the territorial principle (Zajączkowski, 2003). Therefore, each inventor must decide in which countries to apply for patent protection for their own innovation. Undoubtedly, an important criterion for this decision is the cost that must be increased in connection with obtaining a patent.

Importantly, however, not only the number of patents is crucial from the point of view of increasing competition of both entities and the economy. Their quality and range are also important. The most innovative countries/entities have patents that are recognized all over the world and filed through an international or at least regional procedure. In Poland, this situation is the opposite (Figure 2).

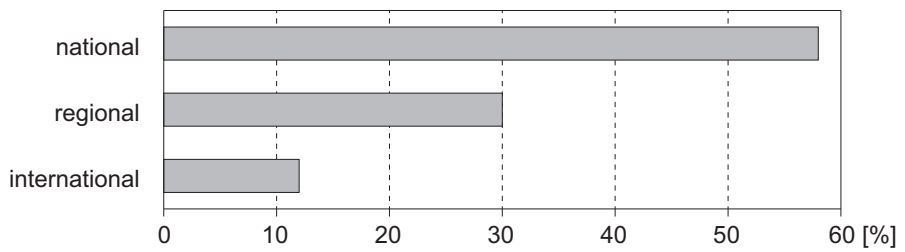


Figure 2. Number of the national, regional and international applications of inventions in 2019

Source: own study based on data from the Patent Office of the Republic of Poland, https://uprp.gov.pl/sites/default/files/inline-files/Raport%20roczny%202019_1.pdf (accessed 31.05.2021).

Domestic patent applications dominate in Poland (58%). The international nature of patents accounts for just over 12% of all filed inventions. It is a small percentage of all introduced procedures, which means that there are few Polish solutions in the world.

The nature and quality of the obtained patents is another important issue. Nowadays, undoubtedly breakthrough solutions are usually the result of the cooperation of various entities within the R&D framework, which results from the increased role of open innovations. This means the transition from a closed (linear) model to

an open (nonlinear) model. Innovative activity in the linear model is based mainly on the potential of the organization (research and development activity, employees, management staff) (Roussel, Saad and Erickson, 1991). On the other hand, open innovations are based on the cooperation of entities that can use their own resources, as well as external resources of other entities (Chesbrough, 2003, 15).

However, such solutions also have some disadvantages. Entities that decide to operate in the R&D area as part of open innovation, i.e. by starting cooperation with other entities, are much more likely to be exposed to uncontrolled disclosure of a patent secret or infringement of intellectual property rights (Ritala, Olander, Michailova and Husted, 2015).

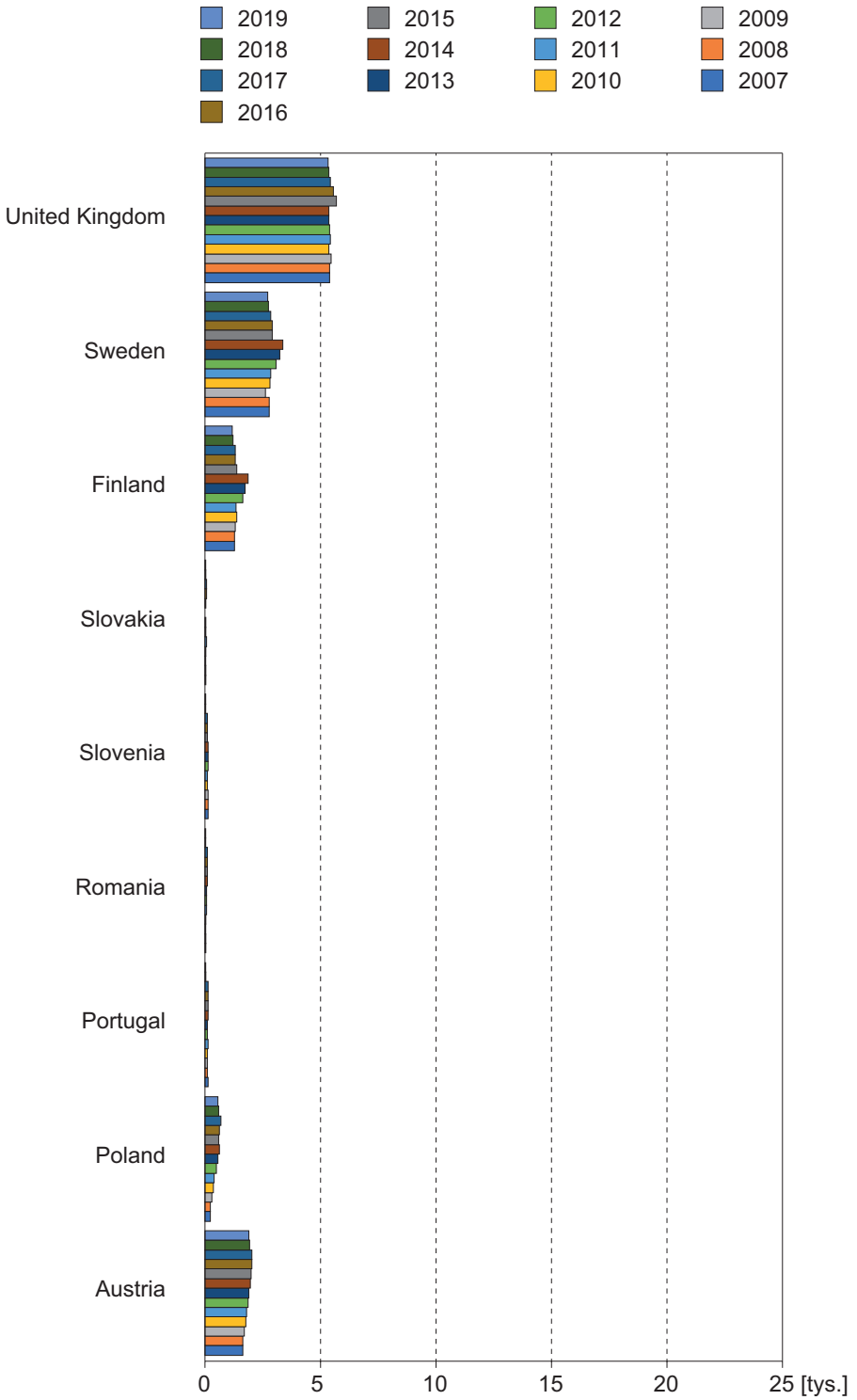
Moreover, because of cooperation in the open innovation system, imitative solutions appear much more often. A breakthrough solution is usually created within one company/entity and most often they are protected by a given organization as the culmination of the innovation process and the previously contributed effort and risk (Hobday, 2005).

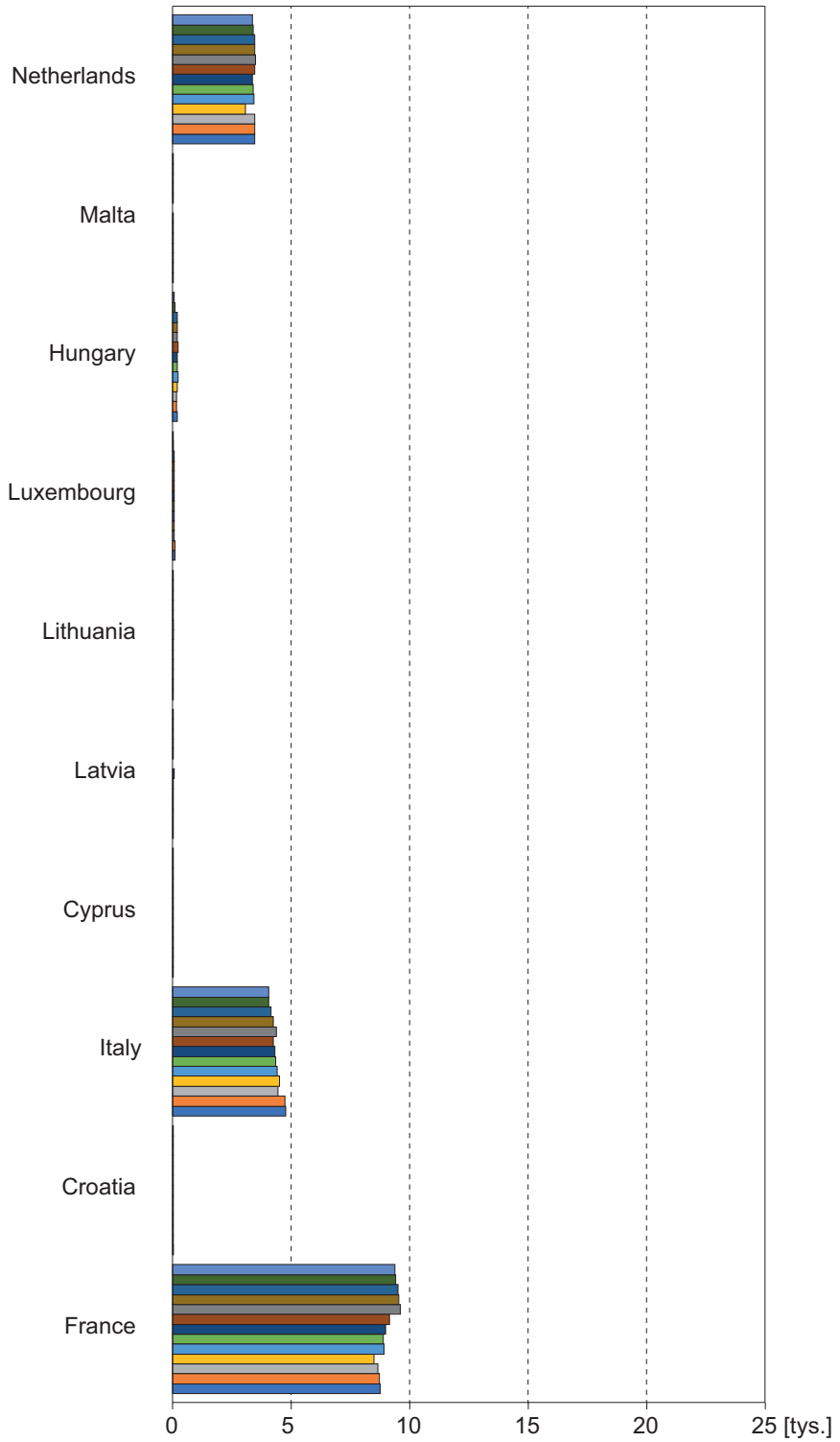
The transition from closed to open models innovation processes is characteristic of modern economies. However, despite the many benefits resulting from such activities, it should be emphasized that there is no high correlation between the cooperation of entities in the field of R&D and the emergence of new solutions.

5. Analysis of research results on patent activity in Poland

The analysis of the outlined research problem was based, on the one hand, on showing the level of innovativeness of the Polish economy on the basis of selected innovation indicators. These results show that Poland does not belong to the leaders in innovativeness, both in the world and in Europe. Within the framework of the mentioned indicators special attention was paid to patent activity (filing and obtaining patents) of Polish entities, which does not seem to be sufficient. In the authors' opinion, the low patent activity of Polish enterprises has a negative impact on the level of innovativeness of the economy. On the other hand, patent law in Poland and the differences between the solutions applied to the national, European and international patenting process (regulations, costs, duration) have been analysed. This research has led to a number of conclusions concerning the formulation of the most significant problems in this area, as well as an attempt to identify solutions, the implementation of which will contribute to an increase in the number of patents, and thus also the innovativeness of the economy.

The patent activity of entities results mainly from the undertaken research and development activity. The intended effects of these activities are new solutions and inventions. However, when analyzing the situation of Poland in terms of the patents submitted, it is clearly noticeable that the results are much worse when compared to many other European countries (Figure 3).





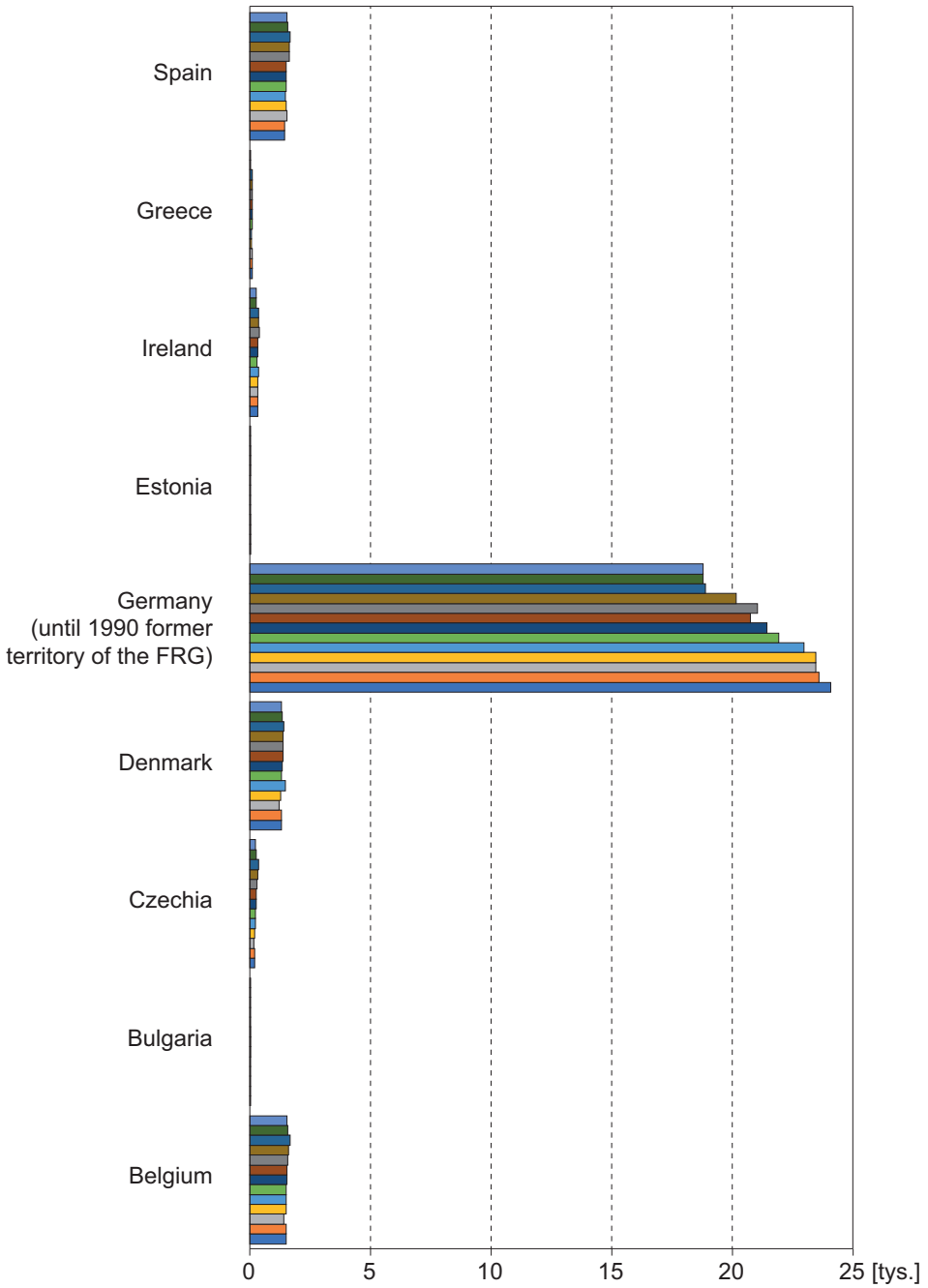


Figure 3. Patent applications of individual European countries to the EPO in the years 2007–2019

Source: own study based on Eurostat data, https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=pat_ep_rtec&lang=en (accessed 31.05.2021).

In terms of the number of patent applications, Poland ranks in the second half of European countries. This is due to several fundamental issues. First of all, patent applications are usually filed by large concerns, of which there are relatively few in Poland, and enterprises from the SME sector are usually not interested in patent protection for their inventions. This is mainly due to a lack of awareness of the importance of protecting one's own property and little knowledge of the rules, procedures and benefits of protecting intellectual property. Unfortunately, both national and international procedures are quite complicated. The owner of the invention may have a problem with the entire patent procedure, therefore they need professional support which is quite expensive. And taking into account other costs (administrative, official, etc.), the entire patent procedure becomes very expensive, and smaller entrepreneurs usually do not have adequate capital (Turczak, 2010).

In addition, owners of inventions are also discouraged by the length of administrative procedures, relatively high costs of extending protection and significant court costs related to the enforcement of their rights. The low number of patents is also affected by the limitations resulting from the existing legal norms. Enterprises from the IT sector do not have the possibility of patent protection for software in Poland, because national law makes it impossible to obtain such a patent, which is possible in other Western countries, e.g. in the United States.

The situation in Poland in terms of the number of patents is disadvantageous. Annually, only a few hundred applications are submitted to the European Patent Office. In 2019, there were less than 700 applications, as in previous years, in 2018 — 627, in 2017 — 580, in 2016 — 600 (UPRP, 2019). A growing tendency is noticeable, but compared to the EU average, in Poland, these numbers are still much lower. As it turns out, the problem is not the long waiting time for a patent in Poland, as this time is similar to the EU average, which is approximately 3–4 years (average: 39 months).

After all, entrepreneurs and scientists often mention long waiting times as one of the reasons for abandoning such a process. However, this is not the only problem for inventors. The current patent law for most inventors is quite complicated and unclear. Inventors do not know what can and even needs to be patented. Sometimes a scientist sells their invention abroad in return for seemingly adequate price. However, entities using a given solution resell said patent (technology) to Polish entrepreneurs for much higher amounts, thus profiting from it. This is due to the fact that frequently, a scientist/inventor is not aware of the market value of their invention.

In addition, patent procedures are often so unclear and complicated that it requires the help of a specialized professional, whose service is also very expensive. To illustrate, in detail, what comes along with the entire patent procedure at different levels of territorial scope, a comparison of the time and the cost of the entire procedure covering the invention patent protection in three specific situations is presented below.

1. Narrow territorial scope (national procedure) — initiation of the patent process in Poland, followed by patent application in Germany and the United States.
2. Moderate territorial scope (EPO regional procedure) — starting the patent process with a European application (Poland, Germany, France, Great Britain), and then the patent application in the United States.
3. Wide territorial scope (international PCT procedure) — starting the patent process in Poland, followed by patent application in several European countries (Poland, Denmark, France, Great Britain, Italy, the Netherlands and Spain) as well as in the United States, Japan, China and Russia.

Table 1 shows the time and the cost of the entire patent procedure in the case of the national procedure (first case) extended to the application of the invention in Germany and the United States.

Table 1. Time and cost of patent procedure when the invention is filed in Poland, Germany and the United States

Date	Step	Description	Cost
1.01.2019	invention	discovery of the invention by scientists	
1.02.2019	patentability analysis	providing the patent attorney with a preliminary description of the invention	approx. PLN 3,000
2.05.2019	submitting the invention	filing a patent application with the Polish patent office	approx. PLN 5,500
7.10.2019	report	patent office report challenging the patentability of the invention	
5.01.2020	addressing the allegations	making the necessary corrections, developing an argument in favor of the invention (cooperation of scientists and a patent attorney)	approx. PLN 2,000
2.05.2020	national patent application in Germany and the United States	the patent application must be made within 12 months of the first filing in the country	approx. EUR 1,900 In Germany USD 3,800 in the US
28.07.2021	report	report of the United States Patent Office challenging the patentability of the invention	
20.08.2021	addressing the allegations	making the necessary corrections, developing an argument in favor of the invention (cooperation of scientists and a patent attorney)	approx. USD 2,000
10.12.2021	decision to grant a patent	the issuance of a decision by the patent office in the United States to grant the patent	approx. USD 1,500 (protection for approx. 3 years)

13.03.2022	notification of obstacles by the Polish Patent Office	notice based on documents obtained by the United States Patent Office	
4.05.2021	addressing the allegations	developing arguments against the allegations	approx. PLN 2,000
29.08.2021	decision to grant a patent	decision on granting the patent by the patent office in Poland	approx. PLN 800 (protection for approx. 4 years)
29.09.2021	application for examination in Germany	obtaining patents in Poland and the United States gives a good chance of obtaining a patent in Germany without major problems, so an application is submitted with the correction of reservations to the version in which the patent was granted in previous countries	approx. EUR 1,150
31.03.2023	decision to grant a patent	decision by the patent office in Germany granting the patent	approx. EUR 400

* the amounts of fees are estimated values, their amount is influenced by many factors, e.g. the level of complexity of the invention, experience and knowledge of the attorney
* after obtaining a patent, fees are also increased in subsequent years (in Poland and Germany every year, in the United States every 4 years)
* the adopted dates are estimated

Source: own study.

The patent procedure shown above usually takes an estimated 4–5 years. In the first year, the applicant has to pay approximately EUR 2,000. In the following year, this cost increases significantly to approximately EUR 5,800. In the third year of the patent procedure, the cost is around EUR 3,100. In the following period, the cost was around EUR 1,700, and in the last year, it was EUR 500. The total cost of the procedure in the analyzed example was approximately EUR 13,100.

Table 2 presents the time and cost of the patent procedure with a moderate territorial scope (EPO regional procedure), starting the patent process with a European application (Poland, Germany, France, Great Britain), and then the patent application in the United States (the second case).

Table 2. Time and cost of patent procedure when an invention is applied for at the regional level

Date	Step	Description	Cost
1.01.2019	invention	discovery of the invention by scientists	
1.02.2019	patentability analysis	providing the patent attorney with a preliminary description of the invention	approx. PLN 3,000

2.05.2019	submitting the invention	filing a patent application with the Polish patent office	approx. EUR 3,920
7.10.2019	report	patent office report challenging the patentability of the invention	
5.01.2020	addressing the allegations	making the necessary corrections, developing an argument in favor of the invention (cooperation of scientists and a patent attorney)	approx. PLN 2,000
2.05.2020	national patent application in the United States	the patent application must be made within 12 months of the first filing in the country	approx. USD 3,300
2.05.2021	application for examination	submitting the application for examination at the EPO	approx. EUR 3,200
28.07.2021	report	report of the United States Patent Office challenging the patentability of the invention	
20.08.2021	addressing the allegations	making the necessary corrections, developing an argument in favor of the invention (cooperation of scientists and a patent attorney)	approx. USD 2,000
10.12.2021	decision to grant a patent	the issuance of a decision by the patent office in the United States to grant the patent	approx. USD 1,500 (protection for approx. 3.5 years)
28.12.2021	correction of the application to the EPO	submitting a correction to the EPO taking into account the allegations made by the US patent office	approx. EUR 500
29.04.2022	decision to grant a patent	the EPO issues a decision on granting a patent	approx. EUR 2,110 (protection approx. 4 years)
15.09.2022	validation	patent validation in Poland, Great Britain, Germany and France	approx. EUR 2,000

* the amounts of fees are estimated values, their amount is influenced by many factors, e.g. the level of complexity of the invention, experience and knowledge of the attorney
* after obtaining a patent, fees are also increased in subsequent years (in Poland and Germany every year, in the United States every 4 years)
* the adopted dates are estimated

Source: own study.

The patent procedure shown above usually takes an estimated 4 years. In the first year, the applicant has to pay approximately EUR 4,600. In the following year, the cost is around EUR 3,400. In the third year of the patent procedure, this cost increases significantly to approximately EUR 6,800. In the last year, it was EUR 3,600. The total cost of the procedure in the analyzed example was approximately EUR 18,400.

Table 3 shows the time and cost of the patent procedure with a wide territorial scope (international PCT procedure), which covers Poland, the EPO (Germany, France, Great Britain, Italy, the Netherlands and Spain) and the United States, Japan, China and Russia (third case).

Table 3. Time and cost of patent procedures when an invention is filed internationally

Date	Step	Description	Cost
1.01.2019	invention	discovery of the invention by scientists	
1.02.2019	patentability analysis	providing the patent attorney with a preliminary description of the invention	approx. PLN 3,000
2.05.2019	submitting the invention	filing a patent application with the Polish patent office	approx. PLN 5,500
7.10.2019	report	patent office report challenging the patentability of the invention	
5.01.2020	addressing the allegations	making the necessary corrections, developing an argument in favor of the invention (cooperation of scientists and a patent attorney)	approx. PLN 2,000
2.05.2020	PCT application	the patent application must be made within 12 months of the first filing in the country	approx. EUR 5,000
2.05.2021	application for examination	submitting the application for examination at the EPO	approx. EUR 3,200
28.07.2021	report	PCT report challenging patentability of the invention	
20.08.2021	addressing the allegations	making the necessary corrections, developing an argument in favor of the invention (cooperation of scientists and a patent attorney)	approx. EUR 3,000
12.12.2021	national stages	if the result of the international study is positive, the procedure continue with successive national stages.	approx. EUR 6,900 and USD 12,400
2.05.2022	application for examination in China	filing an application for examination with a patent office in China	approx. USD 650
2.12.2022	decision to grant a patent by EPO	the EPO issues a decision on granting a patent	approx. EUR 1,525
2.02.2023	decision to grant a patent	notice based on documents obtained by the United States Patent Office	approx. PLN 1,200 (protection approx. 5 years)
2.03.2023	validation	patent validation (based on EPO decisions) in Poland, Great Britain, Germany, France, the Netherlands, Italy and Spain	approx. EUR 6,000

2.05.2023	application for examination in Japan and Russia	filing an application for examination with a patent office in Japan and Russia	approx. EUR 500 and USD 1,600
28.07.2023	report	report of the United States Patent Office challenging the patentability of the invention	
20.08.2021	addressing the allegations	making the necessary corrections, developing an argument in favor of the invention (cooperation of scientists and a patent attorney)	approx. PLN 2,000
10.12.2021	decision to grant a patent	the issuance of a decision by the patent office in the United States to grant the patent	approx. USD 1,500 (protection for approx. 3.5 years)
3.01.2024	report	report of the patent office in Japan contesting patentability of the invention	
4.02.2024	addressing the allegations	making the necessary corrections, developing an argument in favor of the invention (cooperation of scientists and a patent attorney)	approx. PLN 3,000
20.03.2024	report	report of the patent office in China challenging the patentability of the invention	
13.04.2024	addressing the allegations	making the necessary corrections, developing an argument in favor of the invention (cooperation of scientists and a patent attorney)	approx. PLN 3,000
6.09.2024	report	report of the patent office in Russia challenging the patentability of the invention	
15.10.2024	addressing the allegations	making the necessary corrections, developing an argument in favor of the invention (cooperation of scientists and a patent attorney)	approx. USD 1,500
first half of 2025	decision to grant a patent	decision on granting a patent by patent offices (China, Russia and Japan)	approx. USD 1,200 and EUR 400

* the amounts of fees are estimated values, their amount is influenced by many factors, e.g. the level of complexity of the invention, experience and knowledge of the attorney
* the adopted dates are estimated

Source: own study.

The patent procedure shown above usually takes an estimated 8 years. In the first year, the applicant has to pay approximately EUR 2,000. In the following year, the cost is EUR 5,500. In the third year of the patent procedure, this cost increases significantly to approximately EUR 25,000. In the last

year, it was EUR 3,600. The total cost of the procedure in the analyzed example was approximately EUR 18,400 EUR. In the fourth year, the costs amounted to EUR 2,100, in the fifth — EUR 9,700, in the sixth — EUR 12,300, in the seventh — EUR 3,000, and in the last year, the cost was EUR 1,300. The total cost of the procedure in the analyzed example was EUR 60,900.

Comparing the cost of the patent procedure in the three analyzed situations, it is clearly noticeable that obtaining a patent outside one's own country, especially in the international arena, becomes very costly and time-consuming for the applicants. Undoubtedly, these are the factors that limit the number of patent applications filed in Poland, especially by small entities.

Conclusions

Innovation has always been a driving force in socio-economic development. In Poland, too, much has been said recently about the importance of innovation and patenting activity for the future development of the country. At the same time, little attention is paid to research on such a fundamental area for the economy as patent activity and its impact, often limiting, on the innovativeness of a country.

Undoubtedly, the possession of patents increases the market opportunities for a given entity, because a competitive advantage is gained and the inventor's reputation and market value are raised. In addition, by owning patents, a given entity may obtain many different additional benefits, i.e.:

— obtaining a monopolistic position by producing according to a patent which competition has no access to;

— sale of a patented invention;

— licensing;

Despite the numerous benefits of patenting an invention, few entities in Poland decide to undertake this action, which is due to several reasons. First of all, the awareness of Polish entities about the benefits of patent protection is very low. Inventors do not know what can and even needs to be patented. Therefore, it seems necessary to take actions aimed at increasing the knowledge of entities regarding the possibility of legal protection.

Another important point is that the current patent law for most inventors is quite complicated and unclear. Therefore, it should be simplified to the maximum or to a greater extent, at least at the stage of the patent procedure in terms of guidance (e.g. increasing the availability of free consultancy). The first stages of the patent procedure in particular tend to be the most difficult for entities applying for inventions. A good solution would be to increase the possibility of free training for entrepreneurs and scientists on the patent procedure, as well as basic information on inventions, patents and their market valuation.

In addition, the cost of the patent procedure is also an important issue. While the costs of such procedure in Poland is not relatively high (comparable to the EU average), the costs of the international procedure are often too high for smaller entities. Therefore, it seems justified for the state to financially support this type of activity. This is important because patenting an invention only in one's own country gives little in the present times, when competition is usually global. In order for the economy to be highly innovative, it is necessary to have patents on an international scale.

The table below summarizes the main arguments in favor of starting a patent procedure, as well as the reasons to the contrary.

Table 4. Arguments in favor of starting a patent procedure and the reasons to the contrary

	No patenting	Patenting
For	— costs related to keeping the invention secret are much lower than those related to the patent procedure; — the protection of the unpatented invention is not limited in time; — keeping the invention secret allows the company to obtain a monopolistic position on the market	— owned patents have a positive effect on the brand and image of the company; — the patent owner has the opportunity to obtain additional income by granting a license; — the patent holder has the exclusive right to use it throughout the period of protection; — the patent owner has the legal preventive measures to successfully bring forward claims against people who have violated the rules of patenting;
Against	— keeping an invention secret is difficult, sometimes even impossible; — high risk of disclosing the secret of the invention; — in the event that the invention is publicly disclosed, each entity may use the given solution.	— a patent applicant is obliged to publicly disclose its essence; — patent protection lasts a maximum of 20 years from the date of filing the patent application; — the patent is spatially limited as it is valid only in the territory of the country (s) where it was granted; — the costs of obtaining a patent and the costs of pursuing claims under the patent in court are very high.

Source: own study.

However, it can be expected that in the coming years, companies operating in Poland will be more and more active and effective in conducting patent activities, both at home and abroad. This will be facilitated by three factors: the grow-

ing level of internationalization of the Polish economy, the need to compete with Western enterprises that better protect their intellectual property, and the availability of funds to support innovative activities.

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