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**Evolution of Innovation Policy in Poland in a Period
of Economic Transformation**

Abstract

The paper considers the very important problem of innovativeness of Polish economy with particular attention given to its innovation policy. The major thesis of paper argues that the growth of innovativeness in Polish economy requires structural, institutional and financial changes in the long run. The changes which have taken place so far in the process of transformation should be considered as insufficient.

The paper is divided in two parts. First deals with the short characteristics of innovative potential and innovative activity of the Polish economy. Second is devoted to the problem of innovation policy in Poland. This policy should, in its nature, be a horizontal one and should interrelate a scientific-technological policy with an industrial policy. In view of this fact there is an obvious need to co-ordinate the actions of the governmental institutions which should co-operate to create the strategy of the development of science and technology compatible with the directions of modernisation of the economy.

1. Introduction

Experiences of present stage of development of Polish economy indicate that there exists necessity for revival of innovative processes. The very imperative of increasing innovativeness of Polish economy stems from a few important reasons. Relatively low competitiveness of Polish products

on international market as well as a technological gap which exists between Poland and leading countries deserve special attention. Ability of Polish economy to create and propagate innovativeness is, in long term, one of the most important factors which determine both the level of economic prosperity of the society and possibilities of economic growth of Poland in the world.

In the case of highly developed economies, market mechanism constitutes the main regulator of innovative processes determining their dynamics and effectiveness. At the same time, all countries which have covered a great civilization gap within recent decades make use of state interventionist policy in order to stimulate innovative economic activity. Interventionism applied in this area takes the form of innovation policy. The very term ‘innovation policy’ is not clearly interpreted in literature. Putting aside disputes and subtle terminological differences, one can assume that innovation policy constitutes combination of those elements of scientific, technical and industrial policy which determine direction and dynamics of the process of creating, applying and propagating new technical, technological and organisational solutions (Jasiński 1997, pp. 113–116; Rothwell, Zegveld 1981, pp. 1–2). In other words, innovation policy is an art which requires selection of appropriate actions and tools which support development and optimal use of scientific and technical achievements in economy.

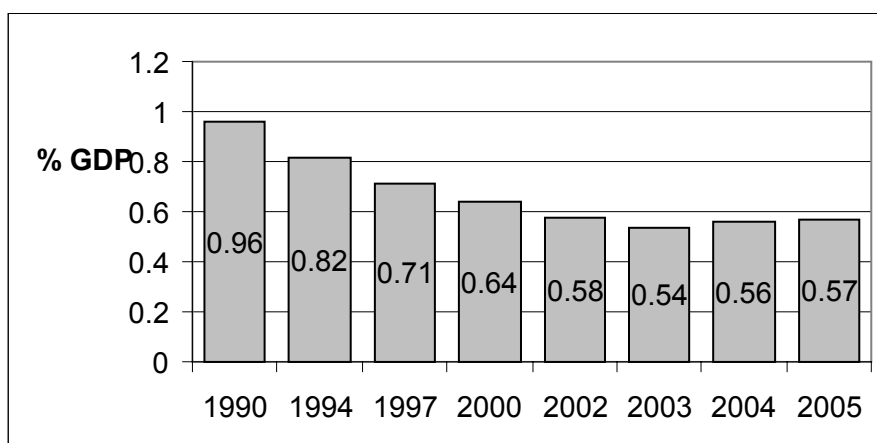
The aim of the paper is to present essence, conditions and tools of innovation policy and, moreover, evaluate innovation policy which has been implemented in Poland since the beginning of economic transformation. Additionally, the paper attempts to evaluate innovative ability of Polish economy analysed by means of measures which illustrate both investments in innovation activities in macro scale and innovation activities of enterprises. This ability constitutes, to a great degree, a function of innovation policy promoted in Poland in successive stages of economic transformation.

2. Innovative ability of Polish economy

In literature on innovative processes and the role of innovativeness in economic development one can come across division of countries according to their ability to create and diffuse innovativeness. Four groups of countries can be distinguished in the report of the European Commission based on the analysis of synthetic innovativeness index for Europe (European Innovation Scoreboard 2005, Comparative Analysis of Innovation Performance. Brussels 2005, pp. 3–4):

- a) leading countries (Finland, Sweden, Denmark and Germany);
- b) average performance countries (France, Ireland, Luxembourg, Great Britain, the Netherlands, Belgium, Austria, Italy);
- c) catching up countries (Slovenia, Hungary, Portugal, the Czech Republic, Lithuania, Latvia, Greece, Cyprus and Malta);
- d) losing ground countries (Poland, Slovakia, Estonia and Spain).

Placing Poland on a better position, which would satisfy its development aspirations, will not be possible without strengthening innovation potential of economy. The level of economic innovativeness constitutes, to a great degree, a function of the scale and modernity of the very potential. Innovation potential can be measured with the following indicators: investments in R&D activities (from the state budget and enterprises) in relation to GDP and the structure of these investments in reference to kinds of research, number of research, number of R&D units and employees employed in R&D sector, number of state inventions and investments in knowledge (investments in R&D activities, public and private expenditures on higher education).



Graph 1. Share of investments in R&D activities in relation to GDP in 1990–2004 (current prices)

Source: Rocznik Statystyczny 2006, GUS, Warszawa 2006, p. 427; Nauka i technika w 2002 r., GUS, Warszawa 2004, p. 29.

Important measures of innovation potential of economy involve the level and structure of investments in R&D activities. The structure of investments in R&D activities constitutes the main source of economic growth and improvement of competitiveness in modern world. Figure 1 illustrates the share

of investments in R&D activities (from the state budget, enterprises, research institutes of the Polish Academy of Sciences, R&D units and international organisations) in GDP in 1990-2005.

The analysis of presented statistical data leads to the conclusion that investments in R&D activities in relation to GDP decreased in Poland in the surveyed period. Share index of these investments in GDP decreased significantly from 0.96% in 1990 to 0.57% in 2005. It is worth remembering that this index, yet at the beginning of the nineties, was considered insufficient and bringing about real threat not only to science but to civilisation development of the country. Moreover, it should be added that the decrease in investments in R&D activities in the first years of transformation of Polish economy (1990-1992) was higher than the decrease in GDP at the same period. Growing tendencies occurred in economy in subsequent years and it seemed that in such circumstances promises of politicians, who had declared increase in R&D expenditures following overcoming economic recession, would be fulfilled. Meanwhile, share index of R&D investments coming from the state budget in relation to GDP was decreasing systematically.

The analysis of a position of Poland in the ranking of countries based on their share of R&D investments in GDP indicates that there exists a huge technological gap between Poland and leading countries of world science and technology. Indicators for chosen EU countries, Japan and the USA are presented in the table underneath.

The analysis of statistical data from Table 1 leads to negative evaluation of bases of innovation potential of Polish economy. As a matter of fact, investments in R&D activities determine, to a great degree, the scale of this potential. It should be emphasised that EU countries, which in comparison to Poland represent a similar stage of economic development, are characterised by higher indicators of the share of R&D investments in GDP (for example the Czech Republic – 1.28%, Hungary – 0.89%, Portugal – 0.78%). Weakness of Polish R&D sector is clearly visible while comparing Polish indicator with indicators of fifteen countries of so called old Europe (the average indicator reaches 1.94%), Japan and the USA (Polska - Unia Europejska 2003, p. 37; Rocznik Statystyczny 2004, p. 774).

Table 1. Ratio of investments in R&D activities to GDP in EU countries, Japan and the USA in 2004

Countries	R&D investments (% of GDP)
Japan	3.13
USA	2.68
EU-25	1.90
Sweden	3.74
Finland	3.51
Germany	2.49
France	2.16
Netherlands	1.77
Belgium	1.93
Great Britain	1.88
Czech Republic	1.28
Ireland	1.20
Italy	1.14
Hungary	0.89
Spain	1.07
Portugal	0.78
Greece	0.91
Poland	0.56

Source: Eurostat, Statistics in Focus Science and Technology, no. 6, 2006, p. 2; Rocznik Statystyczny 2005, GUS, Warszawa 2005, p. 423.

Apart from the level of R&D expenditures, the structure of these expenditures classified according to their financial sources is also an important element for evaluation of innovation potential of economy. The very R&D expenditures are not sufficient to evaluate the innovation potential. The ratio of the level of financing coming out of the state budget (governmental) to the one coming from enterprises is also important. Analyses which compare innovation systems with diversified structures of these expenditures show that countries with dominating enterprise expenditures are characterised by a higher level of economic innovation than the countries in which state budget expenditures predominate (Radło 2003, p. 78). It is caused by the fact that

enterprises finance above all R&D projects which directly increase their innovation ability. Data in Table 2 presents the share of investments in R&D activities classified according to their financial sources.

Table 2. Structure of investments in R&D activities in Poland classified according to their financial sources in 1995-2005 (current prices)

Item	1995	1998	1999	2000	2003	2004	2005
In total:	100.0	100.0	100.0	100.0	100.0	100.0	100.0
including sources coming from:							
– the state budget	60.2	59.0	58.5	63.4	62.7	61.7	57.7
– business entities	24.1	29.7	30.6	24.5	23.5	22.6	26.0
– research institutes of the Polish Academy of Sciences and R&D units	11.9	8.3	7.5	8.1	5.9	7.5	7.0
– international organisations and institutions	1.7	1.5	1.7	1.8	4.6	5.2	5.7
– other units	2.1	1.5	1.7	2.2	3.3	3.0	3.6

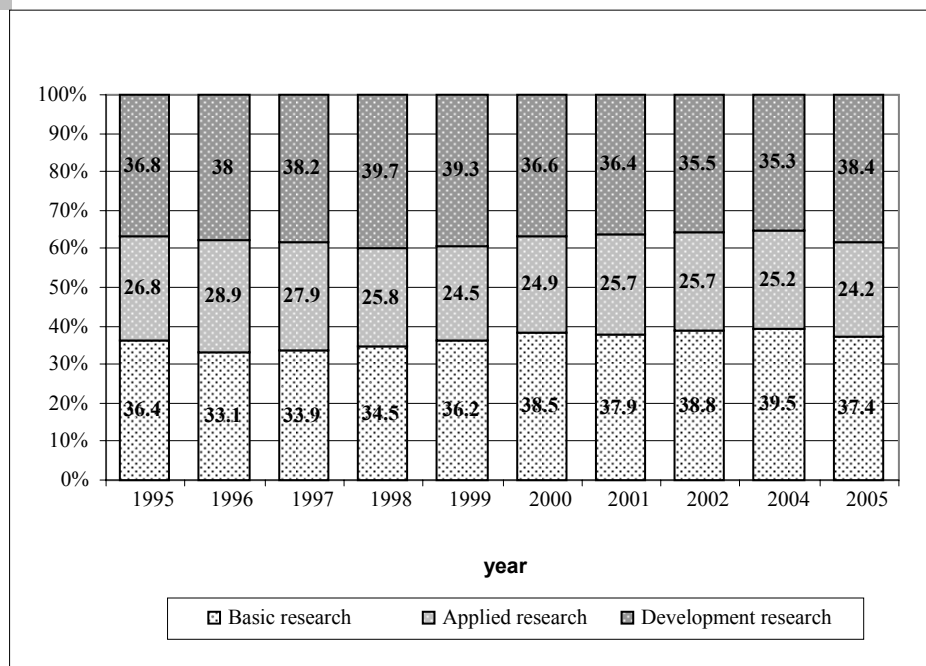
Source: Rocznik Statystyczny 2006, GUS, Warszawa 2006, p. 425; Nauka i technika w 2004 r., GUS, Warszawa 2005, p. 28.

The analysis of structure of investments in R&D activities classified according to their financial sources leads to the conclusion that the share of investments coming out of the state budget in total R&D investments exceeded 50% (in 2005 it reached 57.7%), while the share of investments of business entities (enterprises) reached 22.6%-30.6%, in 2005 – 26%.

It should be emphasised that in the case of highly developed countries enterprise investments are the main source of financing R&D activities. In 2001 they constituted about 56% of total R&D investments in the European Union and more than 63% in OECD countries (Nauka i technika... 2004, p. 31). Predominant nature of the share of state budget investments in financing R&D activities is typical of economically middle-developed countries. OECD countries such as Mexico, Turkey, Portugal and Hungary are characterised by the structure of investments in R&D activities which is similar to Polish one in terms of financial sources.

Relatively low share of enterprises in financing R&D activities influences R&D structure considered from the point of view of research types (basic research, applied research and development research). In 2005 37.4% of total investments in R&D activities were allocated to basic research, 24.2% to applied research and 38.4% to development research. Both gradual increase in the share of investments allocated to basic research and moderate decrease in the share of

investments allocated to applied and development research have taken place in Poland since mid-nineties of the previous century. This tendency was reversed in 2005, which is illustrated in Figure 2.



Graph 2. Structure of investments in R&D activities according to research types in 1995–2005.

Source: Nauka i technika w 2005 r., op. cit., p. 30.

In comparison with other EU countries, Poland has an unfavourable structure of investments in R&D activities, which is reflected in extremely high share of investments in basic research and too low share of investments in development research. In economic literature on innovation the share of development research in R&D investments is considered to be a measure of so called closeness to market of this activity. In the structure typical of highly developed economies the share of investments in development research predominates, whereas the share of investments in basic research reaches the level of 20%. Thus, for example in Spain, which is frequently compared with Poland, the measure of closeness to market reached 42.9% in the year 2000, while in Norway 47% (Main Science... 2003, pp. 31–33).

Ability of economy to create innovation is, to a great degree, dependent on personnel potential of R&D sector and effectiveness of making use of it.

At the initial stage of economic transformation employment in R&D units was significantly reduced. In 1990-1994 the number of persons employed in R&D units decreased from 100.5 thousand to 71.7 thousand (in full-time equivalents), i.e. by about 30% (Raport o stanie... 2002, pp. 52–53). In subsequent years gradual increase in employment in this sector was noticeable; in 2004 the number of employed persons reached 78.36 thousand, whereas researchers constituted about 77.8% of this figure (Statistics in Focus... 7/2006, p. 2). Among EU countries a greater number of persons employed in this group is characteristic only for Germany, France, Great Britain and Italy.

Indicators presented above prove that Poland possesses significant personnel potential in R&D sector, which favours development of economy based on knowledge. Nevertheless, effectiveness of making use of this potential is not satisfactory, which is reflected in Table 3 in data concerning inventiveness in Poland. Data shows that there was systematic decrease in the number of inventions in Poland from the beginning of the nineties of the previous century till 2003. This tendency was brought to a stand in 2004, however, the number of inventions decreased once more in subsequent year. The number of inventions annually reported to be registered as patents in Poland by domestic inventors (residents) decreased in 2004 reaching about 58% of the number of inventions reported in 1990. The value of so called inventiveness indicators, i.e. the number of inventions reported by residents to be registered as patents in relation to 10 thousand inhabitants has amounted in Poland to about 0.7% in recent years, being similar to the value of the same indicator in the Czech Republic, Spain, Belgium and Hungary, however, higher than in Greece, Turkey and Portugal (Raport o stanie... 2002, p. 31).

Table 3. Number of domestic inventions and Polish inventions registered as patents abroad (1990–2005)

Item	1990	1991	1994	1998	2000	2002	2004	2005
Domestic inventions:								
reported	4105	3389	2676	2407	2404	2313	2381	2028
granted patents	2504	3241	1825	1174	939	834	778	1054
Polish inventions registered as patents abroad	149	150	119	110	123	142	-	-

Source: Mały Rocznik Statystyczny 1997, GUS, Warszawa 1997, p. 222; Rocznik Statystyczny 2000, GUS, Warszawa 2000, p. 310; Rocznik Statystyczny 2005, GUS, Warszawa 2005, pp. 431–432.

On the basis of analysis of data from Table 3 one can state that the number of Polish inventions being registered as patents abroad fluctuated and,

despite its moderate increase in 1998-2000, it is still lower than at the beginning of the nineties.

The decrease in activity of Polish economy in the field of inventiveness is a symptom of declining interests and patent possibilities of enterprises. Reasons for such situation arise as a consequence of negative tendencies which occur in R&D sector and industry as well as specific conditions of Polish transformation in the nineties. The most important reasons involve:

- easy and growing inflow of modern technologies from abroad,
- liquidation of permanent posts of patent agencies in most enterprises,
- high costs of patent agents' services, which numerous small and medium-sized enterprises cannot afford,
- frequently applied policy of liquidation or reduction of R&D section in enterprises which have been privatised.

Increasing share of Polish publications in scientific 'world production' in recent years is a positive aspect in contrast to the decrease of investments in R&D activities and declining activity of R&D sector in terms of inventiveness. According to the Institute for Scientific Information in Philadelphia, the very share at the beginning of the nineties of the previous century amounted to about 0.95% and subsequently increased reaching 1.15% in 2000. The share of Polish nanotechnological publications in world publications amounted to 1.2% in 1999, which placed Poland on the 18th position in the world ranking list. In 1995-1999 the number of Polish publications in this field increased by 193%, while the total increase of the number of these publications in the world amounted to 93% (Kleiber 2002, p. 39; Third European... 2003, p. 205). This increase in performance of Polish scientists means that, despite all difficulties, they try to complete their mission in an active way.

Ability of enterprises to put into practice (to implement) and to commercialise new technologies is a key factor which determines the stage of economic innovation. On the basis of indicators analysed previously, one can reach similar evaluation of economic innovation. Indicators, which reflect the stage of economic innovation in a more precise way, are connected with innovation activity of enterprises which is a decisive factor for competitiveness of economy. It should be added that evaluation of innovation activity of enterprises constitutes a key element of characteristics of knowledge-based economy.

Overall data concerning innovation activity of industrial enterprises in 1999-2004 is presented in Table 4¹.

On the basis of analysis of data from Table 4, one can formulate conclusion that innovation activity of industrial enterprises increased. The share of industrial enterprises which carried out innovation activity in 2002 in the total number of industrial enterprises increased in comparison with the year 1999 reaching 39%, i.e. by 13.9 percentage points. Nevertheless, the level of investments in innovation activities in relation to 1 enterprise engaged in such activities decreased in 2000-2001. Such situation was the result of slowdown in economic growth in 2000-2001. Innovation activity of enterprises turned out to be very sensitive to deteriorating economic activity. Starting from 2002, one can observe increase of these investments as a result of accelerated economic growth.

Table 4. Overall data on innovation activity of industrial enterprises in 1999–2004

Item	1999	2000	2001	2002	2003	2004
Total number of enterprises	9271	9123	8664	8488	7997	8021
Share of enterprises involved in innovation activity ^a (%)	25.1	32.1	36.4	36.7	39.3	39.0
Sector: public	34.9	41.7	44.8	45.6	43.3	47.6
private	22.9	30.2	34.9	35.2	38.7	37.8
Investments in innovation activity per 1 innovation enterprise	6542.3	4177.1	3643.2	4442.8	4932.2	4928.7
Sector: public	8892.1	6261.8	3656.9	4517.1	4054.8	4119.8
private	5731.5	3591.9	3639.8	4426.5	5087.1	5071.8

^a i.e. enterprises which invested in this activity in a given year (innovation enterprises).

Source: Nauka i technika w 2002 r., op. cit., p. 106; Nauka i Technika w 2004 r., op. cit., p. 80.

Two indicators are very helpful in evaluation of innovation activities of industrial enterprises, i.e. innovation intensity indicator and an indicator called 'a degree of production renewal'. The former is the ratio of investments in innovation activity to sales value, whereas the latter reflects the share of new and modernised products (technological innovations) sold and introduced into market within the last three years in the total sold production in a given year.

¹ Data concerns industrial enterprises in which the number of employees does not exceed 49 persons.

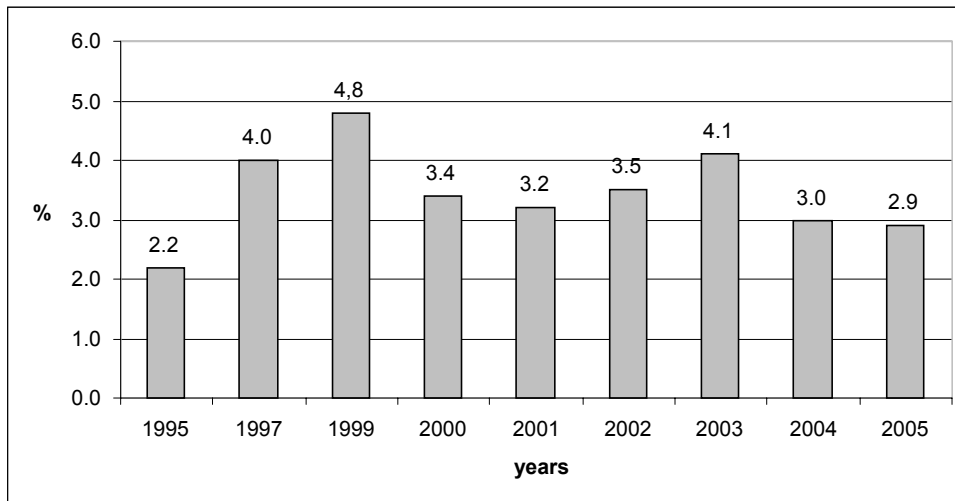
As it follows from the analysis of Figure 3, innovation intensity indicator of Polish industrial enterprises in 1995-2005 was variable. Dynamic increase of this indicator in 1995-1999 (from 2.2% to 4.8%) was followed by its decrease in 2000-2001 (3.4% and 3.2% respectively). In subsequent years the indicator first increased reaching 3.5% in 2002 and 4.1% in 2003, then it decreased to 3.0% in 2004 and 2.9% in 2005. In other European Union countries the innovation intensity indicator amounted to 3.7% (Nauka i technika..., 2004, p. 99).

Data concerning share index of sold production of new and modernised products in the total sold production of industry are presented in Table 5. The analysis of the data from Table 5 leads to the following conclusions:

- decrease in share index of new and modernised products in sold production in 2000 was followed by moderate increase of the indicator in subsequent years; as far as processing industry is concerned, the very indicator is higher than the average indicator for the whole industry;
- a considerably higher than average value of the indicator is noted in the case of modern industries which manufacture: computers, office devices, medical and telecommunications equipment, motor vehicles, etc.;
- significant increase in the share of sold production of new and modernised products in export is a positive tendency; in 1999–2005 the indicator increased from 2.3% to 9.0%.

The share of sale of high-tech products in sold production of industry as well as the share of sale of these products in export are very important elements of evaluation of the level of innovation and competitiveness of Polish enterprises². These indicators reflect the ability of enterprises to absorb new scientific and technical knowledge, to transform it into specific economic effects and make use of these effects in global market. Industries manufacturing these products are the source of high value added and new, usually well-paid, workplaces.

² High-tech industries involve fields such as aircraft industry, electronic industry, pharmaceutical industry, medical instruments industry, etc. in which investments in R&D activities constitute over 4% of sold production.



Graph 3. Innovation intensity indicator in industrial enterprises in 1995–2005

Source: Nauka i technika w 2002 r., op. cit., p. 99; Nauka i Technika w 2005 r., op. cit., p. 179; Działalność innowacyjna przedsiębiorstw przemysłowych w latach 2002–2004, GUS, Warszawa 2006, p. 71.

The share of sale of high-tech products in sold production of industrial enterprises remained on the same level of 3.3-4.5% from the beginning of the nineties to 2004; in 2002 it even reached 5.4%. A similar situation is characteristic for the share of high-tech products in export which reaches 2.3-2.9%. The very indicator amounts to 7.3% in Spain, 9.2% in the Czech Republic, 20.7% in Hungary and 37.2% in Ireland (Nauka i technika... 2004, pp. 162–167).

An analogous indicator concerning import constitutes significant supplement to the analysis of importance of high-tech products in export. The share of high-tech products in Polish import is a few times higher than their share in export (in 2004 it amounted to 9.2%). Comparison of these indicators allows to arrive at the conclusion that the technical level of Polish economy is highly dependent on the inflow of innovation from abroad, which is proved in the analyses presented above. The analyses manifest the low level of investments in R&D activities, unfavourable structure of conducted research and development works as well as weak activity of Polish economy in the field of innovation.

Table 5. Share of sold production of new and modernised products in sold production of industry in 1999–2004 (current prices)

Item	1999	2000	2002	2003	2004	2005
	products (%) whose manufacture was launched in years*					
	1997-1999	1998-2000	2000-2002	2001-2003	2002-2004	2003-2005
In total	21.3	16.4	16.7	20.7	20.9	21.8
including export	2.3	4.1	6.1	6.4	10.6	9.0
including industrial processing	24.7	18.5	19.1	23.8	23.8	25.1
- office devices and computers	96.3	48.3	6.6	33.5	49.9	42.5
- radio, television and telecommunications equipment and devices	37.3	10.9	42.0	60.1	39.9	49.3
- medical, precision and optical instruments. watches	71.6	75.0	47.4	62.7	35.9	23.2
- motor vehicles and trailers	50.1	34.9	43.8	49.2	69.5	52.1

* share of sold production of new and modernised products introduced into the market within the last three years in the total sold production in the last year in a given period.

Source: Rocznik Statystyczny 2004, GUS, Warszawa 2004, p. 428; Nauka i technika w 2004 r., op. cit., p. 95.

3. Stages and directions of evolution of innovation policy

It is worthwhile proceeding characteristics and evaluation of innovation policy which has been implemented in Poland since the beginning of the nineties of the previous century with a short presentation of state institutions responsible for its formation and implementation. Quality of functioning of these institutions, their structure and allocation of competences significantly influence effectiveness of innovation policy and pro-innovation attitudes of a society.

The State Committee for Scientific Research was the main institution responsible for innovation policy in Poland until 2003 (especially for scientific and technical policy), although the word 'innovation' was not mentioned in the act on its foundation, i.e. in 1999 (Jasiński 2006, p. 194). Quasi-governmental Foundation for Polish Science and the Polish Agency for Enterprise Development play a minor role in this field. Additionally, the Ministry of Economy (former Ministry of Economy and Labour) takes initiatives in order to support innovation activity and transfer of technology. Numerous governmental programmes were elaborated in the Ministry of Economy, among others, programme for increase of innovativeness of Polish economy, programme for supporting innovativeness of small and medium-sized enterprises as well as the Act on Supporting Innovation. Insufficient cohesion of documents prepared by the State Committee for Scientific Research with these programmes at the stage of their implementation constituted a basic weak point of the programmes. It was caused by the lack of clear allocation of competences to the Ministry of Economy and the State Committee for Scientific Research in relation to innovation policy.

In 2003, mainly on the basis of the State Committee for Scientific Research, the Ministry of Science and Information Technology was founded, whereas the State Committee for Scientific Research remained an institution deciding, above all, about allocation of state budget funds earmarked for financing scientific research. Subsequently, on the basis of the Act on Rules of Science Financing from 2004, the Science Council replaced the State Committee for Scientific Research on 5th February 2005. It was an expert and advisory organ to the Minister of Science and Information Technology (at present the Minister of Science and Higher Education) who decides about allocation of state investments in R&D activities (Dziennik Ustaw RP 2004, No. 238).

Changes in institutions connected with innovation policy aim at increasing the level of centralisation in this field, especially in relation to financing scientific research. The lack of one governmental organ, which would be entirely

responsible for formation and implementation of innovation policy, is considered to be a weak point.

In order to draw up characteristics and evaluate innovation policy, one needs to conduct analysis of the most important documents prepared by governmental institutions as well as acts passed by the Sejm of the Republic of Poland from the beginning of transformation process to 2005.

At the initial stage of economic transformation (1990-1991) the government eliminated almost all financial incentives for innovation activities which had existed in the eighties. The only incentive left was CIT exemption for scientific institutes. Additionally, the following new incentives were introduced:

- varied types of research projects (individual, ordered and purpose-oriented),
- possibilities of classifying R&D expenditures incurred by enterprises as revenue-earning costs (Jasiński 2006, p. 195).

The first document important for stimulating innovation processes was *Guidelines for Scientific and Technical Policy of the State* elaborated by the State Committee for Scientific Research in 1993. The emphasis in this document was put on activities aimed at improvement of effectiveness of scientific field's functioning and its relation to other fields of economy. Two goals of this document are worth emphasising, namely achieving in the year 2000 the ratio of R&D expenditures to GDP at the level of 2-2.5% (in fact it amounted to 0.67%) and introducing new pro-innovation instruments such as: low-interest credits for innovation purposes, tax exemptions, financial support for science parks, enterprise incubators and organisations transferring new technologies.

Three targets of innovation policy were exposed in the next document elaborated by the State Committee for Scientific Research in 1994 (*Guidelines for Pro-innovation Policy of the State*):

- stimulation and promotion of innovation attitudes in a society and in enterprises,
- support for development of institutions whose activities are aimed at improvement of innovativeness of Polish economy,
- providing legal regulations allowing R&D institutions for transfer of property.

The document involved proposals of applying a vast set of instruments, mainly tax and financial, which were gradually introduced in 1994-1999. Some of them, due to their innovative nature, deserve emphasising, namely:

- guarantee of bank credits reimbursement from the state budget's funds earmarked for investments aimed at introducing state technologies,

- preferential credits offered by state banks for modernising production by means of implementing results of state R&D projects,
- acceleration of depreciation of tangible fixed assets used for purposes of R&D activities,
- partial or total deductions, prior to income taxation, up to 50% of income on account of investments connected with implementing patents, licences and results of state scientific research.

Interesting proposals concerning innovation processes in regional terms are presented in *Programme in Support of Development of Regional Institutions Operating in Favour of Transfer of Technologies* which was prepared by the Regional Development Task Force in 1997³. The main aim of the programme is to develop innovation in the sector of small and medium-sized enterprises by means of facilitating transfer of modern technologies. It was assumed that such target should be achieved by creation of regional innovation systems (Janasz 2005, pp. 267–268). Therefore, a proposal was put forward to place voivodeship authorities in charge of the system. Innovation measures were to be financed with financial resources of the Regional Investment Funds which accumulated governmental and voivodeship funds as well as aid funds from the European Union.

Programme presented above should be evaluated as a positive one taking into consideration its right and ambitious goal as well as attempt to lay foundations for regional innovation systems. However, from practical point of view, the programme was declarative by nature; half out of its twelve tasks directed to the government were not completed, whereas the rest of them were fulfilled only partially (Jasiński 2006, p. 197).

Very general formulation of the target of innovation policy, i.e. increase of innovation and socio-economic development of the country, is characteristic for the next document, *Guidelines for Innovation Policy of the State until 2002*, which was elaborated by the Ministry of Economy in 1999. The list of priorities concerning perspectives of development of technology in Poland is more specific here. Taking into account present trends in this field, the following directions of technology were defined: information technology, biotechnologies, new materials and modern transport technology.

As far as proposals for instruments stimulating innovation processes are concerned, no new instrument was introduced in this document, whereas CIT exemption on account of investments connected with implementing patents, licences, etc. was abolished. The analysed document contains numerous

³ Task Force started operating in 1996 at the initiative of the Government of the Republic of Poland and the European Commission.

declarations on innovation policy in which terms such as rationalisation, popularisation, continuation and improvement predominate. In comparison with the programme of the State Committee for Scientific Research from 1994, the analysed document did not formulate any effective system supporting innovation activity.

The Ministry of Economy, in the form of a programme called *Increase of Innovativeness of Economy in Poland until 2006*, tried to introduce numerous solutions, rational and advantageous to innovation activity⁴. The programme was a part of *National Development Plan until 2006*. Its main goal was to introduce appropriate solutions, organisational in their nature, which would boost development of innovation and aim at:

- formation of mechanisms and structures supporting innovation activities,
- creation of innovation attitudes in a society,
- increase in effectiveness of implementation of modern solutions in economy.

The programme assumes adopting the following measures (Zwiększenie innowacyjności... 2000):

- creating centres of information, training and transfer of technologies within the scope of information technologies,
- providing financial support for innovation projects to small and medium-sized enterprises oriented towards making use of information technologies in products,
- developing information society by means of applying a vast range of information techniques in the process of training, enterprise management, service development, etc.,
- promoting Polish scientific and technical thought and Polish information technologies abroad.

Pro-innovation measures planned in this programme were to be financed by the European Union funds, the budget state, local governments' budgets and financial resources of enterprises. However, due to the lack of appropriate funds coming from the state budget and local governments, the programme was not carried into effect. Such situation proves indolence of the government and insufficient coordination of activities among governmental organs (the Ministry of Economy and the Ministry of Finance) in terms of innovation policy.

Great expectations for improvement of innovativeness of Polish economy are placed with the Act on Some Forms of Support for Innovation Activity from

⁴ The programme was elaborated in 2000.

2005. Most regulations of this Act became effective on 1st January 2006. The main aim of the Act's regulations is growth of innovativeness and competitiveness of economy through increasing the level of private sector's investments in R&D activities and growth of effectiveness of management of public funds allocated to R&D activities.

The Act introduces three new instruments, advantageous to stimulating innovation activity (Jasiński 2006, p. 199):

- technological credits granted on favourable conditions to enterprises interested in investments aimed at implementation of new own or purchased technology, launching manufacture of new products and modernising products in accordance with this technology. Credits up to 2 million Euros are granted by the State Management Bank on commercial terms, whereas an entrepreneur can receive remission of up to 50% of the amount of a credit,
- possibility of obtaining by an enterprise which carries out innovation activity a status of R&D centre provided that at least 50% of the income of that enterprise comes from the sale of own R&D research results,
- taxation of sale of R&D services with due VAT (22%), which is profitable for institutions conducting scientific research, since they can deduct VAT which they pay buying materials, energy, services, etc.

Furthermore, the Act restores previous instruments of stimulating innovation activity, namely: a) PIT and CIT deductions on account of expenditures concerning buying new technologies from scientific entities and R&D centres; b) possibility of classifying R&D expenditures incurred in a given tax year as revenue-earning costs.

A question arises: do Polish enterprises which adopt solutions proposed in the analysed Act increase their own innovation activity? Undoubtedly, the Act enriches innovation policy with new instruments which, following the assumptions, should support innovation activity of enterprises. Proposed solutions provide incentives not only to invest in R&D activities and new technologies but also to facilitate cooperation among scientific institutions and enterprises. However, on the basis of observations carried out up to now in reference to the degree of accomplishment of various pro-innovation programmes, one can question effectiveness of several new solutions. It particularly refers to technological credits, since they might be available, in practice, only to few enterprises. Moreover, bureaucratic procedures connected with obtaining technological credits, tax reliefs, etc. can discourage enterprises from adopting new solutions.

4. Conclusions

Considerations presented above allow to come to a few conclusions concerning evaluation of innovation policy implemented in Poland within the last dozen or so years. These conclusions concern general evaluation of the strategy of development of science and technology as well as instruments supporting innovation activity of enterprises.

Firstly, one can notice the lack of transparent and consistent strategy of development of science and technology which would determine state-preferable directions of development of scientific research and areas of technology in which domestic scientific potential and rich scientific achievements of Polish inventors and engineers can be used. On the basis of this strategy, rational programmes for increasing innovativeness of economy can be elaborated.

Secondly, disadvantages of innovation policy involve its strong centralisation, especially in financing scientific research, and the lack of developed regional structures supporting innovation activity.

Thirdly, great emphasis is put on stimulation of scientific research rather than on implementation of new technological solutions.

Fourthly, instruments of innovation policy insufficiently take into account the need for support of the process of innovation diffusion which requires appropriate institutions that facilitate transfer of new technology (for example bridge institutions and industrial clusters).

Fifthly, most instruments of innovation policy constitute financial incentives (bank credits, tax reliefs); other instruments (government orders, patent law, infrastructure of innovation transfer, etc.) are underestimated (Procesy innowacyjne... 2005, p. 154).

Developing effective and consistent innovation policy requires choice of a particular model (pattern) of innovation development which forms the basis for this policy. One can distinguish two such models in modern economy. In the first model, scientific and technical achievements of domestic R&D sector constitute the main factor indispensable for development of innovation. Investments in domestic scientific and development research determine invention and innovation supply. This model is applied in innovation policy of highly developed economies (Japan, the USA, Germany and Sweden). In contrast, the second model, referred to as adaptive, is based on import of new technologies (Procesy innowacyjne... 2005, pp. 264–265). Poland should develop an adaptive model, however, its effectiveness will be dependent on the increase of the level of R&D investments, especially in the case of enterprises.

The problem is that creative adaptation of imported technologies requires appropriate investments in financing domestic R&D institutions.

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