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R&D DISAPPEARANCE IN THE PERIOD OF ECONOMIC TRANSFORMATION IN POLAND

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Summary

Basing on official statistical data, the article presents changes in R&D taking place in Poland in 1975-2009. In 1975 the Polish centrally-planned economy held a strong position in Europe, especially if we measure it by the number of scientific and technical staff employed in research and development. After transition to a market economy, the level of employment in R&D continually decreased and in 2009 reached 40% of the level from 1975. At the same time, the European Union experienced growth of employment in R&D; for example in Spain R&D employment grew 17-fold (by 1688%).Poland will need to increase its innovativeness in order to effectively compete in the global economy.

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Introduction

The Polish parliamentary election of 1989 and the local government election of 1990 are widely accepted as the beginning of fundamental political and economic changes. At that time in East and Central Europe socialist centrally-planned economies were transformed into capitalist market economies. The socialist structure of economy was based on state ownership. Dramatic dismantling of the so-called real economy inherited from socialism was conducted through quick privatization. As a result, in 1996 the private sector accounted for 65% of Polish GDP (Dillinger, 2007, p. 8). This process was called the shock therapy due to the enormous pace of changes taking place. The EU supported these revolutionary changes in former socialist European countries both organizationally and financially. In Asia, in countries with centrally-planned economies (in China, for example), changes were slower and of an evolutionary rather than revolutionary nature.

In subject literature we can often find the following reasoning: in Poland the structure of economy, inherited from real socialism, was backward as the system of centrally-planned economy did not encourage innovations. After 1990 consecutive governments tried to stimulate the economic system to make up the lag in R&D activity. Scientists emphasize the significance of long-term support from EU member countries which helped Poland financially and organizationally. This aid was also supposed to break the impotence barrier in making scientific and technical progress. However, the situation concerning R&D in Poland is still bad. The current small contribution to scientific and technical progress is mostly attributed not to aspects of the system, but to the negative effects of inheritance after the socialist period and not ambitious enough approach of individuals engaged in R&D. In this article, basing on official statistics, I will attempt to verify the above reasoning.

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The scope of the term "R&D"

I understand R&D as changes in theoretical knowledge (science) and practical skills (technology) useful in economic activity. Science is directly related to understanding. Fundamental (basic) research is that which does not serve practical purposes. Applied research in turn is that which increases the resources of scientific knowledge which can be directly used in economic practice. The results of applied research should therefore have commercial value.

When defining scientific and technological progress and its relation to the resources of theoretical knowledge, it is useful to take into consideration J.A. Schumpeter's classic approach presented in his "Theory of Economic Development". He distinguished three groups of issues: inventions (scientific discoveries, invention projects) which expand our resources of knowledge; innovations (novelties) which are the first practical applications of inventions in economic activity; and diffusion (the spread of innovations) which is a widespread application of innovations in practice. Inventions are scientific events, while innovations and diffusion – economic ones.

In subject literature, beginning with the classic work of J. A. Schumpeter, the intensity of scientific and technological progress is linked to the motive of profit. Entrepreneurs who are the first to introduce innovations, enjoy extraordinary profits. In time innovations are more widely used and these profits diminish. The process of searching for new and better solutions begins again. The size of extraordinary profit is determined mostly by the length of the period during which a company has a dominant position in terms of innovations. In time, the results of research have been transformed into goods, sold in the form of licenses and patents or lent by the enterprise – while maintaining control of the information included therein – to other entities, for example to branches.

The company which has a leading position in making use of innovations is competitive and the prices for its products are high. Such profitable enterprises are able to pay their workers high salaries, as they do not have to compete with others through low production costs, but by way of unique production quality. A country which has a large number of enterprises with leading positions in innovations is therefore likely to become rich. The citizens of such a country usually become wealthy and its GDP *per capita* is relatively high.

The need to encourage enterprises to increase their effort in R&D was also discerned in centrally-planned economy. In Poland, until 1972, state-owned firms were obliged to offer their innovation projects to other interested firms practically free of charge, with only the costs of documentation to be paid. Since 1972 these types of agreement have no longer been free of charge.

The economic significance of R&D

Economic practice has always attached great importance to innovativeness. State authorities realized that people with high qualifications may bring benefits, not only through participating in the production process but also by improving it. Although the following story from medieval times may seem funny, it is nevertheless true and shows the importance attached to highly qualified workers. In 1274 Bologna issued an edict on punishment for arranging "takeovers" of people with Ph.D. degrees. If such a person was over 50 years old, those who encouraged him to emigrate were sentenced to death. If the Ph.D. Holder was younger (and therefore assumed to be less valuable), the punishment was limited to a 200 ducat fine (Sulmicki, 1981, p. 63).

Similar thinking gave birth to the concept of supporting science in one's own country while hindering its development in rival societies. Imperial Russia may serve as an example of the use of a policy of supporting its own scientific development. Some confirmation can be found in the census of 1880. It shows that only 61.2% of students paid for their education, 19.6% of students

were exempted from school fees and 18.5% received grants and scholarships (Lejkina-Swirskaja, 1971, p. 28). In Polish territories captured by Russia, in turn, the occupants applied a policy of hindering the development of science. After the November Uprising of 1830 against the Russian occupation, universities where a lot of Poles studied were closed. For example, the University in Warsaw was closed down in 1830, the famous High School in Krzemieniec in 1831, the University in Vilnius in 1832 and the University in Kiev in 1839. After the fall of the January Uprising in 1864, quantity limits were introduced for students of Polish origin in Russian institutions of higher education. In no university in Russia could Poles account for more than 10% of students. A similar course of events took place in Prussia. After Napoleon's victory, the university in Halle was closed down. In accordance with the train of thought outlined earlier, Prussia responded by immediately opening a university in Berlin in 1809 "in order to modernize the country and to prevent similar failure in the future" (Ashby, 1959, p. 20).

After the Second World War, countries making scientific and technical progress increased control over its effects. A good example is that of the peak period of technological competition between the USA and the USSR. In 1972 the American Congress voted over the Burke-Hartke bill which expressed very strong protectionist tendencies concerning scientific and technical export. Congress rejected the bill but by a very small majority. Later on, when the USSR was dissolved in 1991 in Białowieża, the issue of technological threat became obsolete for the USA. Currently such a threat to the USA and the EU is posed by some Asian countries, especially China.

During the 20th century the global economy has witnessed a tendency of increasing support to innovations by governments. Since the beginning of the 20th century, expenditure on scientific and technical progress in developed countries has grown faster than GDP or investments in fixed capital. In the USA the sense of threat caused by competition with the USSR led to the increase in R&D expenditure measured in relation to gross domestic product (GDP). R&D accounted for 0.2% of GDP in 1921, in 1940 – 0.6%, in 1950 – 1.0%, in 1953 – 1.4%, and in 1960 – 2.8%. In 1964 this share amounted to 3.4% of GDP and thus reached the current saturation level.

In Poland since the 1960s intense work has been conducted which was intended to generate scientific and technological progress. However, later transformations accompanying the change of the political and economic system caused Poland to lose its top position in the ranking of European countries involved in supporting scientific and technical progress and land at the bottom of the list. What was characteristic in Poland was a large number of people employed in R&D and lower expenditure per one such employee. Therefore Poland had relatively better possibilities of achieving a competitive advantage in labor-consuming areas of R&D. On the other hand, its possibilities of achieving a competitive edge in more capital-consuming areas of R&D were much lower.

The above-mentioned unfavorable changes in Polish R&D started at the end of the 1970s. After the climax of strikes in 1980, martial law was introduced. The continuing deterioration of the national economy resulting from the martial law lasted till the end of the 1980s. Since 1990 Poland has had a modern economic system, strongly tied to the European Union economy. The formal beginning of the integration process with the EU was marked by the Europe Agreement signed by Poland and the European Communities in 1991.

Research methodology

When evaluating Poland's international position in R&D activity, three issues need to be clarified. First of all, one has to choose the period in which comparisons will be made; secondly, a method of

measuring the level of R&D needs to be selected, and finally, a choice has to be made in terms of the countries to which Poland will be compared.

The choice of the period for comparisons

Currently, when evaluating changes in Poland's innovative potential, 1990 is usually chosen as a reference point. In 1990 we can observe both a poor state of R&D and a lack of progress in supporting R&D activities. This situation is often explained by difficulties related to overcoming the inheritance of the previous economic system. However, for the purpose of this article 1990 does not constitute a good reference point. The system of centrally-planned economy was ceasing to function properly as early as in the second half of the 1970s, paralyzed by mass strikes. The strikes began in the WSK motor factory in Świdnik when employees stopped working, dissatisfied with higher prices of meals in the work canteen. The fundamental destruction of the R&D potential of companies took place during the time of martial law. In 1980 army officers were introduced to factories and production units to control or even replace their directors. In order to impose the direction of development in Poland, during the martial law many Solidarity activists as well as active party activists and economic life organizers were interned. With his dictatorial powers, general Jaruzelski conducted a process of interning both people from the political opposition and communist party members. Thus, to fully assess the influence of the period of transformation on the present state of R&D, we should adopt the mid-1970s as a reference point. "Transformation" refers to the period of transition from centrally-planned economy to market economy. The process lasted about 20 years in Poland. It started in the mid-1970s, when mass strikes blocked normal operations of the centrally-planned economy. We can assume that basic transformation finished in the mid-1990s. At that time more than half of the GDP was generated by the non-state sector. State sector companies during transformation changed their owners from the Polish state treasury to private owners or to enterprises belonging to the state treasuries of rich EU countries.

The method of measuring the level of R&D

Determining how to measure the level of R&D is a vital issue. Frequently used measures R&D expenditure are not fully suitable in this case. In the analyzed period their comparability is meager. In a centrally-planned economy, Polish currency was not exchangeable and the structure of domestic prices differed significantly from the structure of global prices. In such a situation one is left with quantitative measures, such as the number of people employed in R&D work. In Poland such data is readily available, as it has been constantly collected by the Central Statistical Office.

The choice of countries for comparison

The choice of a country to serve as a reference point for assessing the situation in Poland is of vital importance. The optimal candidate would be a country where changes in its R&D will be comparable to those taking place in Poland. Obviously, a country in an identical situation cannot be found, therefore the chosen country should be as similar to Poland as possible. Spain is generally believed to be the country best fulfilling these requirements. Spain will therefore serve as the main reference point in comparisons with Poland. Spain had a similar area and population, climate and level of economic development. Both countries also share the same religion and have similar historical backgrounds. In the past, the Spanish gentry, much as in Poland, accounted for the core of the army and state administration and was expected not to be involved in industrial or commercial activities. The Spanish used the Cortes like the Polish gentry used the Polish parliament to impose a

policy of creating favorable conditions for importing cheap products from abroad. The accumulation of huge wealth, mostly in the form of precious metals brought from colonies in America and the choice of economic policy led to a situation in which prices – expressed in money made of precious metals – were higher in Spain than the prices in England or France. As a result, Spaniards preferred to buy cheaper English or French goods rather than more expensive domestic products. Poland also has a tradition of stronger protection of consumers' than producers' interests.

Other countries used as reference points are mainly EU member states: France, Germany (former West Germany) and to a lesser extent – Italy. These countries generally differ from Poland as they are more populous and wealthier. They have been chosen in order to show the directions of EU development which is an important reference point for Poland. Membership in the EU was the main goal of Polish governments after 1990. The economic structure of Poland was consistently being adjusted to meet the EU integration requirements. These adjustments were made quickly and with little regard to their costs.

Other countries included as reference points are: South Africa, Mexico and South Korea. Compared with Poland, in the mid-1970s they were at a lower level of economic development. These countries were selected in order to demonstrate the scale of changes taking place in the global economy. Comparisons with these countries should show that it is not only Poland but all of Europe which is losing its traditionally dominant position in R&D. Poland is interested in eliminating development delays. Greater opportunities are available when cooperating with fast developing countries which offer extensive development opportunities. The opportunities are fewer when the partners are economically stagnant countries which are finding it increasingly difficult to find markets for their products and whose traditionally high competitiveness in the global market is diminishing.

R&D in Poland in 1975-2009

In the analyzed period the scale of changes taking place in the innovation potential of Poland can be illustrated by using three measures. First of all, the number of scientific and technical personnel employed in research and development in Poland is compared with analogical figures in selected countries (see Table 1). Secondly, expenditure on research and development activity (both in relation to GDP and expressed in USD per capita) in Poland is set against data from selected countries (see Table 2). Thirdly, the number of registered inventions or patents granted by Patent Offices is compared with appropriate figures in selected countries (see Table 3).

The number of scientific and technical personnel employed in R&D

In 1975 in Poland the number of scientific and technical personnel employed in research and development activity – calculated as the number of full time jobs - was 182 thousand, including 101 thousand scientists and engineers and 81 thousand technicians. Out of the 101 thousand scientists and engineers employed in research and development activity, 75 thousand worked in the "technical and technological" sector. In 1974 in Spain the number of personnel employed in research and development activity was equal to around 6% of the number of personnel in Poland (Rocznik Statystyki Międzynarodowej, 1977, p. 280).

In 1975 in France the number of personnel employed in scientific research and development was equal to around 77% of the personnel employed in Poland. At that time in Germany the number of personnel employed in research and development activity was 201.4 thousand, which was equal to around 112% of the Polish personnel.

Table 1: Scientific and technical personnel employed in research and development activity, calculated as full time jobs (in thousands)

Country/Year	1975	1988	1995	2000	2006	2008	2009
Poland	182	90.7	83.6	78.9	73.6	74.6	73.6
Spain	11.3	29.1	80	120.6	188.9	215.7	
France	140.4	278	318.4	327.5	353.6	372.3	
Germany	204.1	288.1	459.1	484.7	489.1	521.9	
Italy	61.1		141.8	150.1	175.2		
South Africa				21.2	28.8	31.4	
Mexico			33.3	39.7	89.4		

Source: Rocznik Statystyki Międzynarodowej 1977, GUS, p. 280; Rocznik Statystyczny 1978, GUS, p.52; Rocznik Statystyczny 1979, GUS, p. 549; Rocznik Statystyczny 1991, GUS, p. 508; Rocznik Statystyki Międzynarodowej 2009, GUS, p. 294; Rocznik Statystyczny 2010, GUS, p. 461, p. 873

In 1988, in the final period of transformation in Poland, the number of scientific and technical personnel employed in scientific research and development – calculated as full time jobs – was only half (50.3%) of the 1974 level, and only a third (34.2%) as far as scientists and engineers are concerned. Meanwhile, in Spain, the total employment in scientific research and development in 1988 was over two and a half times higher (259.8%) than in 1974, and the number of scientists and engineers grew by 234.8%.

In France, in turn, total employment in scientific research and development in 1988 was nearly two times higher (198%) than in 1974, while the number of scientists and engineers grew by 180%. In West Germany total employment in scientific research and development in 1988 increased by more than a half (157%) compared to 1974, while the number of scientists and engineers grew to 166%.

In 1995 in Poland the number of scientific and technical personnel employed in scientific research and development – calculated as full time jobs – was 83.6 thousand. At the same time in Spain the number of scientific and technical personnel employed in scientific research and development – calculated as full time jobs – reached 80.0 thousand.

Following the change of economic system, employment in R&D in Poland continued to decrease. Total employment at scientific research and development work in 1995 in Poland was 92% of what it was in 1988. In Spain total employment in scientific research and development work in 1995 was nearly three times higher (274.9%) than in 1988. A similar trend is visible in France, where total employment in scientific research and development in 1995 grew by 14.5% compared to the 1988 level. In Germany total employment in scientific research and development in 1995 increased by over a half compared to the level from 1988, although this is also partly due to the reunification of Germany.

The permanent nature of the trend of decreasing creative R&D potential which took place in Poland during the period of transformation can be confirmed with data from 1975-2009 comprised in Table 1. The scale of decrease in Polish R&D potential is enormous. In 2009 in Poland, the level of employment in R&D was at 40.8% of the 1975 level. During the same period (1975-2009)the level of R&D employment in Spain increased 17-fold (1687.5%). In France it grew two and a half times (251.8%), while in Germany to a level of 267.4%. In Italy it reached 287%.

Poland can easily be compared to Mexico, a country at a similar level of economic development. In 1995 in Mexico, the total employment in scientific research and development was 33.3 thousand which equaled 39.8% of such employment in Poland. In 2006 the total employment in scientific

research and development work in Mexico accounted for 89.4 thousand jobs, i.e. 121.5% of such employment in Poland. In other words, in the past decade Mexico, in spite of experiencing consecutive financial crises, increased employment in scientific research and development from 40% to over 121% of the Polish level.

The trends in R&D employment presented above show substantial changes taking place in the global economy and the deteriorating position of Poland. This position seems even worse when the changes in structure of R&D employment are taken into account. In 2009 in Poland the level of R&D employment (73.6 thousand) fell to 71.86% of the 1985 level (102.7 thousand). It is worth keeping in mind that R&D in the engineering and technical sectors largely determine the competitiveness of a given economy. In these sectors in Poland the level of R&D employment experienced a particularly dramatic decrease: by two thirds. Employment fell from 72 thousand in 1985 to 24.7 thousand in 2009, which is 34.3% of the 1985 level. What deserves underlining is the significance of such a dramatic breakdown in R&D employment in engineering and technical sectors in the second part of the transformation period. This type of employment to a large extent determines Poland's competitiveness in the global economy. In the case of Poland such a significant weakening of competitiveness was of major importance in relations with EU countries which were of the majority of Polish exports. At that time the foundations defining Poland's position in the EU were built. The already mentioned decreasing competitiveness of Poland relatively strengthened the position of strong member states in the EU.

Expenditure on R&D activity

Table 2 shows that in 2008 expenditure on research and development activity in relation to GDP was low in Poland, as it amounted to 0.6%. This equaled only 44% of the share of analogical expenditure in Spain at that time. The difference in R&D expenditure *per capita* in USD was even larger as it equaled only 20% of Spanish expenditure. The share of R&D expenditure in Poland's GDP equaled 0.6% and was even lower than the level observed in countries traditionally considered to be not as economically developed as Poland. For example, in South Africa in 2007 the R&D expenditure equaled 0.92% of GDP.

Table 2: Expenditure on research and development activity in relation to GDP (in %) and per capita (in USD)

Country	Expenditure in % of GDP	Expenditure per capita (in USD)
Poland, 2008	0.60	83.8
Spain, 2008	1.35	424.8
France, 2007	2.02	668.9
Germany, 2008	2.64	935.2
South Africa, 2007	0.92	88.6

Source: Rocznik Statystyczny 2010, GUS, p. 873

Currently Poland, already a member of the EU, still allocates relatively little resources to research and development. The share of R&D expenditure in Poland's GDP fell from 0.69% in 1999 to 0.60% in 2008 and 0.59% in 2009. This decrease is a result of a considerable part of R&D expenditure depending on unstable financing from a dangerously indebted state budget. At the same time, the enterprise sector contributes only a small share of such expenditure. In 2004-2007 the

share of R&D expenditure in Poland's GDP was on average at a level of 0.56% which was three times lower than the EU-27 average. At that time the only countries in the EU with a lower share of R&D expenditure were Bulgaria, Greece, Romania, Slovakia and Cyprus. The countries with the highest R&D expenditure share in GDP in the EU were Sweden (3.64%) and Finland (3.47%).
In Poland the problem is not only a low share of R&D expenditure in GDP, but also its unfavorable structure. In Poland the share of the enterprise sector in domestic gross expenditure on R&D decreased from 0.25% of GDP in 1995 to 0.18% GDP in 2009 (Eurostat, 2010). At that time the enterprise sector share of R&D expenditure experienced growth in countries situated nearby with a similar political history. In Hungary the share grew from 0.31% of GDP in 1995 to 0.66% of GDP in 2009, while in the Czech Republic from 0.62% in 1995 to 0.92% of GDP in 2009. At the same time in the EU-27 as a whole, the share of the enterprise sector in R&D expenditure increased from 1.13% to 1.25% of GDP.

Inventions and patents

R&D potential cannot be measured solely by the number of personnel employed in scientific research and development activity. Attention needs also to be paid to the market effectiveness of their work. Patents are a widely used measure of market effectiveness of R&D activity. The number of patents is an indicator possessing various defects, but it is also easily measurable and commonly used in collecting statistical data. Table 3 shows two measures of R&D. One of them is the number of inventions which applied for patents in European Patent Office (EPO), the other is the number of patents granted by the US Patent and Trademark Office (USPTO). In 1995 Poland applied for 13.6 patents, while Spain for 387.1. Thus Spain applied for 28.5 times more patents than Poland. We can assume that such a huge advantage over Poland can be attributed to Spain's superiority in terms of the number of employed people and the size of R&D expenditure. As far as Germany and France are concerned, their advantage over Poland is so crushing that there is no point in calculating it.

Table 3: Inventions applied for patents in European Patent Office (EPO) and patents granted by US Patent and Trademark Office (USPTO)

	Inventions applied for patents in European Patent Office			Patents granted by US Patent and Trademark Office		
Country/Year	1995	2000	2006	1995	2000	2006
Poland	13.6	42.7	121.6	18	30.3	29.6
Spain	387.1	797.1	1333.4	244.6	367.8	249.4
France	5141.4	7271.9	7891.3	3868.3	4137.4	2085.3
Germany	13082.6	22078.5	22674.6	9592.2	12518.4	7257.6
South Africa	80.6	147	126	120.9	125.3	42.9
Mexico	24.4	28.1	78.1	67.7	104.9	86.7
South Korea	459.9	1255.2	5690.2	3484.1	4430.1	6303.7

Source: Rocznik Statystyki Międzynarodowej 2009, Warszawa 2010, GUS, p. 297

It is worth mentioning that in 1995 Poland was defeated by such developing countries as South Africa (it had nearly six times more applications in EPO than Poland) or Mexico with 179.4% more applications than Poland. In USPTO Mexico's advantage over Poland was even bigger and amounted to 376%. In 2000-2006, the poor state of R&D in Poland did not improve. Even if we notice a slight improvement in relation to Mexico and South Africa in EPO applications, at the

same time Poland's position deteriorated in USPTO patents (2006 does not fully fit in this trend, but this is due to weaker results in Mexico and South Africa rather than an improvement in Poland).

The place of Poland in EU R&D

The above analysis shows that the scientific research and development potential in Poland was to a large extent destroyed during the period of martial law. Originally Poland was an R&D leader in comparison to top EU countries in terms of number of employees, but later on it stopped being an important competitor. This destruction of R&D potential was caused by members of the communist apparatus, led by general Jaruzelski, now paradoxically called by some "a man of honor".

There are opinions stating that after 1989 subsequent Polish governments not only did not participate in the destruction of R&D creative potential, but also refused to accept its earlier destruction. However, for such an opinion to be true, subsequent Polish governments after the 1989 elections should have undertaken a reconstruction of Polish R&D potential. In the new economic structure, it would be able to better fulfill the requirements of a market economy. Quick growth in terms of R&D potential would have been easy in the early 1990s, taking into account that there were tens of thousands of recently fired former R&D employees. However, no such reconstruction of R&D potential took place. Consecutive governments not only failed to reconstruct the former potential, but also witnessed the process of R&D potential diminishing even further. This process continued in spite of officially promoted ideas of the importance of R&D for Poland's future economic development. Poland's R&D potential continued to diminish even during our preparations for membership in the EU, despite an inverse process taking place in the R&D sector of our EU competitors and partners.

The Polish R&D potential continued to decrease even when the EU declared improving the faltering international competitiveness of Europe to be a matter of top priority. The European Council implemented a package of reforms at its summit meeting in Lisbon in March 2000. The Lisbon Strategy (LS) was a social and economic program for the next ten years. The strategic goal was for the EU to become the most competitive global economy. One of the main targets was increasing innovativeness (aiming towards a knowledge-based economy). In 2004 the realization of the LS was reviewed and meager progress noticed. Based on a report by the Kok group, the LS was redesigned, its priority still being knowledge and innovations as a basis for economic growth. In February 2010 the whole LS was evaluated and the conclusion was made that a little progress has been made, and the basic goals of the LS were not achieved. In 2009 in "Reviewing Community Innovation Policy in a Changing World", the EU presented conclusions from the evaluation of current activities' effectiveness and once again emphasized the importance of innovations for economic development.

In Poland, preparations for introducing the Lisbon reforms started in the pre-accession period. However, during the validity of the LS (the 2000s), the Polish R&D sector was not strengthened but continued to diminish. This is visible in the fact that employment in research and development activity per one thousand professionally active people in Poland, calculated in full time jobs, fell from 4.6 persons in 2000 to 4.2 persons in 2009 (Rocznik Statystyczny 2010, GUS, p. 463).

The EU still believes that R&D efforts are of key importance for economic development. In the "Europe 2020" strategy adopted in 2010, one of the main projects is the "Innovation Union", consisting in development of the knowledge-based economy and innovations. The success of the "Innovation Union" projects calls for considerable increase of private expenditure on research and development activity. In Poland such postulated growth of private expenditure on research and

development is quite unlikely. This is visible in Polish results in the area so far. In Poland, the enterprise sector's share in domestic gross expenditure on R&D decreased from 0.25% of GDP in 1995 to 0.18% of GDP in 2009. This shows that the new ownership structure resulting from privatization has not been interested in developing R&D activity in Poland.

It seems unlikely that Polish governments will be able to change the unfavorable situation in R&D in the near future. This can be attributed to their involvement in priorities determined by the contemporary ownership structure of enterprises in Poland and to an acceptance of particular aims determined by strong EU member states. Moreover, the huge national debt in Poland may lead to a situation in which, once the constitutional level of debt is exceeded, budget expenses will be limited. This may be accompanied by the currently realized plans aiming at a quick decrease of budget deficit. The scale of budget cuts that may take place can be illustrated through the example of the plan to decrease expenditure on road construction. The plan, prepared at the end of 2010, resulted in the expenditure on motorway construction being decreased by nearly a half, while expenditure on construction of express ways was lowered by nearly two thirds. This happened in spite of great determination of the government to construct roads, pronounced to be important in relation to a significant media event – the European championship in football to be held in Poland in 2012. This determination was much stronger than the government's determination in supporting R&D.

Conclusions

The prospects for supporting innovativeness in Poland are not favorable. The situation is all the more problematic when one takes into account that globally competitive R&D structures in the country would need to be built practically from scratch. However, it should be emphasizedthat without reconstructing its R&D potential, Poland will not be able to create a globally competitive economy. Without such an economy it will be impossible to pay back the enormous debts recklessly accumulated in the period of 20 years of tightening cooperation with the EU. It is consoling, however, to know that a strong R&D sector in Poland can exist. This is visible in the example provided from over 30 years ago, when Poland was not only a partner in R&D activities for large European countries, but potentially also a substantial competitor.

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