

COMMERCIALIZATION OF RESEARCH RESULTS. EFFECTIVENESS OF THE PATENT SYSTEM

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Abstract

Contemporary knowledge-based economies need and use different innovation sources. These include results of research and development conducted by academic centers and research institutions. Some of the solutions developed by them are breakthroughs, and as such are reported to patent offices, which after meeting formal and substantive requirements grant exclusive rights. One of determinants of their economic value is the time passing till they hit the market, and start to be used. The aim of the publication is to assess effectiveness of patent procedure, based on the data of patent offices. This objective will be achieved, inter alia, based on a comparative analysis of elapsed time from the date of notification to the award of a patent for an invention. For needs of the article were analysed over a hundred of patent applications submitted by three Polish academic centres characterized by high inventive activity and six Czech universities that have obtained exclusive rights. Due to the purpose of article, the study included applications prepared in the context of national procedures. The results of documentation analysis show clear evidence of significantly higher procedural efficiency of the Czech patent system, which thus forms a higher real value of protected solutions.

Key words: patents, innovations, intellectual property

JEL Code: O310, O340, O380

Introduction

Contemporary knowledge economies derive from a variety of innovation sources, follow-up or breakthrough innovations. They have the character of both internal and external. However, different is their effectiveness and market value. One of important sources of innovation are studies conducted by academic institutions, increasingly regarded as the core of inventive activity. Their role therefore varies substantially, formerly researchers were expected to focus on the primary goal - to generate and disseminate knowledge. Significantly, only in some economies - eg. the United States, was exerted pressure on compatibility of knowledge

produced in laboratories with industry's needs (Rosenberg, Nelson, 1994). In others, eg. Japan, were not created significant incentives for this type of activity (Bartholomew, 1989), science and industry sector functioned somewhat simultaneously, do not overlap too much. Today, while „Academic canon of twenty-first century (...) becomes the three missions university: traditionally the first two - education and research and so-called third one, including the social dimension, entrepreneurship and innovation (...)” (Brdulak et al., 2013, p. 69). Completion of the third mission - commercial activities began to be expected from the nineties (Göktepe-Hulten, Mahagaonkar, 2010), which was connected with system changes and emergence of new growth theories. The issue of knowledge transfer from universities to business practice includes not only direct cooperation issues but also so called patent citations (Jaffe et al, 1993). Some argue that the process of innovation increasingly requires cooperation in a very broad sense, not only with industry, but also highly specialized researchers, whose knowledge will complement each other. In the literature, on the one hand, is emphasized importance of strengthening academic centers for empowering innovativeness of economies, on the other hand, is drawn attention to incompatibility of projects they developed with market expectations. Empirical studies indicate because, that researchers more than the economic benefit resulting from market utility of developed solutions, primarily crave recognition (Göktepe-Hulten, Mahagaonkar, 2010). At the same time they are often more interested in raising funds for their research (Nilsson et al., 2010) than obtaining private financial gain (Thursby, Thursby, 2007). Still working with commercial entities they treat as a springboard to develop their own research than as an opportunity to support industry with their own know-how (D'Este, Perkmann, 2011). Meanwhile, in order to carry out the mission of innovative university, it is necessary to commercialize its creative efforts. In some academic systems, estimation of invention commercial potential is almost obligatory condition for determining the possible applying for legal protection. Commercialization understood as „multidimensional process that enables an innovator to obtain benefits from implementation of research and development into the business practice“ (Brdulak et al., 2013, p. 39), or shortly as „all activities designed to transfer knowledge from the lab to the market” (Kluczek, 2011, p. 117) is a complex process, and at each stage may encounter certain obstacles, undermining it in whole or in part. The question therefore arises whether specific detachment of scientific technological thinking stems from a meagre university involvement in the process of commercialization of inventions developed by them, whether it also has other institutional base? An example of the second barrier type can be a tardiness of patent offices, that by a lengthy procedure discourage inventive activity, and if the procedure starts,

it causes that reported for protection solution depreciate before they get a chance to confront the market. One of the problems occurring here is unreasonably long period elapsed from the time of the patent application until a patent. Indeed, this is one of the many objections formulated with respect to the patent system - increasingly there are voices that creating exclusive rights in fact does not stimulate, on the contrary, it limits the technological progress (Jaffe, Lerner, 2004; Benkler, 2006; Bessen, Meurer, 2008). Meanwhile, technology obsolescence, which starts almost from the moment of germination of ideas, is an inevitable process. In the case of inventions, it includes technical, functional and postponing aging. The first means that the product loses high-tech value because of the expansion of competitive goods. Second, it loses usefulness, for example, spare parts to it are no longer produced. While postponing aging is that technological changes are not placed on the main invention, because it did not hit the market. The aging process is also very dynamic. For example, for the electronics industry operates so-called Moore's Law, which boils down to saying that the radical technological changes occur approximately every 3 years. Such a period seems to be universal. However, in a patent protection practice, it happens that the very time from application to the exclusive right granting, is longer than those three year periods of solution usefulness. Thus, the solution loses its breakthrough advantage at the time, in which an innovator not even yet entered the stage of commercialization and cutting coupons from their own creativity.

Therefore, the aim of project is two-stage. It covers the first, to examine whether the Polish and Czech academic centers are at all interested in protection of their developed solutions. Second, considers analysis of periods elapsing from the time of notification an invention to obtaining a patent on it. The study contains own pilot research, which was carried out based on the author's database gathered based on data of Polish and Czech patent offices. Three Polish academic centers, which are characterized by high inventive activity, were selected for the analysis, and six Czech universities, which have patent rights to their credit. The study included applications submitted to the patent offices in 2005 (this allows to determine the length of waiting, which may greatly exceed the statutory three-year period). For the purposes of the research were studied a total of 108 Polish and Czech applications submitted for consideration within national patent procedures.

1. Commercialization of research results

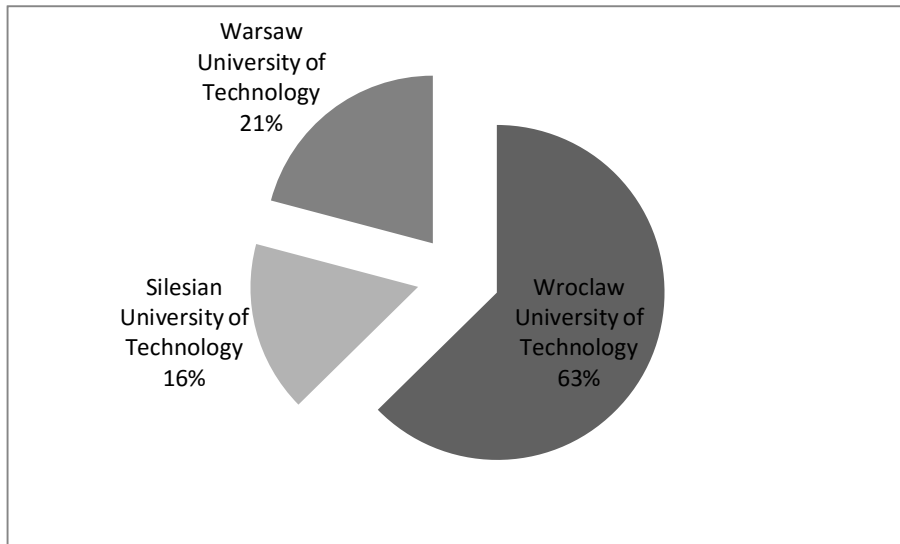
Academic centers based on human capital can make it a regular source of income. Executing this goal, commercialization of research results take the direct or indirect form. The first one is based on the personal involvement of the author in the process of marketization of the invention. Second, is the transfer of invention ownership or a granted protection right to a third party, which takes on the burden of its implementation into the economic circuit (Brdulak et al., 2013, p. 39). The literature emphasizes that the intermediate commercialization is a response to the gap between the entrepreneur's plan and his insufficient for its implementation, innovative capacity (Matusiak, Guliński, 2010). The choice of a particular form entails different consequences as to the risks associated with it and the amount of return. Developing and bringing to market results of their research, universities can diversify revenues commercializing solutions not only protected by law, but also developed know-how, implementing various ordered research services, carrying out expertises or specialist training of managerial personnel. Increasingly, universities are involved in stimulating entrepreneurial attitudes and contribute to the establishment of innovative companies by the academic staff and students creating academic incubators. It happens that they invest capital in so-called spin-off companies, personally and financially independent or even organizationally independent (spin-out), derived from the academic unit or created within it (spin in). Sometimes they also create so called capital special purpose companies, whose mission is to implement results of research and development work conducted in the parent entity. Commercialization of research results therefore requires real effort, but also entrepreneurship. It is also multi-step and complicated process. Commercialization process model schemes represent the supply and demand approach to the problem of generating inventions, close to Schumpeter or Drucker vision of innovation. In fact, the creation of contemporary models of innovation are more complex in nature and are called conjugated systems. The ultimate beneficiary of the commercialization process, however, is always the customer, which receives an innovative product or service as the last link of the value chain. It is not always that solution developed at the university has a market potential. Therefore, before the next stage of commercialization, it is necessary to verify its usefulness in this regard. This does not mean, however, that incurred creative effort was pointless. Research results can be the basis to elaborations and publications and the beginning of new discussions in the literature. In contrast, solutions that pass the selection process as suitable for economic exploitation, and especially those of a technical nature, are subject to further improvement and release on the market, or subject to an additional patent-pending, giving them the nature of exclusive rights. In the latter case, achieved benefits result not only from sale of the final product, but also

possibility of selling the patent or granting license for protected solution. As mentioned above, the transfer of protected solution ownership is an example of the intermediate commercialization, which allows achievement of future revenues generated by the licensee or use a solution, which marketization exceeds financial or organizational capacity of its creator (Brdulak et al., 2013). A factor reinforcing the commercialization process is therefore cooperation of academic centers with commercial entities. The fact that it is not strong enough today, it is not always the fault of universities. Entrepreneurs also approach to the cooperation with caution, explaining it with fear of excessive prolongation of the cycle from research to commercialization, which is associated with loss of competitiveness and solution innovative characteristics as well as bearing costs of high-risk financial contribution (Brdulak et al., 2013). In the literature, attention is drawn to a problem of so-called communication gap between the worlds of science and industry. It stems from a mutually contradictory motivation to undertake professional activity. One side, researchers are guided chiefly by professional passion and curiosity, the other side, entrepreneurs, perceive the solution through the prism of economic benefit and acquiring as well as strengthening market position.

2. Patent applications of selected Czech and Polish universities and waiting periods to obtain exclusive rights

One of the stages in implementing the process of inventions commercialization is application of technical solutions to protection in the right patent office. Obtaining exclusive rights for an invention in the form of a patent, allows a scientific unit to achieve revenue from sales or fees collected after the signing of a license agreement. The amount of revenue depends not only on specific "breakthrough nature of invention", but also factors associated with essence of obtained protection. These include geographic scope of patent protection defining area of potential target markets, including the size and structure of demand and its effectiveness (even in matters of enforcement of exclusive rights violations). In this regard, the authorized entity should therefore carefully consider the nature of patent procedure. In 2005, the Wroclaw University of Technology reported to protection 57 valid patent applications, the Silesian University of Technology in Gliwice 15, and the Warsaw University of Technology 19. In total three selected Polish universities reported 91 applications to obtain exclusive rights for inventions, wherein the highest activity is noted in this regard in relation to the Wroclaw University of Technology, which valid applications represent 63% of all notifications (Fig.1).

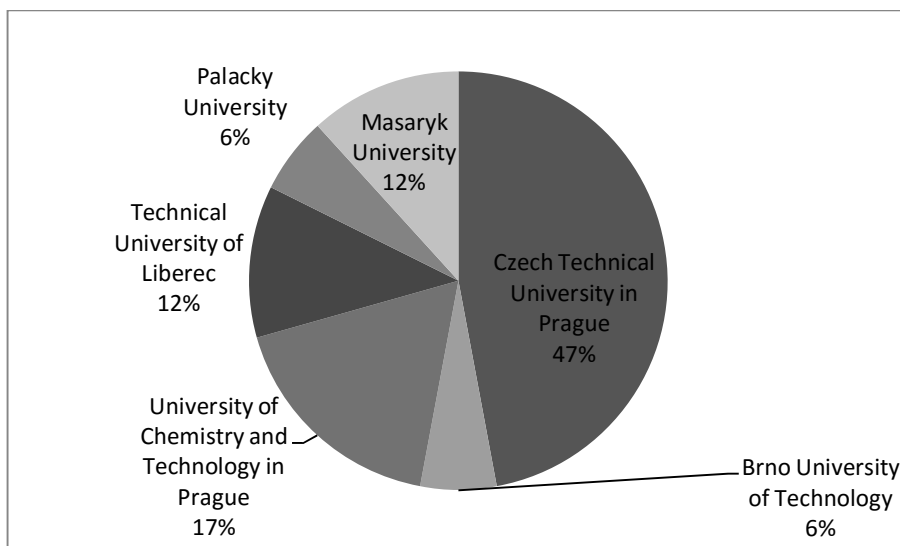
Fig. 1: Inventive activity of selected Polish universities (% approach)



Source: own elaboration

At the same time, six Czech universities reported to protection 17 inventions that after verification by a patent office were granted protection rights. Among them, the highest inventive activity showed the Czech Technical University in Prague, which, in 2005 submitted 8 valid applications. Far behind it was the University of Chemistry and Technology in Prague with five applications and the other four universities (1 to 2 applications; Fig. 2)

Fig. 2: Inventive activity of selected Czech universities (% approach)

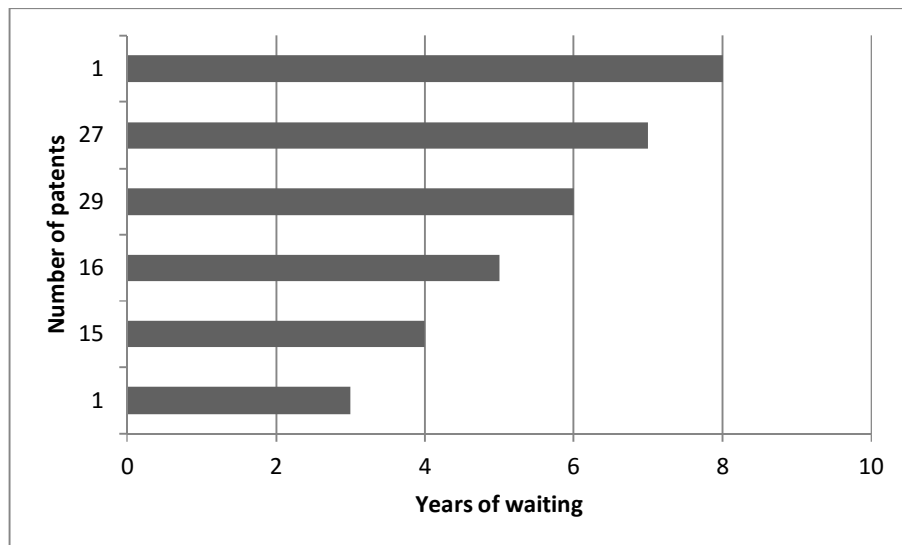


Source: own elaboration

Comparison of inventive activity falls to the disadvantage of Czech universities. The situation is changing dramatically if we look at patents granted in terms of their values measured over time, in which they have a chance to hit the market. As repeatedly was mentioned,

commercialization process should be characterized by high dynamics, it is important that from the moment in which the researcher reports the idea, then the university will decide whether to apply for a patent, to the point where the researcher may publish results of their research and to commercialize the invention, as little as possible time to elapse [Brdulak, 2013, p. 74]. But the analysis of almost a hundred patent applications of Polish universities, indicates that periods from application to obtaining rights are extended over a hypothetical technological aging time. In the case of Wroclaw University of Technology, most applications - 17 - awaited the decision seven years, 16 applications six years each, the remaining 22 applications 5 years and less and 2 applications even 8 years. Similarly, was the case in relation to applications of other universities. Both, researchers of the Silesian University of Technology and the Warsaw University of Technology, in most cases waited for the favorable consideration of their proposal 6 or 7 years. (Fig. 3)

Fig. 3: Time Polish universities waited to get a patent (in years)



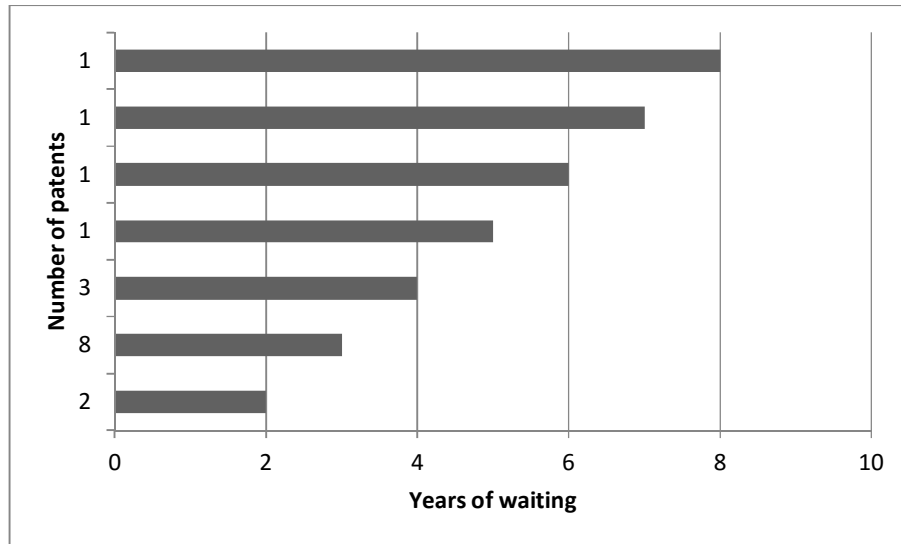
Source: own elaboration

It is worth noting that in the case of 33 for 91 patent applications, universities have abandoned efforts to obtain protection of an invention, before the final decision to grant the patent was obtained. However, in next 12 cases, patent grant date and the date of decision expiry overlap. This is due to the fact that after the decision to grant a patent, The Patent Office informs the university authorities and at the same time calls for the payment of fees for the subsequent years of protection. Universities, however, make any further charges if the developer can prove that there is a real interest in his invention on the part of entrepreneurs. If there are no such signals, universities decide not to bear subsequent payments. In this case, the Patent Office on the one hand, issues the decision to grant an exclusive right, on the other hand, for

the termination of this right. Then, paradoxically, the date of expiry of patent protection is significantly earlier than the date that it is granted.

In the case of Czech universities patent process has significantly been shortened compared to the Polish practice. The vast majority of the 18 applications were dealt within 3 years. For three applications the waiting period was 4 years and for two just 2 years. The other four applications were processed within a period of more than four years (Fig. 4).

Fig. 4: Time Czech universities waited to get a patent (in years)



Source: own elaboration

Conclusion

Commercialization of research results, which is to create added value to technologies created in the backrooms of academic knowledge is a complex process, but necessary if scientific thought is to remain not only a theoretical concept but a real tool to improve innovativity of economies. Whilst the traditional model of university treated a technology commercialization as its side effects, far from the core mission, so much today, they should seek to take on new clothes as the third generation universities. An important component of the commercialization process is the decision about submitting of developed solution to institutional protection. This decision has far-reaching consequences, determines not only the model of potential cooperation between entities, but the whole scheme of the marketization process of invention. Although at each stage of commercialization, researchers may face real barriers nullifying this process, one of the most important is commonly criticized lengthiness of patent procedures, which causes the inventions lose market usefulness before they are offered to the public. Results of the analysis of patent documents indicate significantly higher procedural efficiency

of the Czech patent system. While Polish innovators are forced to wait for a decision about 6 or even 7 years, so far for the Czech universities so long waiting time is an exception. Because they can count on an incomparably faster, because only a 3-year or even 2-year examination of applications, which will undoubtedly affect the real value of their inventions developed and their subsequent commercial success.

Based on the study, it can be concluded that the effectiveness of regional patent systems is of minor importance to stimulate inventive activity of academic centers, and it is affected rather by institutional encouragement of a completely different nature (eg. linking funds for universities on the number of patents granted). For a more complete determination of occurring in this area dependences, one should enrich the scope of the survey with corporate results and expand the territorial scope of the analyzed data. An important element would be conducting a similar research in relation to the European Patent System, whose efficiency in this regard seems to play a more significant role.

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