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DEVELOPMENT OF AN INNOVATIVE ECONOMY IN POLAND BASED ON THE TRANSFER OF KNOWLEDGE FROM UNIVERSITIES TO THE ECONOMY

Summary: What is extremely important in the modern economy is the ability to create and adapt new solutions, technologies, and to introduce new products and services. Innovation is currently a significant factor influencing the development of both businesses and regions or countries [Zalesko 2005, p. 683]. In the European Union and its Member States there is an increasing interest in innovations and their impact on the socio-economic development, as evidenced by the new Europe 2020 strategy of socio-economic development of the European Union, in which innovations are a priority. It is increasingly emphasized that for the innovative economy to develop, the academic sector must cooperate with the economy in the process of both generating and implementing innovations. The article discusses the issue of cooperation between science and business in Poland for the development of innovation.

Keywords: innovation, economy, knowledge, transfer.

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1. Introduction

Innovation is considered one of the most important factors influencing the competitiveness of the economy. Therefore, a number of activities aimed at promoting and creating an innovative economy are being undertaken both at the level of the European Union and the economies of individual Member States and regions. It is worth noting that the innovativeness of the economy largely depends on the innovation policy, which has become an important economic policy. This policy combines elements of scientific policy and industrial policy, and includes, among others, such areas as: strengthening of links in the innovation system, creation and development of the capacity to innovate (both in the field of technology as well as

organization and education), optimum use of innovation as the basic factor for economic growth and for increasing the number of permanent jobs, introduction of technical, technological and qualitative structural changes in the industry. In addition, innovation policy includes EU and government programs, tools, instruments and mechanisms designed to directly or indirectly impact on the level of innovation of different sectors and actors in the economy. A very important aspect in the context of the development of an innovative economy is the cooperation between science and business, and more specifically, the implementation of innovative business solutions developed by the science sector or jointly with a business, i.e. the transfer of knowledge from science to business [European Commission 2010, p. 12].

The purpose of this article is to discuss the importance of knowledge in the development of an innovative economy, with a particular focus on the transfer of knowledge from universities to the economy. The secondary purpose of this article is to present selected projects carried out in Poland to support the development of cooperation between the science sector and business.

2. Knowledge and its importance in economic development

In the modern economy knowledge is becoming an important development factor, which – if properly used and managed – can be the key to economic success. Knowledge is the combination of various information, along with an understanding of how to use them. The use of knowledge may result in new innovations understood as new products, services, or technological, organizational and marketing solutions [OECD 1996, p. 9]. Currently we are dealing with the formation of a knowledge-based economy, i.e. an economy in which knowledge is the key development factor. The literature on the subject of knowledge-based economy defines it in a variety of ways [Chojnicki, Czyż 2006, p.18].

According to L. Zienkowski [2003, p. 15], knowledge is becoming more important than the quantity and state of fixed assets in determining the pace and level of economic development and the knowledge-based economy is a type of economy in which development is much more influenced by science or scientific knowledge than by other factors. In the context of a knowledge-based economy, education is perceived as a process that involves obtaining qualifications and skills (and not limited to knowledge) which lead to greater success in achieving objectives by individuals or organizations. From the point of view of education, the knowledge-based economy is the economy of people who learn [Chojnicki 2003, p. 319]. According to the OECD and the World Bank, a knowledge-based economy is an economy in which knowledge is created, acquired, transmitted and used more effectively by businesses, organizations and individuals, in order to accelerate economic and social development [Dahlman, Andersson 2000, p. 11]. As a result of joint activities of the OECD and the World Bank a paper was published which

analyses the process of transitioning into a knowledge-based economy and distinguishes the following elements [Kukliński 2001, p. 93]:

- “development of a system that creates incentives for the efficient use of existing knowledge, creation of new knowledge, and start of new activities based on innovations,
- educated and entrepreneurial society that can create and use new knowledge,
- dynamic information structure that facilitates the processing and dissemination of information,
- effective innovation system which includes businesses, research centers, universities, consulting firms and other organizations, who, through cooperation, can tap into global knowledge resources, adapt this knowledge to local needs and use it to create new knowledge and technology.”

It should be noted that the role of intellectual capital is gaining in importance, and – due to it – businesses gain identity, stability and the ability to create and assimilate organizational and technical progress. It is becoming an influential factor in the development of societies, companies and entire economies. A high level of intellectual capital directly determines the possibility of educating a society of knowledge which is creative, innovative, open to changes, and able to create lasting social and economic ties. Such a society is capable of building a knowledge-based economy whose foundation is the investment in intellectual capital and the efficient use of external sources of knowledge, which allows for constant development and the creation of the highest quality of added value [Kamińska, Fryca, Majecka 2007, pp. 21–24].

Considering the aforementioned characteristics, the following types of knowledge can be distinguished [Łunarski 2007, p. 35]:

- formal (codified) knowledge – is clear and structured and can be expressed using words, numbers, signs and symbols. It comprises primarily documents, data bases and other forms of recorded information designed to help make the right decisions;
- quiet (hidden) knowledge – comprises individual skills, qualifications and experience, which we know to exist and which we use in our daily activities, but are not able to formalize them, thus making the transmission of such knowledge quite difficult [Mempel-Śnieżyk 2010, p. 45].

The knowledge-based economy is the postindustrial phase of development, in which intensification of links occurs between the processes of creation, distribution and use of knowledge. In a systemic approach the following subsystems of a knowledge-based economy can be identified:

- institutions such as universities, scientific research units and scientific and technological parks;
- technologies (communication, IT, automation and computer control);
- infrastructure (telecommunications, transport, energy, environment);
- stimulators (modern economic process management, human capital management) [Parteka 2007, p. 85].

Knowledge as a resource is identified by the following characteristics [Kamińska, Fryca, Majecka 2007, p. 94]:

- it can reduce the level of uncertainty in risky ventures;
- owing to the process of codification, it is structured in technologies, procedures, documentation and databases;
- it can materialize, i.e. it appears in products and services and therefore can be imitated and transferred.

The scientific literature very often uses the concept of transfer of knowledge and technology. However, it should be noted that the transfer of knowledge is a broader concept than the transfer of technology, which is the transfer of technical knowledge for use in economy (often associated with the purchase of a license or a patent) [Weresa, Poznańska 2012, p. 19].

When discussing issues related to the transfer of knowledge and technology, it is important to mention the actors that are crucial in this process [Matusiak, Guliński (eds.) 2010, p. 13]:

- institutions of science and research (universities, research centers, business development departments, independent laboratories) which form the basis for new knowledge and create the supply of ideas, technological and organizational solutions, etc.;
- innovative entrepreneurs who transfer knowledge, ideas and concepts into new market products, technologies and services;
- centers for the transfer of knowledge and innovation (e.g. technology parks, centers for the transfer of knowledge and technology, business incubators) which support innovative processes through various forms of assistance and pro-innovation services;
- specialized funds that help finance innovation (seed capital funds, venture capital, business angels);
- consulting, training and information companies which offer commercial support for processes of transfer and commercialization of technology [Routti 2007, p. 22].

3. Universities and knowledge transfer

As already mentioned, one of the key players in the area of transfer of knowledge is universities which educate potential workers and employers as well as increasingly cooperate with business.

When analyzing universities in terms of knowledge transfer, one should point out that there are different directions of transfer but the basic ones include: from university to business and from economic practice to university [Mierzejewska 2005, p. 6].

Regarding the issue of knowledge transfer from university to business, it is important to consider two cases: teaching students (education) and cooperation with

business (e.g. through research). Depending on the nature of the transmitted knowledge, its transfer can take different forms. The most popular methods of knowledge transfer in Polish universities in the context of education are: lectures, tutorials and laboratories. Universities organize various types of training, courses, workshops and postgraduate studies. What is also gaining in popularity is the transfer of knowledge via the Internet, i.e. the so-called e-learning.

It is worth noting that universities should prepare students for professional life in which learning by doing and interacting with others are becoming increasingly important. In accordance with the recommendations of the Bologna process, universities should equip graduates with knowledge as well as skills, such as the ability to solve problems, communicate, work in a team, adapt to new conditions, etc. [Weresa, Poznańska 2012, p. 90]. Therefore, it is very important that the teaching process should incorporate case studies, group work and development of different types of projects (of course depending on the subject of individual classes).

What is also very important in education is the knowledge transfer from business to science, i.e. the participation of the representatives of economic practice in teaching activities (e.g. through instruction or guest lectures), which provides students with knowledge and business experience and enables them to establish contacts with entrepreneurs as potential employers. Students are very keen on such meetings and consider them valuable.

Recently it has also been stressed that entrepreneurs should be involved in the development of new training programs – tailored to the needs of the labor market. Of course this kind of transfer from business to science will depend on the specificity of a given university and will be different in the case of a technical university than in the case of an economic university or a medical university, etc.

What is of crucial importance is the transfer of knowledge from universities to business, particularly in the context of the development of innovative solutions, i.e. the commercialization of knowledge. This is the second direction of knowledge transfer carried out by universities, which relies on the cooperation between employees and businesses. It is focused on the practical application of knowledge held by researchers in business. Transfer can be performed in a variety of ways, for example by licensing patents, conducting research for businesses, as well as placements in enterprises. At this point, it is worth discussing a few projects, for example in the Lower Silesia voivodeship, which encourage the transfer of knowledge between science and business: Mozart, Green Transfer, Innovative Transfer and Lower Silesian Innovation Voucher. The purpose of these projects is to establish cooperation between scientists and enterprises for the creation of new, innovative products or services – and therefore the transfer and commercialization of knowledge. So far, the implementation of these projects has resulted in the form of new papers, patents and implementations.

In the present knowledge-based economy, the transfer of knowledge and technology, in addition to teaching and basic research, is becoming an important task

for universities. Cooperation between science and business often helps the science sector to finance scientific research and serves as an opportunity for scientists to gain experience in enterprises. Cooperation between science and economy – more or less intense – has existed for a long time, but is now gaining in importance [Runiewicz-Wardyn 2008]. Certainly such cooperation is fostered through various projects and support programs, which are being implemented in Poland. A good example is given by national programs developed by the National Center for Research and Development (NCRD) – an executive agency under the Minister of Science and Higher Education, which serves as a platform of dialogue between science and business. One of the tasks of NDRD is to promote the commercialization and transfer of research results to the economy. Among the many ongoing programs the following ones deserve special mention [Narodowe Centrum Badań i Rozwoju]:

- BRIDGE aimed at supporting the commercialization of the results of research and development through developing, testing and implementing in practice the new intervention instruments;
- IniTech aimed at establishing and deepening scientific and technological cooperation between Polish scientific centers and businesses, leading to the development of new products and technologies with a high potential for innovation and implementation;
- Innotech, which supports science and enterprises in the implementation of innovative projects in various fields of science and industry (In-Tech program path), with a special focus on advanced technologies (Hi-Tech program path);
- KadTech aimed at supporting the processes of commercialization of technology through the strengthening of cooperation between businesses and highly skilled professionals from the sphere of scientific research. This program gives entrepreneurs an opportunity to receive funding in order to e.g. employ a researcher in their company.

The implementation of these programs will most likely intensify the process of transferring knowledge and technology from universities to the economy, which will result in many interesting and innovative solutions.

Another program worth mentioning is a program launched in 2013 by the Ministry of Science and Higher Education, entitled “Broker of Innovation”, whose aim is to improve the efficiency of the process of commercialization of scientific research results to create a social infrastructure which supports the process of commercialization of knowledge and integration of the scientific community with the economic environment, and to disseminate the results of scientific research in the business environment. All this will be possible owing to brokers of innovation (operating in different areas of knowledge), whose task will be to create and maintain a network of links between the scientific and economic environment aimed at the commercialization of the results of scientific research. Their secondary task will be to establish contacts and organize meetings with the representatives of the scientific and economic communities, aimed at initiating processes related to the transfer and commercialization of knowledge and technology [Monitor Polski 2013, p. 12].

4. Summary

In the development of the modern economy, i.e. the knowledge-based economy, innovations are increasingly important. Therefore, it is becoming crucial for entities to be able to create and adapt new technologies, introduce new services and products, and implement new organizational solutions. It is very important to transform knowledge into new products, services, technologies, marketing techniques and organizational solutions, because this is what determines the market success of people, companies and entire economies. Development trends in highly developed countries show that, at present and in the near future, permanent development can only be achieved by building a competitive advantage through actions and processes based on knowledge and innovations [Ministerstwo Gospodarki 2006, p. 6]. Thus, cooperation between science and business should be promoted and developed. It is desirable to commercialize the results of research and development, and this can be only made possible by engaging in a dialogue between those sectors.

In the near future the representatives of both the economy and the scientific community should also seek to develop cooperation to generate and implement innovative solutions by raising funds for innovation activities, and to use them to the best of their potential. One method involves the use of funds from the new Smart Growth Operational Program, which will be implemented in Poland in the coming years 2014–2020. Certainly the funds in support of innovation will be available also through other programs, for example regional operational programs or grant competitions announced by the National Center of Research and Development, the Polish Agency for Development of Entrepreneurship, etc.

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ROZWÓJ INNOWACYJNEJ GOSPODARKI W POLSCE W OPARCIU O TRANSFER WIEDZY Z UCZELNI WYŻSZYCH DO GOSPODARKI

Streszczenie: We współczesnej gospodarce niezwykle ważna jest zdolność do tworzenia i adaptacji nowych rozwiązań, technologii, wprowadzania nowych produktów oraz usług. Należy zauważyć, że obecnie czynnikiem mającym istotny wpływ na rozwój zarówno przedsiębiorstwa, jak i regionu czy kraju są innowacje. Na obszarze Unii Europejskiej i jej krajów członkowskich zaobserwować można coraz większe zainteresowanie innowacjami, jak również ich wpływem na rozwój społeczno-gospodarczy, czego dowodem jest chociażby nowa strategia rozwoju społeczno-gospodarczego Unii Europejskiej – Europa 2020, w której to innowacje zajmują priorytetowe miejsce. Coraz częściej podkreśla się również, że dla rozwoju innowacyjnej gospodarki niezbędna jest współpraca sektora nauki z gospodarką zarówno w procesie generowania, jak i wdrażania innowacji. W artykule omówiono kwestię współpracy nauki i biznesu w Polsce na rzecz rozwoju innowacyjności.

Słowa kluczowe: innowacja, wiedza, gospodarka, transfer.