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Innovation Performance in Poland and Polish Companies

Abstract

Poland, with its' weak innovation performance still lags far behind most European countries. The share of expenditures on Research and Development in GDP accounts for 0,56% and represents one of the lowest levels in Europe. It is estimated, that Poland, with its' current innovation growth rate, will reach the average level of EU in about 20 years.

The goal of this paper is to analyse the current innovation situation of Poland's economy and Polish companies in comparison to EU countries. The article presents also results of survey on investing in innovations in large Polish companies.

1. Introduction

Innovation is one of key drivers of economic growth. Each country and company should strive to obtain competitive advantage by increasing the efficiency of production, distribution and launching new products. Experts predict that current competitiveness of Poland's economy (resulting mainly from lower labour costs in comparison to Western Europe countries), will decline in coming years. It is therefore important to base economic development on innovative technologies, to increase productivity and improve the quality of products, but also - to lower production costs at the same time. Polish companies

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have to increase the level of technical development, otherwise their competitiveness in the global market will decline[1].

Basing only on technology transfer is not sufficient in the process of modernisation of the economy. Moreover, import of innovation allows only to equal the Western countries in selected fields, but not to achieve competitive advantage in relation to these countries. The fact is, that innovation of Poland's economy is not satisfactory and differs significantly from European average. Positive is fact that this trend begins slowly to change and Poland's economy has high potential of growth.

2. Innovation of Poland's economy compared with European Union countries.

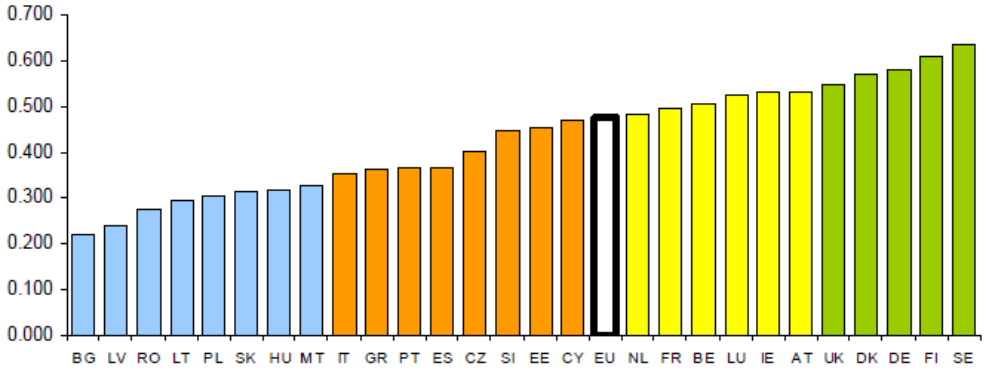
Innovation is a key driver of productivity growth in developed economies. It is based mainly on research and development (R&D), knowledge and education. Currently, innovation has become one of the key measures of competitiveness. Innovative actions generate significant added value for industry and services. They contribute also to reinforce competitive capacity of national economy on the international market. Innovation is a main element in increasing productivity and economic growth, particularly in an era of rapid technological change. Development trends of highly-developed countries show, that only building competitive advantage, based on knowledge and innovation, can ensure sustainable growth and creation of new, better jobs[2].

In 2009 European Commission has published *European Innovation Scoreboard* (EIS) in which, innovation level of each European Unions' country was presented. According to EIS, Poland is still among catching-up countries with an innovation performance well below the EU27 average, together with Hungary, Slovakia, Lithuania, Romania, Latvia and Bulgaria (Figure 1).

[1] Innowacyjność źródłem przewagi konkurencyjnej, http://www.egospodarka.pl/49288,Innowacyjnosc-zrodlem-przewagi-konkurencyjnej,1,20,2.html (22.02.2010).

[2] Innowacyjność 2010, Polska Agencja Rozwoju Przedsiębiorczości, Warsaw 2010, p. 9.

Figure 1. Overall innovation performance: the EIS Summary Innovation Index[3]



Source: European Innovation Scoreboard 2008. Competitive Analysis of Innovation Performance, European Commission, Luxembourg 2009, p. 8.

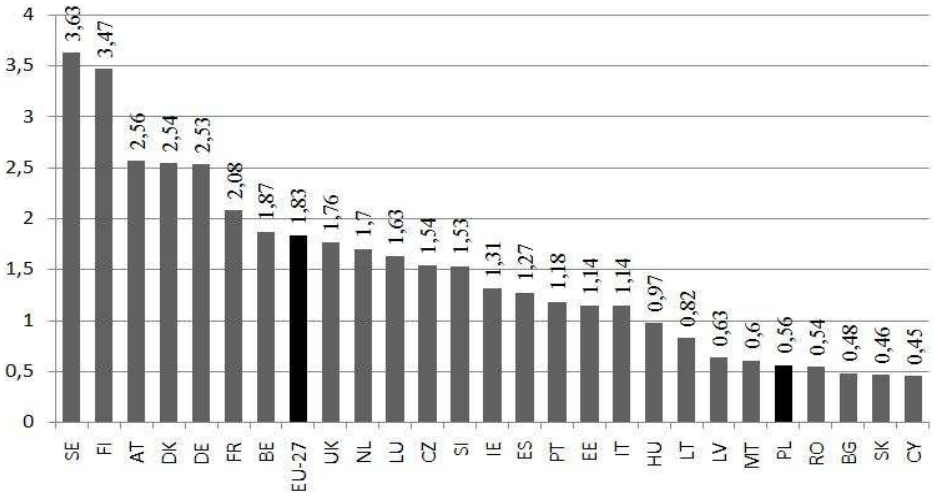
Also the share of R&D expenditures in GDP is one of the lowest in EU-27. In 2007 share of R&D expenditures accounted for 0.56% of GDP, whereas the average level of expenditures in EU-27 accounted for 1.83% (Figure 2).

Nonetheless, only two countries (Sweden and Finland) exceeded 3% expenditure level set by the Lisbon Strategy. Austria, Denmark and Germany are now very close to this level.

May agree with the claim, that current level of innovation of the Polish economy is a result of a many years' lack of investment in R&D, and also due to the low activity of state to improve this situation (Janasz, Kozioł 2007, p. 102).

[3] The Summary Innovation Index (SII) is a composite of 29 indicators going from a lowest possible performance of 0 to a maximum possible performance of 1. The 2008 SII reflects performance in 2006/2007 due to a lag in data availability. (See: Calculating composite indexes, *Innovation scoreboard 2008*… op.cit., p. 47).

Figure 2. R&D intensity (R&D expenditures as % of GDP), all sectors, EU27— 2007[4]



Source: Science, technology and innovation in Europe, Eurostat, European Commission, Luxembourg 2009, p. 21.

Despite low R&D expenditures in Poland, their percentage share was stable. Nominal R&D expenditures were increasing year on year. For example, between 2004 and 2007 growth of investments reached € 379 million. However, R&D expenditures per capita in 2007 amounted only € 43 (Table 1).

Table 1. Basic R&D indicators for Poland in 1995, 2000 — 2007[5]

	1995	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
R&D Expenditures (Mio € in current prices)	533	1199	1215	1131	1140	1289	13934	1473	1668
GERD/GDP %	0.63	0.64	0.64	0.58	0.56	0.56	0.57	0.56	0.57
Expenditures per capita (€)	13.8	31.3	31.5	29.5	29.8	33.8	36.5	38.8	43.8

Source: Nauka i technika w 2007, Główny Urząd Statystyczny, Warsaw 2007, p. 32.

[4] Eurostat estimation: EU-27 — Exceptions to the reference year: 2006: IT, PL, UK, TR, US; 2005: IS, CN, JP, RU; 2004: CH. Provisional data: BE, EE, IE, FR, CY, LU, MT, NL, PT, SI, SE — National estimations: DK, DE, EL, AT — US: federal or central government only.

[5] Euro/zloty exchange rate = 4.0.

In spite of the current poor innovation performance in comparison to most EU countries, Poland has made significant progress in this area over the last 12 years. The best proof is that R&D expenditures in Poland tripled between 1995 and 2007.

As one of the main reasons for this low level of expenditures on R&D activities deemed low involvement of non-public resources, primarily coming from companies. The reasons for low involvement in R&D might be seen in high costs and the risk of this type of action. Deficit of own resources on research and development is seen mainly in SMEs, which are predominant in the Poland's economy.

A major problem is an access to external sources of funding. Banks find namely financing the sector of small and medium enterprises as too risky and unprofitable. Still an access to the venture capital funds is very limited. Problem is both a small number of these funds, and poor knowledge among entrepreneurs about them (Grodzka, Zygierewicz 2008, p. 2). Inefficient is also policy of spending budget funds on R&D. They are spent namely in 40% on basic research, in 35% on experimental development, and only in 25% on applied research[6]. Moreover, money is spent on purchase of low value and low quality equipment (Nazdrowicz 2009, p. 59).

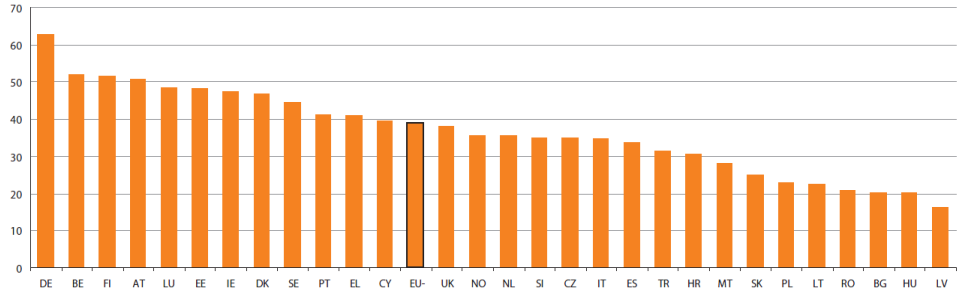
3. Innovation performance of Polish companies

Referring to innovation[7] level of enterprises in 2006, Poland was under EU average. Only about 23% of all enterprises were innovative. (Figure 3).

[6] **Basic research** is understood as activity carried out in order to acquire knowledge. **Applied research** is understood as activity carried out in order to apply new knowledge in practice.

[7] According to the definition of Central Office of Statistics, **innovative activity** includes scientific (research), technical, organizational, financial and commercial activities, which objective is to develop and implement innovation. **Innovation** is defined as implementation of new or significantly improved product (good or service) or process, new method of organization (also organization of the workplace), or marketing. **New or significantly improved product** is implemented when it is placed on the market. **New processes, methods of organization or marketing** are implemented when started to be used in the company.

Figure 3. Innovative enterprises, as a percentage of all enterprises, EU27 and selected countries — 2006[8]



Source: Science, technology and innovation …op. cit., p. 63.

As might be seen, almost 40% of EU27 enterprises were involved in innovation activities. Between 2004 and 2006, 39% of the EU27 enterprises from industry and services sector with at least 10 employees were involved in some form of innovation activity. The highest proportion of enterprises involved in innovation works in this period was recorded in Germany (63% of enterprises)[9]. Poland still stays far behind the EU average.

Also, the number of R&D personnel hired in Polish companies is not significant. Only 0.8% of employed personnel were involved in R&D activities and this share has even diminished since 2001 about 0.4%[10] (Table 2). In EU27 in 2007 2.3 million persons working full-time were involved in R&D works. This group of personnel accounted for 1.6% of total employment in 2007. The highest proportions of R&D personnel in 2007 were found in Finland (3.2% of total employment).

[8] EU-27: excluding France (no data available).

[9] *"Eurostat News Release"*, 2009, no. 127/2009, p. 3.

[10] Ibidem.

Table 2. R&D personnel and innovative companies, 2007

	R&D personnel			Researchers, % of total employment 2007***	Enterprises with innovation activities, 2004-2006 (% of all enterprises)
	Total 2007*	**Annual average growth 2001-2007 (%)**	**% of total employment 2007*****		
EU27	**2 314 627e**	**2.2**	**1.6e**	**0.9e**	**38.9**
Germany	493 858e	0.5	1.8	1.1	62.6
Finland	56 243	0.9	3.2	2.1	51.4
Poland	**75 309**	**-0.4**	**0.8**	**0.6**	**23.0**
Japan	935 182	0.9	1.8	1.4	:

* Data in full time equivalents. 2006 Japan

** 2001-2006 Japan, 2005 Germany

*** % of total employment based on head count. 2006 Japan, 2005 Germany

e Estimated

: Data not available

Source: "Eurostat News Release", 2009, no. 127/2009, p. 3.

The results of studies on innovation performance in Poland showed that share of companies which introduced new or significantly improved products or processes between 2006 and 2008 was even lower than between 2004 and 2006. Between 2006 and 2008 it accounted for 21.3% in industry sector and 15.6% in services sector, whereas between 2004 and 2006 it accounted for 23.2% in industry and 21.2% in services[11] (Table 3).

Table 3. Introduction of new or significantly improved products (% of all companies in sector) in Poland

	2004-2006	**2006-2008**
Services sector	21,2	15,6
Industry sector	23,2	21,3

Source: Działalność innowacyjna przedsiębiorstw w latach 2006-2008, Główny Urząd Statystyczny, Warszawa 2009, p. 1.

[11] Działalność innowacyjna przedsiębiorstw w latach 2006-2008, Główny Urząd Statystyczny, Warsaw 2009, p. 1.

Referring to expenditures on innovation, situation seems to look better. Expenditures on product and process innovation in industry amounted to € 6.4 billion in 2008 and they were higher than in 2006 by 43.8%. In services, expenditures amounted to € 3.15 billion and they were higher than in 2006 by 51.8% (Table 4.). However, the percentage of companies that invested in product and process innovation in 2008, was lower than in 2006 both in industry and in the services sector.

Table 4. Expenditures on product and process innovation in Poland

€ Billion	**2006**	**2008**	**Growth in %**
Services	2,07	3,15	51,8
Industry	4,45	6,4	43,8

Source: Działalność innowacyjna przedsiębiorstw w latach 2006-2008, Główny Urząd Statystyczny, Warszawa 2009, p. 2.

However, the value of **expenditures per one company involved in product and process innovation** (i.e. incurring expenditures on this activity) **increased.** In industry, expenditures amounted to about € 1163.6 thousand (45.17% increase in comparison to 2006) whereas in services sector they amounted to about € 1160.6 thousand (75.3% increase in comparison to 2006). Both in industry and services the largest share of inputs on innovation activities was in machinery and technical equipment (56. 6% in industry and 48. 7% in the services sector). **Expenditure on research and development accounted for 8% in industry and 7% in the services sector**[12].

Unfortunately, cooperation of companies with other companies or institutions has diminished. Between 2006 and 2008 only 8.3% of all companies in industry co-operated with other entities in this field (2.8% decrease in comparison to years 2004-2006), while in the services 6.6% of all companies co-operated in this area (4.5% decrease in comparison to years 2004-2006).

Tendency to cooperation rises with size of a company (in 2008, 3.8% of companies employing 10-49 workers, 14.9% employing 50-249 and 40.5% of companies employing more than 249 workers in industry and respectively 5%, 11.8% and 34% of enterprises in the services sector co-operated in that field.) (Table 5).

[12] Ibidem, p. 2.

Table 5. Cooperation in innovation field in 2008

Size of a company (number of employees)	Sector	
	Services (%)	Industry (%)
10-49	5	3,8
50-249	11,5	14,9
>249	34	40,5

Source: Działalność innowacyjna przedsiębiorstw w latach 2006-2008, Główny Urząd Statystyczny, Warszawa 2009, p. 6.

Between 2006 and 2008, the collaboration with suppliers of equipment, materials, components and software (39.1% indications in industry and 51% in services) **had the most beneficial effect on innovation performance**. In the study on innovation performance of companies between 2006 and 2008, for the first time a new term was introduced – Eco-innovation. This kind of innovation was introduced by 26.2% of industrial firms and by 15.5% of firms in services sector. As the reason for introduction of Eco-innovation, companies indicated following aspects: existing environmental regulations (11% of the surveyed firms in industry and 6.2% of enterprises in service sector) and also the expected future environmental regulations (7.2% in industry and 3.4% in services)[13].

The fact is, that small and medium-sized companies introduce less innovation than large ones. It results from the activity area of these companies. Small enterprises base their trade mostly on one category of product or service. For this reason, the probability of implementing changes is lower than in big companies, which base their trade (more often) on a wide range of products (Wojnicka, Klimczak 2008, p. 7).

Factors limiting innovation activity have mostly economic character. Companies emphasise lack of one's own or external financial resources for innovation performance and too high costs of implementation. Another problem is poor knowledge about potential support of innovation activity, the lack of information on technology and markets, problems in finding appropriate partners for cooperation, but also - too big monopolisation of markets and uncertain demand. Other reasons of low innovative activity may result from the lack of need for such activities or total lack of demand for innovations[14].

[13] Działalność innowacyjna przedsiębiorstw w latach 2006-2008, Główny Urząd Statystyczny, Warszawa 2009, pp. 5-11.

[14] Ibidem, p. 56.

4. Investment in innovation in Polish large companies

Research and development activity depends on numerous micro- and macro economical factors. The special role plays possibility of financing R&D works. A few years ago for, most companies, financial barrier was practically impossible to overcome. However, in recent years, as a result of high economic growth, the influx of large foreign investments and an greater participation of Poland in projects co-financed from EU funds, companies and researchers have incomparably bigger capabilities of development. Although nearly 60% of researches are carried out basing on budget funds, only between 2000 and 2006 the share of state expenditures in financing R&D, decreased by 6 percentage points, and the share of companies increased. It should be stressed, that share of foreign companies increased almost four times – up to 7% in 2006[15].

The survey[16] carried out in 2008 by KPMG among large companies in Poland shows, that innovation situation in big companies looks much better than in small o nes. Below main results of this survey are presented[17]:

1) Most of large companies carry out R&D activity

Approximately 60% of large companies, covered by the survey, admitted that were involved in this kind of activity, 80% of them on a regular basis. The number of R&D units within the firms also increased. Between 2000 and 2006 their number increased from 402 to 573, representing 53% of all research and development units in Poland.

2) Companies focus on the practical side of R&D

Firms involved in R&D projects are oriented on developing or enhancing existing products, equipment, materials and processes. Companies need therefore, to commercialise the results of research and development works.

3) Companies formalise R&D activity

More than 80% of firms operating in R&D have created a formally empowered, under the existing organisational structure, R&D dedicated

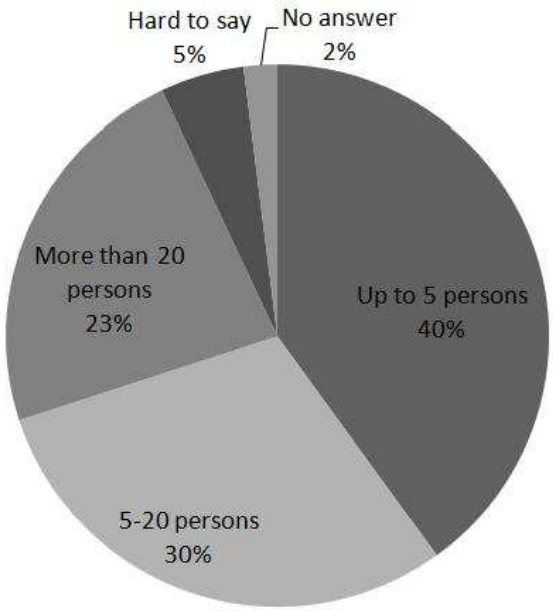
[15] Czy warto inwestować w innowacje? Analiza sektora badawczo-rozwojowego w Polsce. Raport KPMG, KPMG Polska, Warszawa 2009, p. 13.

[16] The survey covered 75 big companies operating in Poland and 59 scientific and research units like industrial parks, technology parks and research and development units. Data was collected by Computer Assisted Telephone Interview. The survey covered companies from all major industries: representatives of the energy sector, industrial companies, producers of consumer goods and the chemical and pharmaceutical firms. *(Czy warto inwestować w innowacje?...* op. cit.).

[17] *Czy warto inwestować w innowacje?...* op. cit., pp. 9-43.

department (or cell). However, the average number of employees involved in R&D in most cases did not exceed 20 people (Figure 4).

Figure 4. How many persons are involved in R&D activity?

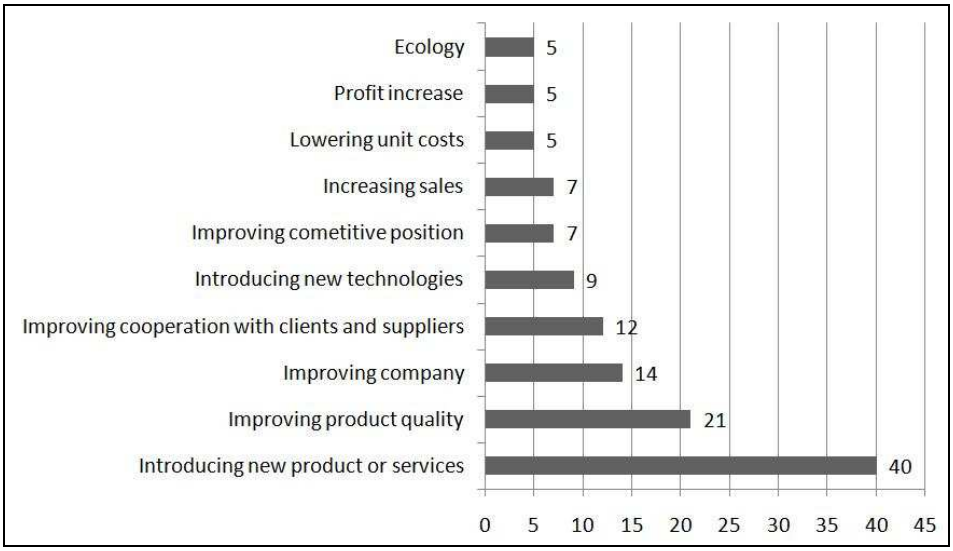


Source: Czy warto inwestować w innowacje?... op. cit., p. 14.

4) Investing in R&D is not seen as a part of achieving competitive advantage

Only few companies declared that as a result of their R&D work, they improved their competitive position. The majority stressed the significant role of R&D in creating new (40%) or improved (21%) products and services (Figure 5).

Figure 5. What were the most important effects of R&D activity conducted by your company?



Source: Czy warto inwestować w innowacje?... op. cit., p. 16.

This result was confirmed by the research[18] conducted by J. Nazdrowicz. It shows, that 38% of companies invest in introducing and improving products, whereas 26% invest in improving their company[19].

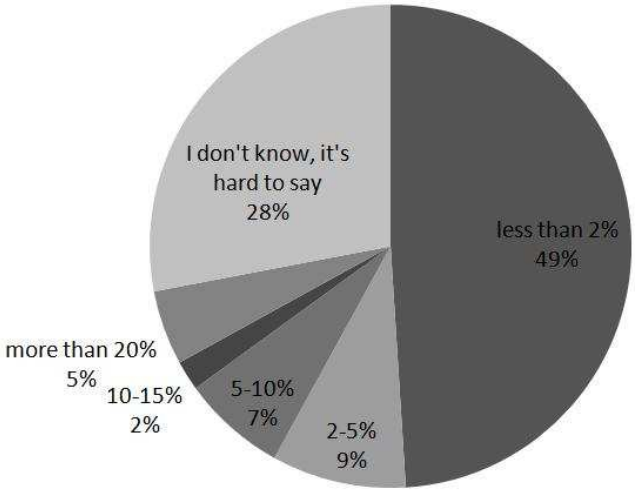
5) Expenditures on R&D are lower than EU average

About 50% of big Polish companies spend around 2% of their income on R&D (against the EU average of 2.3%). On the other hand it should be noted, that almost every fifth company in the survey reached or exceeded the average level of EU's spending (Figure 6).

[18] The survey covered 221 of Polish companies – 49 (22%) small companies, 70 (32%) medium companies, 102 (46%) big companies. More in: J. Nazdrowicz, *Wdrażanie innowacji w polskich przedsiębiorstwach*, "Ekonomika i Organizacja Przedsiębiorstwa", nr 6 (713), 2009.

[19] More in: J. Nazdrowicz, *Wdrażanie innowacji w polskich przedsiębiorstwach*, "Ekonomika i Organizacja Przedsiębiorstwa", Orgmasz, Warszawa, nr 6 (713), 2009.

Figure 6. What is the approximate value of conducted R&D works (% of companies' annual income)



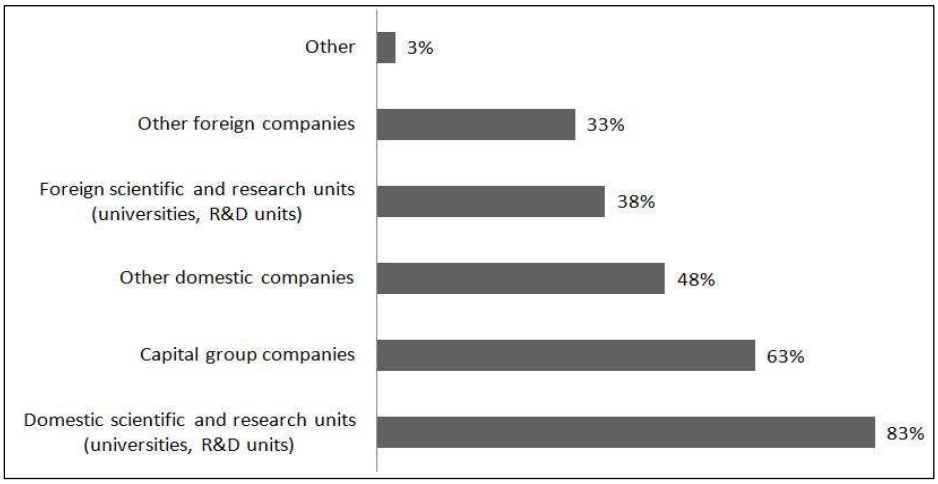
Source: Czy warto inwestować w innowacje?... op. cit., p. 15.

6) Companies co-operate on R&D with other units

More than 90% of companies are engaged in research and development works with other organisations. Most of them with national scientific and research units as academies and R&D units. Less frequently, with the companies from the capital group or with other domestic and foreign companies. Such cooperation is necessary to make their work more effective. (Figure 7).

Unfortunately respondents report a number of concerns to the progress and quality of this co-operation. Even co-operation between entities from a capital group is negatively appraised by 80% of respondents. Only co-operation with other national firms was positively apprised (by more than 10% respondents).

Figure 7. Who are you co-operating with?



Source: Czy warto inwestować w innowacje?... op. cit., p. 19.

7) Companies do not use public funds

Almost 80% of firms operating in R&D do not use (so far) financial support from public funds for this purpose. What is more, despite the increasing availability of these funds (particularly from EU operational and framework programmes) half of all surveyed companies are not interested to use these funds to support research and development and development of innovations.

Both large and small companies point out a number of **barriers for innovations and R&D activity** in their firms. From the perspective of large companies, for 31% of them problem lies in complicated procedures to obtain grants or subsidies. What is interesting, for 23% of respondents R&D activity occurred to be unimportant.

Figure 8. Basic impediments for R&D activity

Source: Czy warto inwestować w innowacje?... op. cit., p. 33.

Survey on trends in SMEs sector conducted by the Ministry of Economy indicates that the problem with the financing of innovative solutions is the largest barrier for entrepreneurs in implementing new products or services (42% of indications). Other barriers are: to high risk of implementation of innovations (25%), and lack of interest in new products/services from clients/customers (20%). Despite these impediments, about 80% of respondents declared that in view of the next few years, introducing innovation will be necessary to maintain or improve the competitiveness of their company (Grodzka, Zygierewicz 2008, p. 3).

5. Conclusion

Poland's economy has to take an effort of catching up with the EU-27 average in innovation. The key role is to be played by the companies. Many firms still do not see the need of implementation new products or services. The big problem is also resistant attitude of business owners, who prefer very often to maintain the status quo, rather than invest in new ideas.

The government of Poland should create the best possible conditions for operation and development of business. What is needed, is therefore a construction of an effective financial and advisory infrastructure for companies but also a dissemination of knowledge about possible support for research and development activities. Still in many cases, business owners are not aware that relevant institutions may support implementation of their innovative ideas to the market.

As might be seen, the most innovative companies in Poland are the large ones. This may result from bigger amount of financial resources for this type of activity. Additionally big companies may hire better educated personnel and professional managers. However, the SMEs sector is dominant in Polish economy, and that's why innovative projects of these companies should be specially supported.

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Streszczenie

INNOWACYJNOŚĆ POLSKI I POLSKICH PRZEDSIĘBIORSTW

Polska, przy obecnym poziomie innowacyjności, nadal pozostaje daleko w tyle za większością krajów europejskich. Udział wydatków na B+R na poziomie 0,56% wciąż stanowi jeden z najniższych wskaźników w Europie. Szacuje się, że przy utrzymaniu proporcjonalnego wzrostu poziomu innowacyjności, kraj osiągnie średni poziom Unii za około 20 lat.

Pomimo dużego potencjału gospodarki, przedsiębiorstw, a także pracowników, Polska od lat nie rozwija się odpowiednio szybko w dziedzinach nowych technologii. Za jedną z barier innowacyjności podaje się nieefektywną politykę państwa w tworzeniu sprzyjających warunków dla rozwoju przedsiębiorstw, a także nieprawidłowe ukierunkowanie finansowania inwestycji, których głównym celem wciąż są badania podstawowe. Ograniczenie stanowi biurokracja, utrudniony dostęp do źródeł finansowania dla sektora MSP, a także brak świadomości właścicieli firm o możliwościach wsparcia ich działań przez odpowiednie instytucje. Duży problem stanowi także opór przed zmianami samych właścicieli firm, którzy wolą zachować status quo, zamiast inwestować w nowe pomysły.

Wciąż najbardziej innowacyjnymi przedsiębiorstwami w Polsce są duże przedsiębiorstwa, co wynikać może przede wszystkim ze znacznej ilości środków finansowych na tego typu działania. Niemniej jednak, to właśnie sektor MSP jest sektorem dominującym w polskiej gospodarce i to właśnie jego aktywność innowacyjną powinno się pobudzać.