



# ERAWATCH Country Report 2008

## An assessment of research system and policies

### Poland

Michał Górzyński and Małgorzata Jakubiak



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**EUROPEAN COMMISSION**

# **ERAWATCH COUNTRY REPORT 2008**

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**ERAWATCH Network – CASE**

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**Joint Research Centre  
Directorate-General for Research**

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## Executive Summary

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Research-related policies aimed at increasing investment in knowledge and strengthening the innovation capacity of the EU economy are at the heart of the Lisbon Strategy. The strategy reflects this in guideline No. 7 of the Integrated Guidelines for Growth and Jobs, namely to increase and improve investment in research and development, in particular in the private sector. The report aims at supporting the mutual learning process and the monitoring of Member States efforts. The main objective is to characterise and assess the performance of the national research system of Poland and related policies in a structured manner that is comparable across countries. In order to do so, the system analysis focuses on key processes relevant for system performance. Four policy-relevant domains of the research system are distinguished, namely resource mobilisation, knowledge demand, knowledge production and knowledge circulation. This report is based on a synthesis of information from the ERAWATCH Research Inventory and other important available information sources.

Poland is the largest new EU Member State. With R&D expenditures of €1.5b (2006) it ranks 14th in the EU, contributing around 0.7% of total EU27 R&D expenditures. Poland's society and economy have undergone a profound transformation. Poland has now also started to adjust and reformulate the role of the research system in the economy and society. The table below summarises the ways in which Poland can build on existing strengths in this process and which weaknesses remain relevant.

Resource mobilisation despite an improvement during last years continues to be low and this hampers possibilities for long-term investment and fighting with barriers for private R&D. Statutory or block funding remains to be the main instrument of financing research, as opposed to competitive project grants. Bolstering of links and knowledge circulation between public and private R&D actors is frequently highlighted as one of the main challenges the Polish research system is facing. Well-developed institutional setting for knowledge circulation exists, yet there is scope for improvement in terms of its functioning. In addition, business demand for knowledge in Poland is constrained by the low- and medium-tech dominance of industrial production. However, measures aimed to enhance knowledge circulation between the public and the private research sector have started to be implemented and systematic instruments to identify drivers of knowledge demand have been introduced. Here, the positive role has been played by copying the institutional solutions from the "old" EU and by the support which Poland has been receiving through the EU structural funds and the Framework Programme. The new rules and the additional resources – although acting as top-ups only – have introduced an element of competition into the system, which should soon bring results. On the top of it, increasing demand for knowledge from the side of multinational subsidiaries may create spillover effects and boost overall knowledge demand.

Domain	Challenge	Assessment of strengths and weaknesses
Resource mobilisation	Justifying resource provision for research activities	Resource mobilisation has not been high on the policy agenda but there are signs that this is slowly changing. There is greater recognition of a need to invest in R&D in order to innovate.
	Securing long term investment in research	Resource mobilisation still low and there is scope for improvement of long-term planning.
	Dealing with barriers to private R&D investment	Private actors still face difficulties in coping with the risk of R&D investment. Yet some supporting measures started to be introduced (guarantee and loan funds for innovative SMEs, support of commercialisation of research etc.).
	Providing qualified human resources	Increasing number of young graduates yet still lack of perspectives for young researchers and conditions for foreign researchers are not attractive.
Knowledge demand	Identifying the drivers of knowledge demand	Knowledge demand constrained by the low- and medium-tech profile of the production. Systematic instruments to identify drivers of knowledge demand have only been introduced in recent years.
	Co-ordination and channelling knowledge demands	Policy makers started to coordinate and channel knowledge demand only recently.
	Monitoring of demand fulfilment	Evaluation culture and systemic monitoring not strongly developed.
Knowledge production	Ensuring quality and excellence of knowledge production	Need for restructuring and consolidation of the public R&D sector. Effective evaluation system of research units is still required. Statutory or block funding still the main instrument of financing research, as opposed to competitive project grants. Starting with FP5 competitive EU funding mechanisms started to play a role. Solid system to enhance basic research underpinned by quality criteria
	Ensuring exploitability of knowledge	Weak mechanisms (even disincentive system) to gear knowledge production towards commercial applications at public research units. Majority of internal IPR regulations pose huge barrier for simulation of R&D activity.
Knowledge circulation	Facilitating circulation between university, PRO and business sectors	Well-developed institutional setting exists, yet the quality of services is low on average. The challenge to bolster links between public and private R&D actors remains.
	Profiting from international knowledge	Despite supporting policies, level of internationalisation of Polish R&D is still low. This in turn limits absorptive capacities.
	Enhancing absorptive capacity of knowledge users	Low absorptive capacity of knowledge users and in particular SMEs but a number of initiatives launched in order to improve absorptive capacities of Polish companies.

Recent policy changes created many opportunities for better-tailored actions. On top of it the ongoing reform of the funding system aimed at its decentralization (shifting of the financing and project implementation from the Ministry of Science and Higher Education to newly established units – e.g. NCBR) is the most important initiative. The goal of the reform is to increase the effectiveness of public expenditures through shifting of the funding system towards more project than statutory based funding and concentrate the financial sources in the most competitive research units. Additionally more precise funding priorities, improved implementation mechanisms through multi-annual strategic programmes, and the need to conduct impact assessments

evaluating the use of the EU funds should better channel demand for knowledge. In terms of resource mobilisation, opportunities are created by public commitments (meeting Lisbon objectives) and by the availability of the EU structural funds. On the top of it, new support measures are expected to boost business enterprise R&D. However, leverage effects from public towards private resource mobilisation may not be achieved to the expected degree. Slow pace of restructuring of the State research institutes can be next important barrier for a concentration and increase of international competitiveness of the Polish R&D potential.

Domain	Main policy opportunities	Main policy-related risks
Resource mobilisation	<ul style="list-style-type: none"> <li>Increased public resource mobilisation for research due to significant budget increases in response to the Lisbon Strategy and the availability of European Structural Funds</li> <li>Enhanced private R&amp;D investment due to a range of new support measures, which may also contribute to further foreign R&amp;D investment</li> </ul>	<ul style="list-style-type: none"> <li>Leverage effects from public towards private resource mobilisation might not be achieved to the extent expected</li> </ul>
Knowledge demand	<ul style="list-style-type: none"> <li>New instruments preparing research policy priority setting including major scientific and private stakeholders, e.g. through the "Poland 2020" National Foresight Programme</li> <li>More effective public demand through the joint Operational Programme for an Innovative Economy and improved implementation mechanisms for multi-annual strategic programmes</li> <li>Impact assessments evaluating the use of EU funds may help to target better future R&amp;D support and make business community more involved</li> </ul>	<ul style="list-style-type: none"> <li>Possible improvement of effectiveness of public expenditure by increased involvement of the regions through regional operational programmes threatened by a lack of adequate regional governance capacities</li> </ul>
Knowledge production	<ul style="list-style-type: none"> <li>Enhancing excellence as well as effectiveness of public expenditures through decentralization of the financing system (e.g. including creation of NCBR)</li> <li>Shift of the funding system towards more project than statutory based funding, what will stimulate the concentration of the R&amp;D potential and the quality increase of the produced knowledge</li> <li>Development and modernisation of the R&amp;D infrastructure</li> <li>Development of the cluster's structures</li> </ul>	<ul style="list-style-type: none"> <li>Slow pace of concentration of the R&amp;D sector</li> <li>Too large reliance of R&amp;D institutions (mainly public) on the structural funds, what may blocks the process of matching the knowledge production with economic purposes</li> </ul>
Knowledge circulation	<ul style="list-style-type: none"> <li>Implementation of the Innovative Economy and Human Capital Operational Programme for the period 2007 to 2013 will enhance cooperation and transfer between PRO, universities and private enterprises</li> <li>Support for international activities in the Framework Programmes and beyond might produce leverage effects</li> <li>Development of the cooperation among PRO, universities and private enterprises through development of the technology platforms</li> </ul>	<ul style="list-style-type: none"> <li>Modest scope of reform of institutional setting for facilitating knowledge circulation may limit effectiveness of measures</li> <li>The policy measures implemented are not yet sufficient to significantly enhance absorptive capacity of private actors</li> <li>Too high dependence on the public sources by the PRO and universities - having an easy access to public money (structural funds) lack of incentives to develop inter-sectoral cooperation</li> </ul>

Relevance of the European Research Area (ERA) dimension has increased in recent years. It is the crucial factor stimulating internationalization of the R&D sector in Poland. The recently adopted strategies (e.g. Strategy for the Development of Polish Science until 2015) assume that Polish active contribution into ERA development is one of the most important challenges. In terms of the mobilisation of resources, contribution of the EU funding started to be important since Poland joined the EU (2004). Systematic instruments to identify drivers of knowledge demand modelled on the EU ones have been introduced in recent years (e.g. foresight and strategic research agendas).

Despite unsatisfactory results of the Polish research institutions participation in the EU FP programmes, the role of the EU funding and programmes in the process of production of high quality knowledge is very important. It includes among others an opportunity to participate of the Polish researchers in the high quality international research projects. Additionally, participation in the EU research programmes can be considered as an alternative quality assessment system of the researchers, research teams or units – alternative to the present parametric assessment system. ERA is one of the most important factors facilitating knowledge circulation among university, PRO and business sectors (e.g. a creation in 2005 of the Polish Technology Platforms for cooperation between industry and research).

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# 1 - Introduction and overview of analytical framework

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## 1.1 *Scope and methodology of the report in the context of the renewed Lisbon Strategy and the European Research Area*

As highlighted by the Lisbon Strategy, knowledge accumulated through investment in R&D, innovation and education is a key driver of long-term growth. Research-related policies aimed at increasing investment in knowledge and strengthening the innovation capacity of the EU economy are at the heart of the Lisbon Strategy. The strategy reflects this in guideline No. 7 of the Integrated Guidelines for Growth and Jobs. This aims to increase and improve investment in research and development (R&D), with a particular focus on the private sector. One task within ERAWATCH is to produce analytical country reports to support the mutual learning process and the monitoring of Member States' efforts.

The main objective is to analyse the performance of national research systems and related policies in a comparable manner. The desired result is an evidence-based and horizontally comparable assessment of strength and weaknesses and policy-related opportunities and risks. A particular consideration in the analysis is given to elements of Europeanization in the governance of national research systems in the framework of the European Research Area, relaunched with the ERA Green Paper of the Commission in April 2007.

To ensure comparability across countries, a dual level analytical framework has been developed. On the *first level*, the analysis focuses on key processes relevant to system performance in four policy-relevant domains of the research system:

1. Resource mobilisation: the actors and institutions of the research system have to ensure and justify that adequate public and private financial and human resources are most appropriately mobilised for the operation of the system.
2. Knowledge demand: needs for knowledge have to be identified and governance mechanisms have to determine how these requirements can be met, setting priorities for the use of resources.
3. Knowledge production: the creation and development of scientific and technological knowledge is clearly the fundamental role of a research system.
4. Knowledge circulation: ensuring appropriate flows and distribution of knowledge between actors is vital for its further use in economy and society or as the basis for subsequent advances in knowledge production.

These four domains differ in terms of the scope they offer for governance and policy intervention. Governance issues are therefore treated not as a separate domain but as an integral part of each domain analysis.

On the *second level*, the analysis within each domain is guided by a set of generic "challenges" common to all research systems that reflect conceptions of possible bottlenecks, system failures and market failures (see table 1). The way in which a specific research system responds to these generic challenges is an important guide

for government action. The analytical focus on processes instead of structures is conducive to a dynamic perspective, helps to deal with the considerable institutional diversity observed, and eases the transition from analysis to assessment. Actors, institutions and the interplay between them enter the analysis in terms of how they contribute to system performance in the four domains.

**Figure 1: Domains and generic challenges of research systems**

Resource mobilisation	Knowledge demand	Knowledge production	Knowledge circulation
<ul style="list-style-type: none"> <li>• Justifying resource provision</li> <li>• Long term research investment</li> <li>• Barriers to private R&amp;D funding</li> <li>• Qualified human resources</li> </ul>	<ul style="list-style-type: none"> <li>• Identification of knowledge demand drivers</li> <li>• Co-ordination of knowledge demands</li> <li>• Monitoring of demand fulfilment</li> </ul>	<ul style="list-style-type: none"> <li>• Quality and excellence of knowledge production</li> <li>• Exploitability of knowledge production</li> </ul>	<ul style="list-style-type: none"> <li>• Knowledge circulation between university, PRO and business sectors</li> <li>• International knowledge access</li> <li>• Absorptive capacity</li> </ul>

Based on this framework, analysis in each domain proceeds in the following five steps. The first step is to analyse the current situation of the research system with regard to the challenges. The second step in the analysis aims at an evidence-based assessment of the strengths and weaknesses with regard to the challenges. The third step is to analyse recent changes in policy and governance in perspective of the results of the strengths and weaknesses part of the analysis. The fourth step focuses on an evidence-based assessment of policy-related risks and opportunities with respect to the analysis under 3) and in the light of Integrated Guideline 7; and finally the fifth step aims at a brief analysis of the role of the ERA dimension.

This report is based on a synthesis of information from the European Commission's ERAWATCH Research Inventory<sup>1</sup> and other important publicly available information sources. In particular in the system analysis and assessment, it draws to a significant extent on the ERAWATCH Analytical Country Report 2007 (Nill, 2008). In order to enable a proper understanding of the research system, the approach taken is mainly qualitative. Quantitative information and indicators are used, where appropriate, to support the analysis.

After an introductory overview of the structure of the national research system and its governance, chapter 2 analyses resource mobilisation for R&D. Chapter 3 looks at knowledge demand. Chapter 4 focuses on knowledge production and chapter 5 deals with knowledge circulation. Each of these chapters contains five main subsections in correspondence with the five steps of the analysis. The report concludes in chapter 6 with an overall assessment of strengths and weaknesses of the research system and governance and policy dynamics, opportunities and risks across all four domains in the light of the Lisbon Strategy's goals and the ERA.

<sup>1</sup> ERAWATCH is a cooperative undertaking between DG Research and DG Joint Research Centre and is implemented by the IPTS. The ERAWATCH Research Inventory is accessible at <http://cordis.europa.eu/erawatch/index.cfm?fuseaction=ri.home>. Other sources are explicitly referenced.

## 1.2 Overview of the structure of the national research system and its governance

Poland is the largest new EU Member State and one of the six largest EU countries in terms of population. With gross domestic expenditures on R&D (GERD) of €1,513m (2006) it ranks 14th in the EU, contributing around 0.7% of total EU27 R&D expenditures. At 0.56% (GERD as a percentage of GDP in 2006) Polish R&D intensity is significantly lower than the EU 27 average of 1.84% and also lower than ten years ago. At 7% (2006) the share of GERD financed from abroad is still not very significant and remains below the EU average, but has been increasing rapidly since 2000.

Figure 2 below shows the current governance structure of the Polish research system. It has undergone considerable changes in the last four years. In 2004, for the first time a ministry responsible for the definition of R&D policy (instead of the scientific community itself) was established. Since the end of 2005 it has taken the form of the [Ministry of Science and Higher Education](#) (MNiSW) and is the central financing institution of public non-military R&D (see Table 1 below).

**Table 1: Ministry of Science and Higher Education 2008 budget plan (in €m)**

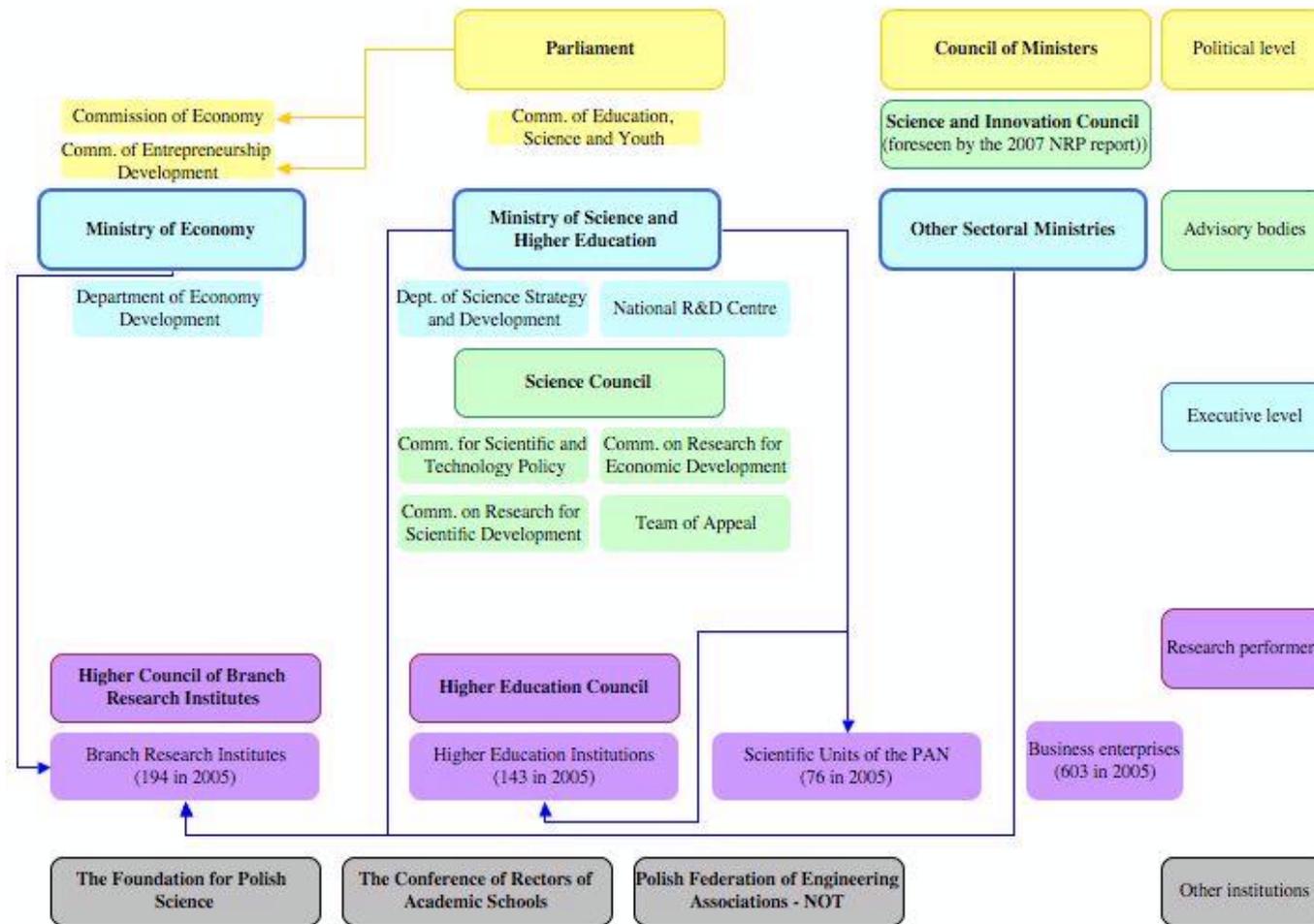
Spending categories	Budget	Share (%)
Research projects and goal-oriented projects	307	28,0
Statutory activity and investments	611	55,7
Research support activity	18	1,6
Foreign cooperation	44	4,0
Remaining activity	117	10,7
Total	1 097	100,0

Source: Ministry of Science and Higher Education; these figures do not include EU Structural Funds

Advice to the MNiSW is provided by the Science Council, the successor of the State Committee for Scientific Research formerly responsible for research policy. The Science Council comprises a science and technology committee and research commissions for the needs of science and of industry. The opinions and recommendations issued by the Science Council have a significant impact on the final decisions of the MNiSW. Further changes in the governance structure are currently ongoing, such as the creation of the National R&D Centre, a national agency for research programme implementation (National Science Center). The goal of the present reform is to decentralize in the next years the present financing system (to shift financing and implementation of the research and development projects from the MNiSW to the newly established institutions).

The [Ministry of Economic Affairs](#) (MG) is responsible for innovation policy. It governs the majority of the so-called R&D units (JBRs), one of the main groups of public R&D performers, although some JBRs are also governed by other sectoral ministries. It is also the co-ordinator of the Lisbon Strategy for Poland and in charge of the corresponding National Reform Programme. Of other ministries, [the Ministry of Regional Development](#) is worth mentioning. It is the main responsible for the national development strategy which includes the supervision of the management of EU Structural Funds and responsibility for the regional operational programmes.

**Figure 2: Overview of the governance structure of the Polish research system**



Source: ERAWATCH Research Inventory (2008), [Structure of research system](#)

Parliament plays a fairly strong role in research policy making as initiatives in this area are usually introduced in the form of laws which need to be approved by Parliament, e.g. the 2007 amendments to the [Act on the Principles of Financing Science](#). Moreover, it significantly shapes and finally decides the annual public budget for R&D as well as the structure of taxation.

The role of the 16 Polish regions in research policy making is still limited. Nevertheless, regional governments have significant resources from European Structural Funds with which to implement innovation activities and develop regional human resources and now all the regions have regional innovation strategies. Their role is supposed to increase over the 2007-2013 financial perspective, as each region has its own regional operational programme for the first time.

There are four major groups of R&D performers. These are the currently 147 research-performing universities, 190 Research and Development Units (JBRs), 78 institutes of the [Polish Academy of Science](#) (PAN), and around 570 R&D centres of private enterprises, the latter performing around 1/3 of total Polish R&D (where the EU average of share of R&D performed by the business sector is twice as high).

## 2 - Resource mobilisation

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The purpose of this chapter is to analyse and assess how challenges related to the provision of inputs for research activities are addressed by the national research system. Its actors have to ensure and justify that adequate financial and human resources are most appropriately mobilised for the operation of the system. A central issue in this domain is the long time horizon required until the effects of the mobilisation become visible. Increasing system performance in this domain is a focal point of the Lisbon Strategy, with the Barcelona EU overall objective of a R&D investment of 3% of GDP and an appropriate public/private split as orientation, but also highlighting the need for a sufficient supply of qualified researchers.

Four different challenges in the domain of resource mobilisation for research which need to be addressed appropriately by the research system can be distinguished:

- Justifying resource provision for research activities;
- Securing long term investment in research;
- Dealing with uncertain returns and other barriers to private R&D investment; and
- Providing qualified human resources.

### 2.1 *Analysis of system characteristics*

#### 2.1.1 Justifying resource provision for research activities

Resource mobilisation for research has not traditionally been high on the general policy agenda, although there is evidence suggesting that this is slowly changing. Until 2005, there was clear competition between research and innovation policy, which in practice meant a lack of horizontal coordination between the ministries concerned. The changing context after EU accession in 2004 has contributed to greater recognition of R&D as a driver of innovation, e.g. Poland initially even

embraced the Barcelona objective of attaining a level of 3% of gross domestic product (GDP) devoted to R&D by 2010.

However, support for research has conflicted with other types of spending. Last governments debated largely about sector-specific wage demands, about lowering taxes and/or labour costs and the need of cutting some spending in the light of lowering fiscal deficits. The idea of steadily increasing budgetary resources to finance R&D at the same time has been rarely put forward. It is well reflected in the figures of the state budget. Still in 2006 share of government budget appropriation or outlays for R&D (GBAORD) in total public expenditures remained well under 1% (0.7%; with the EU average of 1.6%), and lower than in 2000 (data from Eurostat).

Correspondingly, the enhancement of public understanding of science is not a priority topic, but there are initiatives in Poland promoting science among the general public, and particularly children and young people, e.g. Science Days or Science Picnics (European Trend Chart on Innovation, 2006). There are also flourishing science festivals at the local level, which are co-funded by the government.

The role of public debate while discussing public support for research – although still low – increased along with entering the EU and with the compulsory social consultations of National Development Plans and shorter-term strategic documents used to secure funding from the EU budget. Consequently, the idea of mobilising resources for research became a topic in Polish media.

### 2.1.2 Securing long term investment in research

In Poland, government – and in particular the Ministry of Science and Higher Education - plays the main role in securing long-term investment in research. The legal framework was last updated in 2007 in the form of amendments to the 2004 [Act on the Principles of Financing Science](#). The Act introduced for the first time a basis for multi-annual research programmes. It also requires that government expenditures on R&D should be set at a level sufficient to achieve the Lisbon Strategy goals. On the top of this act that governs financing of science, the 2006 [Act on the Rules Guiding Development Policy](#), defines main bodies responsible for development policy and the cooperation among them. Among others, the act foresees the creation of the long-term strategy for the development of science in Poland - the strategy was drafted in 2008 and has been sent to intergovernmental and social consultations (see part 2.3 on recent changes in policies). 2007 amendments to the Act on Principles of Financing Science included measures directed at: i) better selection of beneficiaries of state support for research ii) support to R&D transfer from the research to the enterprise sector and from abroad to Polish enterprises (MNiSW, 2007).

The Polish system is heavily reliant both on publicly-funded research and on publicly-owned research organisations. Public funds covered nearly 58% of GERD, i.e. around €870m (in 2006). Half of this amount of publicly financed research is conducted in public or semi-public research institutes, while more than 40% is performed in higher education and less than 10% in the business sector. This structure of publicly-funded R&D has not changed in recent years, although the nominal amounts of public money directed to R&D has steadily increased since 2004. The main funding instrument is statutory (block) funding of research activities and infrastructure, which according to the 2008 budget is estimated at 2.28 billion PLN, equal to about 55.73% (comparing to 63.16% in 2007) of the entire public budget allocated to science and research. Since the beginning of the 1990s research

spending of public research units (universities, Polish Academy of Sciences, R&D units) is financed by this type of funding from the national budget. In relative terms, basic research has benefited from this funding structure, as between 1994 and 2003 its share rose from 32% to nearly 40% and began to decrease slowly since 2004 only – to 36,5% in 2006 (ERAWATCH Network, 2006 and GUS, 2007).

Since Poland joined the European Union in 2004, European funding has started to play a significant role in R&D resource mobilisation. This has resulted in a considerable increase in the amount of financial support allocated to research, technological development and innovation through the EU Structural Funds. The total allocation from the National Development Plan 2004 - 2006 amounted to €800m for innovation and R&D support (Republic of Poland, 2006). Planned resources for this period under the measure "Strengthening cooperation between the R&D sector and the economy" amounted to €137m, of which €100m come from the EU. In mid-2007 nearly this entire amount was contracted (Republic of Poland, 2007) and the implementation of projects finished in 2008. In this year an implementation of the next round of Structural Fund interventions for the financial horizon 2007-2013 started (see part 2.3 on recent changes in policies).

In addition, Polish research units currently receive about €50m a year from the Framework Programme (IPTS, 2006). For some research units this represents a considerable share. Poland has also joined many European infrastructure initiatives, and was for instance, the first Central and Eastern European country to become a member of CERN. Co-operation with ESA has also recently begun.

In conclusion, basic resources for long term investment in research are mainly and steadily provided by the government. Comparing with Europe as a whole, however, resource mobilisation is low. Government appropriations for R&D as a share of GDP is 0.34% (2005), which is significantly below the EU25 average of 0.64% (2005) as well as below the share in other Central and Eastern European Countries except for Slovakia and has been in continual decline since the early 1990s (Dabrowa-Szeffler and Jablecka-Prylowska, 2006). At 1.1%, the annual rate of growth in R&D expenditure in real terms between 2001 and 2005 was also low, although this seems to have changed recently. In a recent OECD assessment, the capacity for long-term planning was highlighted as one of the areas where there is scope for improvement (OECD, 2007).

### **2.1.3 Dealing with uncertain returns and other barriers to business R&D investment**

*Enterprise R&D.* The framework for private resource mobilisation for R&D changed completely with the transition from a centrally planned economy to a market economy. In 2006 573 enterprises were involved in R&D activity (GUS, 2007). Today, the share of total Polish R&D financed by the business sector is around 26% (2006), which even dropped comparing to 1995 (GUS, 2007). This comparatively low share is also due to the lack of large R&D intensive firms. According to the 2008 EU Industrial R&D Investment Scoreboard (European Commission, 2008), the only Polish company among the European top 500 R&D investors is BRE BANK (€22.91m in 2007). Also in comparison with other Central and Eastern European Countries, multinational firms still play a minor, albeit expanding role. Nearly 40% of BERD is performed by small and medium-sized firms (SMEs) with less than 250 employees, a significantly higher share than the EU average.

*Role of banks and venture capital.* External private financing mechanisms for business R&D by banks and venture capital firms are also rather weak, although a range of guarantee and local loan funds have recently emerged. In 2005 government decided to create a fund of funds – [National Capital Fund](#) (KFK – Krajowy Fundusz Kapitalowy), which aims to supply equity to innovative SMEs. The activities of the Fund have recently started, so it is too early to assess its effectiveness. However, the general picture is that of lack of seed capital. It is partly due to low attractiveness of the Polish market (the average size of innovative projects are too small and there is too few projects) and partly due to still high exit barriers (relatively less developed financial market).

*Role of government.* The government has partially attempted to address the problem. 13.7% (2005) of business R&D is financed by the government, which appears to be one of the highest shares in the EU, although it is decreasing. This figure has to be interpreted with caution, because it includes those state-owned R&D units (JBRs) whose R&D is over 50% funded from market sources. So - called goal oriented projects are one instrument financed by the [Ministry of Science and Higher Education](#), which supports collaborative research for SMEs and industry. In principle, they require a 50% contribution from business. Recently, also a new initiative was introduced "Technology Initiative - IniTech" (Inicjatywa Technologiczna) - (see part 4.3). The initiative is aimed at supporting a commercialisation of research results such as market research, feasibility studies, construction of prototypes, tests, etc.

With the [Act on Some Forms of Supporting Innovation Activities](#) (2005), the government has introduced additional mechanisms to support research in the private sector. The status of private R&D centres has been created (for details see section 2.3). For the first time, the Act also allows R&D expenditure to be classed as an expense for tax purposes, regardless of the final R&D results, and to shorten the depreciation period from 36 to 12 months. Further incentives provided focus less on R&D as such and more on the acquisition of technologies, e.g. the creation of a Technology Loan Fund and a 50% deduction of the cost of acquiring new technology from taxable income (see section 5.1.3). In addition, general income tax exemptions and other investment incentives are available for new "technological" investment in special economic zones, and these also apply to R&D investments.

Summing up, private actors in Poland seem to still have difficulties coping with the risks of R&D investment. At 0.17% (2005) business-financed R&D as a share of GDP is significantly lower than the EU average of 1.0% (2005). While the EU average is not the appropriate benchmark for comparison given the socio-economic situation of Poland, the intensity of private R&D funding is also lower than in other Central European Countries such as the Czech Republic, Hungary and Slovenia. Increasing business R&D is one of the challenges repeatedly highlighted, but given the low absorptive capacity and a lack of private knowledge demand an adequate response has to go beyond the domain of resource mobilisation (see also sections 3 and 5.1.3).

#### **2.1.4 Providing qualified human resources**

*Quality of postgraduate education.* Postgraduate education is offered by universities, which have a fairly autonomous status. The availability of qualified researchers is relatively high. Currently 30,000 students are undertaking PhD training, and 5,000 of them graduate each year. The number of doctoral students has increased 12-fold

since 1990 (Dabrowa-Szeffler and Jablecka-Prylowska, 2006). Also the number of S&T graduates has risen significantly over the last few years (see also section 5.1.3). With the economic and social transformation, other fields such as economics, business and social sciences have become increasingly attractive and there are career prospects for young researchers within these fields.

*Perspectives for researchers.* Pursuing an academic career requires a PhD, "Habilitation Doctor" status, and subsequently the academic title of Professor, with specific criteria and procedures at each of the three levels. The majority of the research community, in particular young researchers, are calling for the abolition of the second degree, while its defenders support the present system as a quality assurance mechanism (Dabrowa-Szeffler and Jablecka-Prylowska, 2006). Moreover, limited post-doc and faculty positions in universities compared with the number of PhDs, particular in the social sciences, and low demand for researchers in business are disincentives for starting a researcher career (OECD, 2007). The government is trying to enhance quality and perspectives of postgraduate education with the provision of competitive grants (supervised by the Science Council) for:

- supervised projects aimed at preparing a doctoral dissertation and
- specific projects, including projects relating to the post-doctoral academic degree, on subject matter specified by the applicant.

*Attractiveness of research conditions for foreign researchers.* Attracting foreign researchers, as additional mechanism to provide qualified human resources, is hampered by comparatively low salaries and partly also by the language barrier and obsolete research equipment. However in 2006 the Polish government implemented programme to recruit expatriate researchers - [Homing Programme](#) coordinated by the Foundation for Polish Science. It was designed for young researchers returning from an extended scientific stay abroad to continue and develop the research in Poland.

## 2.2 Assessment of strengths and weaknesses

The most important mechanisms to ensure the provision of adequate and well qualified human resource base for R&D have been recently implemented and are in place, and they seem – at least partly – address main weaknesses of knowledge mobilisation in Poland. However, their effects are yet to be seen. The low overall mobilisation of public resources remains problematic.

Main strengths	Main weaknesses
<ul style="list-style-type: none"> <li>• Mechanisms are in place to ensure the provision of an adequate and well qualified human resource base for R&amp;D.</li> </ul>	<ul style="list-style-type: none"> <li>• Still low public resource mobilisation.</li> <li>• Limited private R&amp;D funding in comparison with the EU average and other new Member States</li> <li>• Little pressure from society and the economy to provide more resources for R&amp;D – low awareness issue</li> <li>• Lack of career perspectives for new postgraduates</li> </ul>

### 2.3 Analysis of recent policy changes

While foreign multinational firms present in Poland have typically conducted little R&D in Poland, this has been changing in recent years. Around 70 foreign companies invested in R&D and many of them were established during last few years. The majority of these investments are in the IT and transportation sector (including air-transportation sector – 3 cases). Another trend relevant for securing long-term investment in R&D is that of the increasing budgets for R&D and innovation in the new programming period for the EU Structural Funds (2007-2013). The total Community allocation for Poland foreseen is €66.5b of which 63.9% are scheduled to be Lisbon goal-relevant expenses. This is around three times the respective amount for the period 2004-2006 (Republic of Poland, 2007).

The [National Reform Programme \(2005-2008\)](#) of December 2005 assumed that a level of 1.65% GERD per GDP will be reached by 2008. On 8 June 2006, the Council of Ministers adopted the Implementing Document of the National Reform Programme (KPR), setting clear targets for R&D policy. The document confirmed the 1.65% policy target for GERD, and introduced the additional target of increasing private funding of R&D from 0.17% of GDP in 2004 to 0.55% of GDP by 2008. The progress report of 2007 expects and commits to a much more modest rise of GERD per GDP to 0.81% in 2008 and 0.92% in 2010 (Republic of Poland, 2007). Given existing funding levels which are still well below, the latter percentages are more realistic (although still difficult to achieve).

In 2008, the public science budget (excluding military R&D and EU Structural Funds) is 4.1 billion PLN (increase of 10% over 2007). According to the Ministry of Finance the public science budget should increase in 2009 by 29% (1.4 billion PLN) to 5.6 billion PLN.

Early in 2006 the various R&D relevant fiscal measures contained in the [Act on Some Forms of Supporting Innovation Activities](#) (2005) came into force (see also section 5.1.3). It is expected that these incentives will also help attract R&D investments by foreign companies. A business granted the status of a private R&D centre will be exempted from various taxes (e.g. agricultural tax, forestry tax and property tax). Such businesses will also be able to establish an internal innovation fund from which to finance R&D activities. An R&D Centre is allowed to pay up to 20% of its monthly income into this fund. The advantage is that the financial resources allocated to this fund (if used) are not treated as income, thus reducing tax liability. Among the conditions to be met is that 50% of annual revenues (of at least €800,000) should be generated by the company's own research and development activities. Participation by firms has thus far been low, however (OECD, 2007).

In 2008 new [Act on the Principles of Financing Science](#) was proposed by the MNiSW and on 2<sup>nd</sup> December 2008 voted by the Council of Ministries. The main objective of the Act is to impose a new structure of the financing system of R&D activity in Poland. According to the Act the new system will be based on three pillars. National Science Center – a new institution, according to the legislation to be established in 2009, will be responsible for financing of the basic research. National Research and Development Centre, already responsible for implementation of the strategic programmes, according to the new Act will be also in charge of financing all development projects financed and implemented up to now by the Ministry of Science and Higher Education. According to the Act, up to 2015 the budget of these

two institutions will achieve a level of 50 % of public expenditures for science. The funds will be distributed by these institutions on the competitive base.

[“The strategy for the development of science in Poland until 2015”](#) was drafted in April 2008. The strategy sets the following goals: i) upgrade level and effectiveness of science in Poland and enlarge its input into the global science; ii) enable fuller use of science potential of Poland; iii) stimulate increase of innovativeness of Polish economy, iv) assure tighter links with the European Research Area. Among others, the strategy sets the goal to change the proportion of subjective and objective (competition-related) public support for research, so that more support would be allocated through research competitions. The Strategy assumes the following tools (activities) for achieving its goals: development and rejuvenation of the research staff, restructuring of the public R&D structures (including PAN and JBRs – state-owned research units), increase of expenditures on R&D, stimulation of international cooperation, prioritization of research and development activities and development of R&D infrastructure. According to the Strategy till 2015 GERD should achieve the level of 2%, while BERD 0,8% (what seems to be unrealistic). The strategy is to be reviewed in 4 years time (MNiSW, 2008).

New programmes have been also recently designed and implemented by the Ministry of Science and Higher Education to support the career development of young post-doctoral researchers and attract foreign researchers to Polish R&D institutions. The Welcome Programme and International PhD Studies Programme are the examples of such activities. The objective of the [International PhD Studies Programme](#) is to increase the quality of research carried out in Poland and performed by young scientists during the preparation of their PhD theses. The objective of the [Welcome Programme](#) is to engage outstanding researches from abroad in creating research teams in Poland and intensifying international cooperation of the Polish institutes and universities.

Challenges	Main policy changes
Justifying resource provision for research activities	<ul style="list-style-type: none"> <li>• The needs have been clearly articulated, but it has not yet transformed into decisions (the draft Acts were passed to the Parliament).</li> </ul>
Securing long term investments in research	<ul style="list-style-type: none"> <li>• Measures with the aim of attracting more FDI into R&amp;D (tax incentives) started to be implemented</li> <li>• Long-term strategy for the development of Polish science aimed at stimulating the reform of the financing scheme in Poland (more rapid shift towards more competitive forms of funding)</li> </ul>
Dealing with uncertain returns and other barriers to business R&D investments	<ul style="list-style-type: none"> <li>• Long-term strategies aim at changing present structure of research activities; more focus on the experimental development and applied rather on the basic research projects.</li> <li>• Development of the instruments ensuring commercialization of the research projects results.</li> </ul>

Recent policy initiatives have to a large extent concentrated on preparing the Structural Fund interventions for the financial horizon 2007-2013, which is not surprising given the importance of financial allocations. According to the National Strategy Reference Framework (NSRO) adopted by the Council of Ministers on 1 August 2006, there have been 40 events and 3,500 people have been consulted

about the priorities. One result is the single [OP Innovative Economy 2007-2013](#), which includes research-related issues. The total public allocations for the implementation of the programme amount to €9,711.6m, including EU funding of €8,245.9m. Among the priorities are research and development of modern technologies as well as R&D infrastructure, for which an EU contribution of €2,234m is foreseen (Ministry of Regional Development, 2007). In addition there are 16 regional operational programmes with an overall EU contribution of €16.55b, including technological research and development, and innovation and enterprise as one action line. In particular the implementation at the regional level, which up to now had a limited role, still constitutes a considerable research policy challenge (Walendowski, 2007). The new operational programmes "[Human Capital 2007-2013](#)" (see section 5.3.) and "[Development of Eastern Poland](#)" contains important R&D-related elements, too.

### 2.4 Assessment of policy opportunities and risks

Lisbon Strategy and the availability of European Structural Funds should enhance mobilisation of resources in the near future. There is also a chance that new policies will enhance private R&D. However as the quality of the domestic research sector (the quality of research staff and infrastructure) is one of the crucial factors for stimulating the business sector R&D activity, the effectiveness of recent policies (especially ensuring the adequate level of resource mobilization from the public sources) will impact the scope of the private R&D activity and at the same time its recourse mobilization. The risk is also associated with the global economic slow down, and the present available tools for stimulation of private resource mobilisation may not be adequate (not enough direct support, instruments based on banking co-finance may not be available for innovative companies). Finally slow pace of restructuring of the financing structure may cause that the public funds will be channelled to the areas (e.g. basic research). This and the non R&D-oriented design of measures like tax incentives (see also section 5.1.3) contribute that the leverage effects for private R&D might not be achieved to the extent expected.

Main policy opportunities	Main policy-related risks
<ul style="list-style-type: none"> <li>• Increased public resource mobilisation for research due to significant budget increases in response to the Lisbon Strategy and the availability of European Structural Funds</li> <li>• Enhanced private R&amp;D investment due to a range of new support measures, which may also contribute to further foreign R&amp;D investment</li> </ul>	<ul style="list-style-type: none"> <li>• Leverage effects from public towards private resource mobilisation might not be achieved to the extent expected</li> </ul>

### 2.5 Summary of the role of the ERA dimension

Contribution of the EU funding started to be important since Poland joined the EU (2004). It was planned that the allocation of the EU resources for innovation and R&D support in the previous financial perspective (i.e. in the case of Poland during 2004-2006) would be €800m (Republic of Poland, 2006). In mid-2007 nearly this entire amount was contracted (Republic of Poland, 2007). In addition, Polish research units currently receive about €50m a year from the Framework Programmes (IPTS, 2006).

Poland has joined many European infrastructure initiatives, and was for instance, the first Central and Eastern European country to become a member of CERN. Co-operation with ESA has also recently begun. Attracting foreign researchers, as additional mechanism to provide qualified human resources, is still hampered by comparatively low salaries and partly also by the bureaucracy and by the language barrier.

### 3 - Knowledge demand

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The purpose of this chapter is to analyse and assess how research related knowledge demand contributes to the performance of the national research system. It is concerned with the mechanisms to determine the most appropriate use of and targets for resource inputs.

The setting and implementation of priorities can lead to co-ordination problems. Monitoring processes identifying the extent to which demand requirements are met are necessary but difficult to effectively implement due to the characteristics of knowledge outputs. Main challenges in this domain are therefore:

- Identifying the drivers of knowledge demand;
- Co-ordinating and channelling knowledge demands; and
- Monitoring demand fulfilment

Responses to these challenges are of key importance for the more effective and efficient public expenditure on R&D targeted in IG7 of the Lisbon Strategy.

#### 3.1 *Analysis of system characteristics*

##### 3.1.1 Identifying the drivers of knowledge demand

*Structure of knowledge demand.* Private demand for R&D is constrained by the sectoral structure of the Polish economy, which primarily focuses on low- and medium-low-tech activities. Over 70% of manufacturing value added and nearly 75% of manufacturing employment belonged to these two bottom-end technological sectors in 2006 (with almost half of manufacturing employment in the low-tech sector only). This situation is not only very distant from the EU27 average (where only half of employment was in the two lower-tech sectors in 2006), but it is also less favourable than in countries such as Hungary or the Czech Republic (data from Eurostat). Consequently, the share of medium-low and low tech in manufacturing BERD is 20% (2002), which is double the EU average, while the share of high tech is 34%, which is significantly below the EU average of over 41%. The three main industrial sectors driving private knowledge demand are motor vehicles (10% of the total amount of BERD), machinery (8%) and pharmaceutical products (8%); (Eurostat; data are for 2005). The share of BERD performed in services is very high and well above the EU average (48% in 2005; data from Eurostat). However, it rather reflects low overall level of R&D and the fact that many enterprises who do engage in some kind of research-related activities are registered as 'performing R&D services'. If one takes R&D services out, the percentage of R&D in services is 13%, which is equal to the EU average (without R&D services for the sake of comparison).

Recently, knowledge demand of multinational enterprises has increased, e.g. in the transportation and the IT sectors.

Public R&D demand is comparatively unspecific. Around two thirds of government appropriations and outlays for R&D are attributed to non-oriented research and general university funds. Among the oriented socio-economic objectives of R&D, in a European perspective compared with the EU 15, Poland is only specialised in industrial production (ERAWATCH Network, 2006), which probably reflects a large number of extramural industrial R&D institutes.

*Process of identifying knowledge demand.* Systematic instruments to identify drivers of knowledge demand have only been introduced in recent years. The main instruments involved in identifying research priorities are:

- [The National Foresight Programme](#), which is supposed to provide strategic orientations. A pilot foresight was conducted in the "health and life" area between 2003 and June 2006, with financing from the EU Structural Funds.
- The Strategic Research Agendas prepared by the Polish Technology Platforms. These were initiated in 2004 in response to the EU's FP activities on technology platforms. Today, there are 25 Polish Technology Platforms which attempt - with a varying level of activity - to integrate the most dynamic and competitive companies as well as research units.

The unification of existing instruments for identifying knowledge demand with the ones used by the old EU member states seems to be the primary drive behind changes in recent years (Kozlowski, 2006).

Consultation mechanisms are occasionally used (e.g. during preparation of the National Framework Programme and recently during preparation of the Operational Programmes of the National Strategic Reference Framework 2007-2013). Think tanks, such as the Gdansk Institute for the Market Economy, CASE – Center for Social and Economic Research, the Polish Academy of Sciences, the Main Council of the R&D Units or the Conference of Rectors of Academic Schools in Poland, usually take part in debate on the planned research policy measures (IPTS, 2006).

The business sector's ability to articulate its demands to political actors is not very strong. This is in large part due to the economic profile resulting from the transformation of the economy and the resulting low absorptive capacity for R&D (see also section 5.1.3). Only since February 2005 the Minister of Science and Higher Education is able to appoint industry representatives as members of the Committee on Research for the Development of the Economy, part of the Science Council. Currently, in the transitional period, only two members of this Committee have been drawn from industry, although after 2008 their number is expected to rise (IPTS, 2006). The state-owned R&D units (JBRs) partly act as intermediaries between traditional industries and science (OECD, 2007).

An overall appraisal of innovation governance ranked the Polish system's performance as satisfactory with regard to the openness of the process of designing innovation policy (measures) and the involvement and consultation of key stakeholders. However, it highlighted weaknesses in the appraisal of the impact on innovation of developments and regulations in other policy fields (European Trend Chart on Innovation, 2006).

### 3.1.2 Co-ordinating and channelling knowledge demands

Until recently, research policy had a relatively passive role and all research areas were supported without prioritisation, as was also indicated by the large share of non-oriented Government appropriations for R&D (85% of total GBAORD in 2004 and 77% in 2005 and in 2006). Also unless recently, business representatives have not been consulted when deciding about these broad priorities. It all started to change around 2004, when the accession to the EU (and use of the EU structural funds) started to be conditional on National Development Plan, of which R&D policy was an important part, and which had to be consulted with different stakeholders.

However, there has been some room for manoeuvre. Ministries have been able to initiate multi-annual thematic programmes, either within or beyond the KPR framework. Programmes have been established which support specific national policies in energy, health, agriculture and the environment. However, each of these socio-economic objectives receives well below of 2% of GBAORD (2006, Eurostat). Agreements on multiannual programmes are negotiated with the respective Ministries, e.g. the Ministry of Agriculture and Rural Development. Beyond that, sectoral ministries can also use those R&D units (JBRs) which they govern to channel demand for thematic R&D. This is also one mechanism with which to channel the 11% of GBAORD which is oriented towards industrial production and technology.

The European influence on the system's performance with regard to knowledge demand has been evaluated positively (Kozłowski, 2006). By contrast, assessments of co-operation and co-ordination between different Polish government actors have found this area to still be rather weak. Improving overall co-ordination with a special emphasis on enhancing horizontal policy cooperation and the quality of partnerships is considered to be one of the key challenges in the Polish context (European Trend Chart on Innovation, 2006). This challenge has been repeatedly mentioned in reports or studies addressing the problems of the Polish innovation system (e.g. Goldberg, 2004; Wintjes, 2004) and still remains actual.

Polish co-operation with the European Space Agency will produce further European interaction, the next step in which will require, among other things, committing at least €1m a year over five years to strengthening the space industry. Currently, R&D related to the exploration and exploitation of space is negligible (0.1% of GBAORD).

### 3.1.3 Monitoring demand fulfilment

Officially, the Science Council may carry out evaluations, but in practical terms no evaluations of national research policy measures and programmes have yet been conducted (except from the evaluation of the structural funds programmes). However, the problem has been mentioned in the 2004 *Guidelines for the government's science, science and technology and innovation policy until 2020*. Also, participation of industry stakeholders in the various forms of research evaluation has been recommended. Representatives of the business community are expected to participate in the peer review of funding applications in the field of applied research.

So far assessments have only been performed in order to evaluate programmes supported by Structural Funds. Recently, a few evaluations have been completed regarding the implementation of the Operational Programme 'Increasing Competitiveness of Economy 2004-2006'. The evaluations were conducted by

independent experts and the results are publicly available. Also the ex-ante evaluation of “Innovative Economy 2007-2013” Operational Programme was conducted by independent experts.

System evaluations so far have been largely conducted with the assistance of international organisations such as the World Bank (Goldberg, 2004). More recently, a peer review of the Polish policy mix for innovation has been conducted by the OECD which was requested by Polish government (OECD, 2007). Policy makers were also made use of international assessments. For example, the project Phare SCI-TECH led to the updating of the Act on the Research and Development Units (JBR) with a view to speeding up the process of reorganising the public R&D sector. An innovation governance assessment financed by the Dutch Government (Wintjes, 2004) stimulated debate, which ultimately led to the adoption of the [Act on some forms of supporting innovation activities](#).

An overall appraisal of evaluation practice in innovation policy ranked the Polish system's performance on a range of aspects as being unsatisfactory (with room for improvement), e.g. with regard to the regularity and transparency of policy monitoring and review processes, the existence of an “evaluation culture” and the use of evaluation results in policy making (European Trend Chart on Innovation, 2006).

### 3.2 Assessment of strengths and weaknesses

Increasing demand for knowledge from the side of multinational subsidiaries may create spillovers and boost overall knowledge demand. Yet this demand is weak for the moment. The situation is due to the lack of reforms of the R&D public funding (limited access to public funds for R&D by the private sector) and the overall level of the development of the Polish economy (with still high share of agriculture and labour-intensive manufacturing). For this reason, the effects will be stronger, if this knowledge demand is well monitored and resources for its support are well channelled and spent in an effective way.

Main strengths	Main weaknesses
<ul style="list-style-type: none"> <li>Increasing demand for knowledge from the side of multinational subsidiaries may create spillovers effects and boost overall knowledge demand</li> </ul>	<ul style="list-style-type: none"> <li>Still low private R&amp;D demand</li> <li>Until recently, weak co-ordination of knowledge demands by policy actors</li> <li>Evaluation culture and systematic monitoring mechanisms not strongly developed</li> </ul>

### 3.3 Analysis of recent policy changes

One recent trend already mentioned, which is also relevant for knowledge demand, is the increase in European Structural Funds. This corresponds to an increasing role and responsibility of regions with regard to the channelling of demand. While around €6.3b Lisbon goal-relevant expenditure is allocated via the national Innovative Economy Operational Programme, nearly €7b of expenditure of this type is now allocated via regional operational programmes (Republic of Poland, 2006).

The National Reform Programme as one of the few recent policy initiatives adopted is an example of a tool that is clear and transparent. Built jointly with stakeholders, it aimed to overcome a key gap of the Polish research system and is geared towards the Lisbon targets (IPTTS, 2006). However, implementation has progressed more

slowly than expected. It has been superseded by changes in the government and the development of a new implementation structure for research support. The establishment act of the new National Research and Development Centre (NCBR), as a state agency financing strategic R&D activities, has entered into force mid July after several delays. The NCBR is due to manage strategic R&D projects with a budget of more than €25m. Several ministries as well as representatives from the private sector and the scientific community are represented on its council. In total, 10% of the MNiSW budget is planned to be allocated to the NCBR, using also resources from the Innovative Economy Operational Programme based on EU Structural Funds.

Since 2006, on the initiative of the Ministry of Science and Higher Education, a consortium co-ordinated by the Institute of Fundamental Technological Research of the Polish Academy of Sciences has been running the "Poland 2020" National Foresight Programme. The three main areas covered are sustainable development, ICTs and security. The impact of this initiative remains to be seen.

2006 saw the preparation of the new programming period for the European Structural Funds. A national strategic reference framework was adopted. Research- and innovation-related measures were integrated into the [Operational Programme Innovative Economy 2007-2013](#), which was jointly prepared by the ministries for science and for the economy and accepted by the EC in October 2007. A draft version of this programme was circulated among representatives of various interest groups for consultation. In September 2006, the Minister responsible for science and higher education organised a collection of ideas for the themes of key R&D projects which should receive financing in the framework of the Operational Programme. One example of a project of this kind is the so-called DoBioMat project, for which the Wrocław research community is due to be granted €120m. This formed one element of the European Institute for Technology plus (EIT) initiative which aimed to establish the EIT in Wrocław (EIT PLUS, 2007).

The policy coordination challenge with regard to public knowledge demand has been recognised by the Polish government and is mentioned in strategic policy documents. The two options discussed are to strengthen the existing Council for Science and Technology and to create a new Innovation Council, linked directly to the Prime Minister's office and responsible for the horizontal and vertical coordination of research and innovation policy. Recently the latter option, which had been proposed by the Ministry for the Economy, is favoured and an implementation as replacement of the existing Council is envisaged for 2007 (OECD, 2007).

Challenges	Main policy changes
Identifying the drivers of knowledge demand	<ul style="list-style-type: none"> <li>• Private demand for R&amp;D is constrained by the sector's structure of the Polish economy, which primarily focuses on low- and medium-low-tech activities</li> <li>• Low level of BERD</li> </ul>
Co-ordinating and channelling knowledge demands	<ul style="list-style-type: none"> <li>• Increased role of the regions in distribution of the structural funds aimed at stimulation of innovation (including R&amp;D) expenditures.</li> <li>• Coordination of the administration activities in the area of S&amp;T policy on the central level.</li> </ul>
Monitoring demand fulfilment	<ul style="list-style-type: none"> <li>• Strengthening the evaluation and monitoring capacities of the public administration (not only in the case of the structural funds programmes) including the follow up activities</li> </ul>

### 3.4 Assessment of policy opportunities and risks

Recent policy changes involving more demand-based channelling of funds should help in better monitoring of the demand for knowledge (e.g. through the "Poland 2020" [The National Foresight Programme](#).) and in better channelling of funds (e.g. through the Operational Programme for an Innovative Economy). Assessments of impacts of the EU funds may help to target better future R&D support and make business community more involved. However, the evaluation culture is not yet well developed in Poland, which may still compromise on the quality of assessments (and on the actual decisions).

Main policy opportunities	Main policy-related risks
<ul style="list-style-type: none"> <li>• New instruments preparing research policy priority setting including major scientific and private stakeholders, e.g. through the "Poland 2020" National Foresight Programme</li> <li>• More effective public demand through the joint Operational Programme for an Innovative Economy and improved implementation mechanisms for multi-annual strategic programmes</li> <li>• Impact assessments evaluating the use of EU funds may help to target better future R&amp;D support and make business community more involved</li> </ul>	<ul style="list-style-type: none"> <li>• Continuation of channelling the vast majority of public funds for R&amp;D to non-oriented and non-competitive research may severely undermine the effects of recent policy changes.</li> <li>• Possible improvement of effectiveness of public expenditure by increased involvement of the regions through regional operational programmes threatened by a lack of adequate regional governance capacities.</li> </ul>

### 3.5 Summary of the role of the ERA dimension

Systematic instruments to identify drivers of knowledge demand modelled on the EU ones have only been introduced in recent years. These are foresight and strategic research agendas. Consultations with main stakeholders (business sector including) when identifying knowledge demand has also just started and it was as well due to the integration with the EU. The similarity of the nine strategic research areas of the Polish National Framework Programme (KPR) with the thematic areas of the European Framework Programme indicates that the European Union at least has an indirect influence on priority setting and programme design in general. Polish co-operation with the European Space Agency will produce further European interaction while channelling the demand for knowledge. Overall, the European influence on the system's performance with regard to knowledge demand has been evaluated positively.

With regard to the monitoring and evaluation of the demand fulfilment, the requirement to study the impacts of the EU structural funds seems to be a promising path. Some evaluations have been completed and the results are publicly available. However, these assessments do not yet include specific analysis of R&D related results and impacts.

## 4 - Knowledge production

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The purpose of this chapter is to analyse and assess how the research system fulfils its fundamental role to create and develop excellent and useful scientific and technological knowledge. A response to knowledge demand has to balance two main generic challenges:

- On the one hand, ensuring knowledge quality and excellence is the basis for scientific and technological advance. It requires considerable prior knowledge accumulation and specialisation as well as openness to new scientific opportunities which often emerge at the frontiers of scientific disciplines. Quality assurance processes are here mainly the task of scientific actors due to the expertise required, but subject to corresponding institutional rigidities.
- On the other hand there is a high interest in producing new knowledge which is useful for economic and other problem solving purposes. Spillovers which are non-appropriable for economic knowledge producers as well as the lack of possibilities and incentives for scientific actors to link to societal demands lead to a corresponding exploitability challenge.

Both challenges are addressed in the research-related Integrated Guideline and in the ERA green paper.

### 4.1 Analysis of system characteristics

#### 4.1.1 Improving quality and excellence of knowledge production

There are three types of organizations that are the main knowledge producers: universities, state-owned Research and Development Units (JBRs) and the Polish Academy of Science.

The research performing universities now account for more than 30% of Polish R&D (Dabrowa-Szefler and Jablecka-Prylowska, 2006). There are 147 higher education institutions performing R&D (GUS, 2007). The best known universities are [University of Warsaw](#), [Technical University of Warsaw](#), [Wroclaw University of Technology](#) and [Jagiellonian University in Cracow](#). The [Warsaw School of Economics](#) has also gained an important international position and reputation. Universities in Poland have a huge autonomy and impose the self regulation procedures. The main quality assurance mechanism of R&D activity is a promotion system. However, the system is not effective as the promotion criteria are not always transparent and objective. The next reason of a low effectiveness of the system is a non competitive remuneration system.

The [Polish Academy of Science](#) is the central umbrella over a 78 of public research institutes, performing mainly basic research (GUS, 2007). It is still quite influential due to its historical role in research governance, although it performs less than 15% of R&D. And on the other hand, there are 190 state-owned Research and Development Units (GUS, 2007), which in communist times collaborated closely with industry and were even seen as substitutes for companies' in-house R&D (see also Goldberg, 2004). They lost some of their role after the economic transformation but still perform more than a third of Polish R&D.

Since the early 1990s research excellence and quality have been the formal main priorities of research policy and key criteria for public research funding. Despite that for a few years the competitive project-oriented grants have gained a larger importance, selective statutory or block funding is still the main instrument of the financing. The scope of financing depends on the external assessment system - based on a parametric assessment model. In case of the assessment process various indicators are applied, including factors such as peer-reviewed publications, monographs, and academic degrees obtained, patents, quality management of laboratories, etc. over the three previous years. The research units are benchmarked on this basis against other units conducting research of a similar nature in a similar discipline and graded into five categories, leading to different levels of block funding. In 2005, 60% of PAN R&D units, 19% of university research units and 15% of JBRs were graded in the highest category. In 2005 the system was partially reformed. The goal of the measures taken by the Ministry of Scientific Research and Higher Education was to increase the importance, in the assessment system, the indicators evidencing more applied researches (such as patents or number of successful development projects). The reform of the assessment system was only partially successful as the system met with criticism from the research community (Dabrowa-Szefler and Jablecka-Prylowska, 2006). So far it seems only to have been implemented for funding research in universities, but the amount of the additional premium funding is insufficient to significantly raise overall levels of university research (OECD, 2007). Given the low level of funding and the tradition of the research community's distributing funding bottom up according to scientific disciplines that prevailed until 2004, in practice the envisaged selective effects have barely materialised (OECD, 2007). Nor was openness to inter- and multidisciplinary projects promoted by these practices. The lack of selective effects is one key reason for the increase in competitive project-oriented funding mechanisms and the planned creation of the NCBR as a new agency for its management.

Starting with FP 5, competitive European funding mechanisms played an important role in the establishment of networks of centres of excellence and competence centres. For example, in 2001 85 centres of excellence were selected which received an additional budget of €26m, representing a considerable share of funding at the research unit level. EU initiatives were followed in 2004 by a competitive call run by the Polish research ministry for the establishment, selection and co-financing of 100 Centres of Advanced Technologies in Poland.

While the natural sciences and engineering together remain the dominant scientific fields in Poland, accounting for 60% of HERD and two thirds of GOVERD, the share of engineering has decreased in universities and increased in public research organisations. Over the period 2001 to 2003, compared with the EU15, Polish scientific publications showed a strong specialisation in chemistry, physics and also in materials sciences, plants and animals. Compared with 1993/1995, Polish publications lost their specialisation in engineering and space sciences. Citations show a roughly similar picture, but engineering here remains a field of specialisation. The social sciences have increased their share, particularly in universities, but are still an area with strong negative specialisation compared to the EU15 (ERAWATCH Network, 2006).

The Polish government correctly assesses the persistent fragmentation of the R&D structure. There is a relatively large number of small, comparing to EU counterparts, Polish public R&D institutes - in case of 78 PAN units and 190 JBRs the average

current expenditures on research and development in 2006 amounted only to 2,2-2,3 million Euro, what limits significantly the research potential of these institutions. The next example of the fragmentation of the R&D structure in Poland is a number of Centres of Advanced Technologies – around 100, what is a too large number comparing to JBR's number and PAN units. The development and modernisation of the R&D infrastructure, which has not been favoured by the dominant funding mechanisms, and the strengthening of the system of centres of excellence are the next important challenges to ensure the quality of knowledge production. The room for quality improvement is also indicated by the number of peer-reviewed scientific publications per million inhabitants, which is, at around 300, only half of the EU average, and also lower than in many other Central and Eastern European Countries, although growing faster than the average between 2001 and 2004.

#### **4.1.2 Improving exploitability of knowledge production**

The traditional mechanisms linking knowledge production to possible economic or other societal needs largely collapsed during the transition to a market economy. With the establishment of the branch R&D units (JBRs) in the communist era, production of applied knowledge was in fact institutionally separated from both firms and universities. The decline in public funding and decreasing demand for R&D from industry meant that JBRs had to compete on small-scale projects. They adjusted during the transformation by downsizing and realising assets to generate income with which to survive. In more than half of the branch R&D units, the main source of income has been generated by non R&D activities. This had a negative impact on their subsequent ability to perform their previous role. An attempt in 2003 to introduce reforms produced only limited results. A new reform has been started in 2006 but it was also only partially successful - the reform assumed that the consolidation process would cover 63 units, while 27 units would be commercialised and privatised. In 2006 the consolidation process covered 9 only JBRs.

The present general IPR legislation in Poland fully meets the EU standards. The process of adjusting intellectual property rights to international standards started with the Association Agreement with the EU in 1991. A separate law on Industrial Property Rights was finally adopted in 2000 (Dabrowa-Szefler and Jablecka-Pryslopska, 2006). The most important last changes of the IPR legislation concerned the adaptation of the legislation to the Directive 89/104 (relating to the trade marks), European Council Ordinance no 2082/92/EC and Ordinance of EEC no 40/94/EEC (relating to the European trade mark). The Polish Patent Office is the main institution responsible for implementation of the IPR policy in Poland. Despite that recently the institutional environment improved significantly (e.g. through the intensive informatization) it is still considered as costly (especially in the context of IPR protection abroad) and time consuming. The next two most important weaknesses of the system are very low awareness of the IPR issues among the representatives of administration, business and R&D sector as well as a very low level of effectiveness of the judicial system.

Incentives for academic researchers to co-operate with industry are also limited as statutory funding distribution mechanisms have been the main source of R&D funds (Dabrowa-Szefler and Jablecka-Pryslopska, 2006). This is reflected in the comparatively high and even increasing share (nearly 40%) of basic research in Polish R&D (see also ERAWATCH Network, 2006). The problematic status of the exploitability of knowledge is also reflected in the low correlation between sectoral

business R&D and patent applications. Moreover, patent specialisation only partly corresponds to value added specialisation (each compared with the EU15 specialisation profile), with significant discrepancies in some areas, for instance, in the chemicals, pharmaceuticals and petroleum sectors (ERAWATCH Network, 2006).

The problem of matching of scientific knowledge production specialisation with economic specialisation has been addressed by a few policy tools. The [Act on the Principles of Financing Science \(8 October 2004\)](#) tried to respond to these challenges by introducing or strengthening two types of competitive R&D projects: development projects aimed at carrying out a research task intended for practical application, and goal-oriented projects - now including also projects, which can be submitted by sectoral ministries, regional authorities or entities able to implement results in practice (Dabrowa-Szeffler and Jablecka-Prylowska, 2006).

The goal-oriented projects, financed by the budgetary sources, targeted at SMEs, are managed by the [Polish Federation of Engineering Associations \(NOT\)](#), which is a non-governmental network of around 50 branch institutions. The similar instrument was also introduced within the framework of the structural fund's Sectoral Operational Programme of the Growth of Enterprise Competitiveness – Activity 1.4.1. The program has been aimed at co-funding of larger R&D projects - submitted by medium and large enterprises) and has been managed by the Ministry of Science and Higher Education.

At present there is growing recognition of the importance of the cluster policy expressed by the number of expert reports and conferences. Tens of clusters have been identified including very successful cases like [aviation valley located in the South-East part of Poland](#). Moreover the PARP (Polish Agency for Enterprise Development) introduced successfully in 2007 a cluster pilotage programme (described in section 4.3.). More policy tools are included within the framework of a new structural fund's programme Innovative Economy 2007-2013.

The improvement of a co-operation with industry in knowledge production as one means to increase the exploitability of knowledge has repeatedly been highlighted in assessments as one of the main challenges facing the Polish research system (e.g. OECD, 2007; European Trend Chart on Innovation, 2006). A recent OECD review found that only a few of the Centres for Advanced Technology are performing well and that, to date, they have had little effect on seeding regional or interregional clusters (OECD, 2007). The system's weak performance in terms of exploitability of knowledge is also reflected in the low number (less than 5) of EPO patent applications per million inhabitants (2003) compared with an EU 27 average of 128, although this indicator should be interpreted with care in the case of the new EU Member States. However, patent applications have increased four fold since 1996, leading to one of the fastest growth dynamics in the EU 1999 to 2002.

## **4.2 Assessment of strengths and weaknesses**

The two main groups of problems concern the commercialization of the knowledge production (e.g. lack of knowledge of research institutes and business sector about each others expectations and offers, limited cooperation, not enough developed mechanisms driving the knowledge production towards the market application activities) and fragmentation of the Polish research institutes. On the other hand

there is a solid base, which can be used to change the present situation (solid basic research base, IPR legislation).

Main strengths	Main weaknesses
<ul style="list-style-type: none"> <li>• Solid system to enhance basic research underpinned by quality criteria</li> <li>• General IPR legislation in Poland fully meets the EU standards</li> </ul>	<ul style="list-style-type: none"> <li>• Weak mechanisms (even disincentive system) to gear knowledge production towards commercial applications at the public research units</li> <li>• Low level of R&amp;D potential concentration</li> <li>• Inadequate assessment systems of R&amp;D institutions, not enough promoting high quality researches</li> </ul>

### 4.3 Analysis of recent policy changes

On 2<sup>nd</sup> December 2008 the Council of Ministers adopted a package of acts aimed at reforming S&T sector in Poland. The set of acts entitled “Building on the knowledge - the reform of science sector for the development of Poland” was developed by the Ministry of Science and Higher Education. It consists of five acts: Act on the Principles of Financing Science (described in the section 2.3), [Act on the Polish Academy of Sciences](#), [Act on Research Institutes](#), [Act on the National Research and Development Centre](#) and [Act on the National Science Centre](#). The proposed package focuses on the reform of the present structure of the Polish state research institutes and present financing system (described in the section 2.3).

The [Act on the Polish Academy of Sciences](#) inter alia assumes rejuvenation of the Academy’s staff (e.g. by imposing the age limit of 70 for persons to be appointed on the managerial posts at the Academy), stricter rules of controlling of PAN’s units (periodic audits, creation of Curator Council - a monitoring and evaluation bodies to the PAN units). The Acts also creates the legal framework for consolidation (also with other research units – e.g. JBRs or universities) of Academy’s institutes and units.

According to the [Act on Research Institutes](#) JBRs will be transformed into state-owned research institutes. The institutes will be evaluated by the Committee of Research Unit Evaluation and classified into one of three categories: A – leading institutes, B – good institutes but having room for improvement, C – institutes of unsatisfactory quality. The institutes of grade C will not receive funds such for the maintenance of the research potential (according to the draft Act it will replace the statutory funding) and be the subject of liquidation, privatization or consolidation. According to the Act on the principles of financing education the funding will be concentrated in the best institutes (of grade A). It also assumes the stricter rules of control and systematic audits of research institutes (at least on a bi-annual basis) and creates the legal framework for consolidation (also with other research units – e.g. PAN units or universities).

[The National Centre for Research and Development \(NCBR\)](#) was established in July 2007 (the Act as of 15<sup>th</sup> of June 2007 about the National Centre for Research and Development) to implement priority tasks in the field of Polish scientific and innovative policy. NCBR shall fulfil its mission mainly by financing and managing strategic scientific research and experimental development programs. Encouraging collaboration between researchers and business community is the next priority. The Centre’s tasks also include: supporting commercialisation and other forms of transferring the results of scientific research to the economy, supporting the

development of the research staff - including in particular the involvement of young scientists in the implementation of research programs<sup>2</sup>. A new [Act on the National Research and Development Centre](#) additionally assigns to the Center implementation of development programmes financed and implemented up to now by the Ministry of Science and Higher Education.

Another agency the National Science Center, according to the [Act on the National Science Centre](#) is to be created in 2009 to deal with projects aimed at the support of the development of science - it will be responsible for financing of the basic research projects and research staff development projects. This agency is partly transferring the model of the German Research Foundation (DFG) and the European Research Council (ERC) to the Polish context. According to the Act on the Principles of Financing Science (described in the section 2.3), up to 2015 the budget of these two institutions will achieve a level of 50 % of public expenditures for science. The funds will be distributed by these institutions on the competitive base.

As the financing and project implementation will be shifted to these institutions from MNiSW, the Ministry will concentrate on planning, statutory funding of research units, development of research infrastructure, monitoring and evaluation – in order to strengthen Ministry's evaluation capacity the Act on the Principles of Financing Science assumes a setting up of the new institution responsible for independent evaluation of research institutes – Committee of Research Unit Evaluation. The main goal of this institution is to assess the quality of the research in the context of granted funding. The draft laws also ensure a more transparent selection procedures and ensuring the mechanisms for concentration of funding in the best performing research units.

In the 1<sup>st</sup> of March 2007 a new program called "[Technology Initiative – IniTech](#)" was launched in Poland by the MNiSW. In 2007 around €90m was allocated in the programme. The goal of the IniTech is to stimulate the cooperation among the R&D and enterprise sector aimed at an increase of innovativeness. Among the others, it includes the following actions: strengthening of R&D potential and stimulation of applied research. Next edition of the Programme according new Acts will be implemented by NCBR.

In August 2007 PARP announced the pilotage programme "[Support for clusters development](#)". The goal of a programme was a development and competitiveness increase of clusters, which have a direct or indirect impact on the social and economic development of the regions. Over 30 applications were submitted, out of which PARP selected 5. The programme is going to be continued in the next years (and co-financed by structural funds).

Further changing of the funding system towards more competitive project-oriented grants replacing the selective statutory or block funding as well as actions aimed at concentration of the R&D potential will be supported by the activities within the framework of the structural funds (mainly [Operative Programme Innovative Economy](#) – Priority 1 "Research and development of modern technologies" (€1,3b) and Priority 2 "R&D infrastructure" (€1,3b). Funds reserved in the OP IE will constitute a significant part of R&D financing in Poland during next years (it includes R&D projects as well as the development of R&D infrastructure). These funds will be available on the competitive base.

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<sup>2</sup> [www.ncbir.gov.pl](http://www.ncbir.gov.pl)

Recently, the Ministry of Science and Higher Education has launched [Patent Plus Initiative](#), the aim of which is to improve the technology transfer from science research institutions to the private sector via financing support for registering intellectual property rights and trainings for R&D personnel. The initiative description mentions that it is complementary to the Measure 1.3 of Operational Programme Innovative Economy and Priority 4 of Operational Programme Human Capital (Walendowski, 2008).

Challenges	Main policy changes
Ensuring quality and excellence of knowledge production	<ul style="list-style-type: none"> <li>• Introduction of more transparent and objective promotion and remuneration systems at public research institutes and universities</li> <li>• Further reform of the research institutes assessment system (focused more on the results of applied and experimental research)</li> <li>• Concentration of the research potential</li> <li>• Increase of the importance of competitive project-oriented financing over the statutory funding</li> <li>• Stimulation of cluster's structures development</li> </ul>
Ensuring exploitability of knowledge production	<ul style="list-style-type: none"> <li>• Increase of the IPR awareness among the representatives of administration, business and R&amp;D sector</li> <li>• A stimulation of a cooperation between academic researchers and industry</li> </ul>

#### 4.4 Assessment of policy opportunities and risks

The recently developed programmes and initiatives may stimulate an increase of the quality of knowledge production through more competitive financing schemes and funding concentration. However, the slow pace of the Polish R&D sector restructuring as well as too easy access to public money may significantly block the process – as having an easy access to structural funds, R&D institutions (especially public one) may focus on the research programmes fully financed by public funds; such a situation may cause that the public R&D institutions will not be interested in a cooperation with the private sector and the new knowledge will not be appropriately useful in the context of meeting the economic purposes.

Main policy opportunities	Main policy-related risks
<ul style="list-style-type: none"> <li>• New improved mechanism to enhance excellence as well as effectiveness of public expenditures</li> <li>• Shift of the funding system towards more project than statutory based funding, what will stimulate the concentration of the R&amp;D potential and the quality increase of the produced knowledge</li> <li>• Development and modernisation of the R&amp;D infrastructure</li> <li>• Development of the cluster's structures</li> </ul>	<ul style="list-style-type: none"> <li>• Slow pace of the public R&amp;D sector concentration process (including significant delays in launching large and interdisciplinary research projects and administrative decisions regarding the concentration)</li> <li>• Too large reliance of R&amp;D institutions (mainly public) on the structural funds, what may significantly limits the cooperation with the private sector and blocks the process of matching the knowledge production with economic purposes</li> </ul>

#### **4.5 Summary of the role of the ERA dimension**

Despite not satisfactory results of Polish research institutions in a participation in the FP programmes (e.g. in case of finished VI FP, Poland was a “net payer” to the EU budget – the contribution amounted to 2,52%, while the Polish researchers managed to receive only 1,30% of the VI FP budget (Supel, 2007), the role of the EU funding and programmes in the process of high quality knowledge production is very important - 1878 Polish research teams participated in the finished VI FP (Supel, 2007). Additionally, participation in the EU research programmes can be considered as an alternative, to the present parametric, quality assessment system of the researchers, research teams or units. It can be also a source of additional and significant founding for the best performing public and private research institutes, supporting the reform of the system aimed at shifting from the statutory to the project based funding. Participation in the EU programmes is also a very significant stimulus for concentration of the research potential, as it is one of the key success factors allowing to compete with other foreign institutes for the European funding and to apply for the large EU projects. The activities within the framework of FP 5 initiated the process of the establishment of networks of centres of excellence and competence centres. EU initiatives were followed in 2004 by a competitive call run by the Polish research ministry for the establishment, selection and co-financing of 100 Centres of Advanced Technologies in Poland.

## **5 - Knowledge circulation**

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The purpose of this chapter is to analyse and assess how the research system ensures appropriate flows and sharing of the knowledge produced. This is vital for its further use in economy and society or as the basis for subsequent advances in knowledge production. Knowledge circulation is expected to happen naturally to some extent, due to the mobility of knowledge holders, e.g. university graduates who continue working in industry, and the comparatively low cost of the reproduction of knowledge once it is codified. However, there remain three challenges related to specific barriers to this circulation which need to be addressed by the research system in this domain:

- Facilitating knowledge circulation between university, PRO and business sectors to overcome institutional barriers;
- Profiting from access to international knowledge by reducing barriers and increasing openness; and
- Enhancing absorptive capacity of knowledge users to mediate limited firm expertise and learning capabilities.

Effective knowledge sharing is one of the main axes of the ERA green paper and significant elements of IGL 7 relate to knowledge circulation. To be effectively addressed, these require a good knowledge of the system responses to these challenges.

## **5.1 Analysis of system characteristics**

### **5.1.1 Facilitating knowledge circulation between university, PRO and business sectors**

The Research and Development Units (JBRs) had traditionally been the main public research institutions to facilitate inter-sectoral knowledge circulation. With the changing of the role of the JBRs during the transition, these institutions failed to preserve this role when adapting to the new environment. The majority of the JBRs have not developed strong links with business, rather they have tended either to specialise in knowledge production or take on other activities. Nevertheless, these public research organisations are still the main actor in terms of links with business. As a result the overall share of GOVERD financed by industry at 15,6% (2006) is significantly higher than the EU 27 average of 8,3% (2005).

Another important bridging institution is the Polish Agency for Enterprise Development, which was established in 2000. Among other activities, it supports collaboration between SMEs and public research entities, promotes the commercialisation of R&D results and supports academic entrepreneurship (European Trend Chart on Innovation, 2006).

The next important institution is Industry Development Agency, which supports investments and creation of the technological and industrial parks as well as technological incubators.

The main financial instruments enhancing cooperation among the university, PRO and business sector are the goal - oriented projects managed by the Polish Federation of Engineering Associations (NOT) and a new program called "Technology Initiative – IniTech", launched in Poland by the MNiSW in 2007 (both programmes were described in the previous chapter).

Incentives for inter-sectoral R&D collaboration and the circulation of personnel between universities and industry seem to be low from both sides. Despite the limited public HERD funding, the share of HERD financed by business is, at 5.4% (2006), lower than the EU average of 6.3% (2005) and has declined since the end of the 1990s. At present there is practically a lack of the programmes aimed at personnel circulation among the university, PRO and business sectors. However there were some pilotage programmes (mainly on the regional level) financed within the framework of the previous round of structural funds. It is worth adding that some of them were very successful (e.g. scholarship programmes) - similar activities are included in "Human Capital 2007 – 2013" Operational Programme – Priority 4.

The institutional infrastructure of institutions supporting the knowledge circulation between university, PRO and business sectors is relatively well developed. In 2007 there were 87 technology transfer centres (located mainly at the universities, regional development agencies and business associations), 16 technology incubators, 15 technology parks, 49 academic entrepreneurship incubators, 6 seed capital funds. Recently the development of the network was supported by the Sectoral Operational Programme "Improvement of the competitiveness of enterprises 2004-2006". However, the main weaknesses of the system are: strong concentration in the larger cities and towns, unsatisfactory quality of the services, weak economic condition of the business support units (e.g. lack of statutory funding), too large dependence on the state funding and lack of specialization (e.g. in case of the technology parks).

One of the most important problems is limited number of the academic spin-offs. It results from the present legislation, which forbids the capital investments of the public universities into the commercial companies – one of the most important development barrier of the technology transfer centres located at the universities aimed at support academic spin-offs.

The internal IPR regulations ruling the exploitation of the patents worked out at the public institutions (universities and state-owned Research and Development Units - JBRs) is a huge barrier for knowledge circulation. These regulations depend on the internal regulations of these institutions. Generally the patent owner is an institution, while the incomes from the licence fee or royalties can be divided between the institution and the research team. In case of no regulations the whole patent returns (including royalties) go to the institution. In case of the universities, at present only one university prepared the internal regulations ruling the IPR issues – the Jagiellonian University in Cracow, while only three others are under the process of preparation of such regulations.

Recently, other mechanisms to enhance inter-sectoral knowledge-circulation have grown in importance. One such mechanism is the creation (since 2005) of Polish Technology Platforms for cooperation between industry and research. Some of them are very successful and competitive on the EU level (e.g. in the field of security).

The bolstering of links and knowledge flows between public and private R&D actors is frequently highlighted as one of the main challenges facing the Polish research system (e.g. OECD, 2007; European Trend Chart on Innovation, 2006). Responses to this challenge also call for improvements in the exploitability of knowledge and the absorptive capacity of knowledge users.

### **5.1.2 Profiting from access to international knowledge**

In Poland, the internationalisation (including profiting from the access to international knowledge) of R&D is one of the most challenging issues in the area of S&T policy. The policy process in that field is mainly driven by the Ministry of Science and Higher Education.

Apart from the active participation in the EU research programmes, Poland has 52 S&T agreements with foreign partners. Priority is given to cooperation with research organisations. The following instruments are being used: special research projects implemented within international cooperation, scientific research or development projects carried out under programmes launched by the EU or other international programmes, bilateral research projects, financed from statutory funds (focused on researchers' mobility), programmes of the Minister. For example the Ministry of Science and Higher Education of Poland supports small projects of exchange of research staff between scientific institutions from two countries, based on executive protocols to agreements between Poland and other countries. Another instrument designed to create a leverage effect is the programme of the Minister entitled "[Supporting international mobility of researchers](#)". It offers financing to Polish research institutions willing to delegate their young scientists to foreign research institutions in order to participate in research projects - after the period of 1-3 years delegated scientists are supposed to come back to their home institutions to share their experience and continue their research activities (brain circulation) (CREST, 2007). The government has developed also a new funding formula for allocating money to individual universities that will provide additional (premium) funding for

universities engaged in high quality research projects including at the international level. Moreover the government has created a programme to recruit expatriate researchers and is also studying the possibility to use overseas embassies to link overseas Polish researchers to Polish research institutes and firms (OECD, 2007).

However, despite these actions the level of internationalization of the Polish R&D institutions is not satisfactory – e.g. see chapter 4.5. Regardless of the increase of the foreign funding share (including the funds of the international organizations) in the total R&D expenditures over last years, in 2006 it accounted for only 7% (GUS, 2007). It is still below the EU average.

### 5.1.3 Absorptive capacity of knowledge users

The absorptive capacity of Polish knowledge users is very limited. According to the Community Innovation Survey 2004, the share of innovative enterprises is, at 26.6% in industry and 22% in services, still much lower than the EU 27 averages of 41.5% and 37% respectively. A report on the innovation potential of Polish SMEs reveals that 91.1% of surveyed SMEs do not co-operate with JBRs, universities, and technology transfer centres (Żołnierski, 2005). While total private innovation expenditures increased between 2000 and 2004, BERD decreased over this period. Companies have started to upgrade their outdated technology but not increased their R&D capabilities (European Trend Chart on Innovation, 2006). Nevertheless, recent data of the Polish Statistical Office suggests that the co-operation agreements of firms with research institutions or other firms on innovation activities are rapidly growing from 8% 2001-03 to 24% 2003-05.

The incentives introduced in the [Act on Some Forms of Supporting Innovation Activities](#) for the fiscal year 2006 onwards focused strongly on boosting firms' absorptive capacity. The main elements are the creation of a Technology Loan Fund and a 50% deduction from taxable income of the cost of acquiring new technology.

The technology loan may not exceed €2m and an entrepreneur's own share in the full investment capital must not be less than 25%. The Bank of the National Economy (BGK) evaluates the applications for technology loans. A considerable proportion of the credit may be forgiven if products based on such a new technology are sold on the market. Specific conditions apply to loan abatements, which cannot exceed €1m. The annual budget is estimated at €25m which might be quickly exhausted by a small number of big companies with strong market positions taking advantage of the measure (Walendowski, 2007).

The tax incentives allow small and medium sized companies to deduct up to 50% of their spending to acquire new technologies from their taxable income. The definition refers to technological knowledge which allows production or modernisation of products and services, and it must be less than 5 years old. For other companies the limit on the tax credit was initially set at 30%, but the act has since been amended to offer the same conditions to these companies. Participation by firms has thus far been limited, however (OECD, 2007).

A shortage of highly qualified labour does not constitute the main bottleneck, although there are some problematic recent trends. The share of scientists and engineers in the total labour force has increased steadily since 2000 and in 2006 it reached a level of 5.9%, which is above the EU 27 average of 5.4%. The number of S&T graduates has also risen significantly, although less than the huge threefold

increases in total students and graduates over the last 15 years. Hence the share of S&T graduates in total graduate numbers has dropped to around 12%, a percentage which is considerably lower than the EU 25 average of 23% (2004). The share of students in science and engineering has fallen to 7.2% (2006) and the number of S&E students declined by almost 10,000 in the period between 2003 and 2007.

The Act of 20th July 2001, amending the existing Higher Education Act, established the State Accreditation Committee as legal body working for the quality of education, defined its tasks and its working procedure. The Law on Higher Education, adopted by the Parliament on 27 July 2005, redefined the objectives of the State Accreditation Committee. The State Accreditation Committee is the only statutory body entrusted with the responsibility of evaluating the quality of higher education, its opinions and resolutions have a legally binding effect. The primary objective of the Committee is to support Polish public and non-public higher education institutions in the development of educational standards matching the best models adopted in the European and global academic space. The State Accreditation Committee carries out its mission by conducting obligatory assessments of the quality of education and giving opinions on applications for the authorisation to provide degree programmes submitted by higher education institutions. The Committee actively co-operates with other accreditation commissions and their international umbrella organisations in the implementation of the Bologna Process and the creation of the European Higher Education Area.

The Polish government has recognised the challenge of the low absorptive capacity for R&D of Polish companies and launched a number of initiatives to improve it. Most of the measures are part of the Structural Funds' Operational Programmes and focus on investments and purchases of technology, and partly also on the improvement of human resources for innovation (for details see European Trend Chart on Innovation, 2006). The focus on technology uptake has also driven the fiscal incentives in force since January 2006.

## 5.2 Assessment of strengths and weaknesses

Main strengths	Main weaknesses
<ul style="list-style-type: none"> <li>• Solid base for development of the institutions supporting knowledge circulation (especially transfer technology centres at the universities)<sup>3</sup></li> <li>• Development of the cooperation among PRO, universities and private enterprises through development of the technology platforms</li> </ul>	<ul style="list-style-type: none"> <li>• Low absorptive capacity of knowledge users and in particular SMEs</li> <li>• Lack of robust mechanisms to facilitate knowledge circulation between university, PRO and business sectors mainly due to non transparent law regulations</li> <li>• Low quality of the offered services by the institutions supporting knowledge circulation</li> <li>• Low mobility of the Polish researchers</li> <li>• Too low level of internationalization of the Polish R&amp;D units activity</li> </ul>

Not satisfactory knowledge circulation is one of the most important weaknesses of the National Innovation System in Poland. It mainly results from the low absorptive

<sup>3</sup> At present central as well as regional authorities and the main universities recognized the need to develop such infrastructure and created many institutions supporting knowledge circulation – the infrastructure was developed especially during last a few years due to access to structural funds (however the quality of the offered services by these institutions is still below the expectations, what significantly limits the inter-sectoral knowledge circulation – see one of the main weaknesses)

capacity of enterprise sector, low mobility of the researchers and significant institutional and legal barriers blocking knowledge circulation between university, PRO and business sectors.

### 5.3 Analysis of recent policy changes

The measures included in the implementation programme for the 2004-2006 Structural Funds focused on the development and modernisation of R&D infrastructure and, on the human resources side, on general employee training (Walendowski, 2007).

The Innovative Economy Operational Programme under the National Development Plan 2007-2013 announces measures aimed at increasing the synergy with world science, such as cooperation between research networks and consortia and development of the network of institutions participating in FP7. Additionally some actions are supposed to increase the innovative capacities of the enterprise sector - especially Priority 3 – “Capital for innovation”, Priority 4 – “Investments in innovative ventures” and Priority 5 – “Diffusion of innovations”). Increasing absorptive capacity by human resource development is addressed by the "[Human Capital 2007 – 2013](#)” Operational Programme (HC OP). The programme is implemented on the basis of the European Union allocations from the ESF in conjunction with the national funds. The total allocation for the implementation amounts to €9,559.8m, including the EU allocation – €8,125.9m and national public funding of €1,433.9m. One of the ten priorities is high quality education meeting the needs of the labour market.

The new financial perspective of the structural funds is also a very important factor for constituting and strengthening the networks enabling or stimulating knowledge circulation between university, PRO and business sectors. For example PARP has developing recently its “National Innovation Network”. The goal of the NIN is to support the innovative companies through offering pro-innovative services (e.g. solving problems concerning technology transfer, IPR issues, financing the innovative projects) and stimulate the cooperation between the SMEs and research institutions. The development of the network is going to be supported by the activities included in the Innovative Economy Operational Programme”. According to the assumptions of the Ministry of Economy and PARP only the most vital and most competitive networks will be co-financed by the public funds.

Challenges	Main policy changes
Facilitating knowledge circulation between university, PRO and business sectors	<ul style="list-style-type: none"> <li>• Structural reform of the present Polish R&amp;D sector (JBRs, PAN units and R&amp;D units of universities)</li> <li>• Strengthening inter-sectoral R&amp;D collaboration and inter-sectoral knowledge-circulation</li> <li>• Stimulation IPR exploitation at the universities and public research institutions</li> </ul>
Profiting from access to international knowledge	<ul style="list-style-type: none"> <li>• Internationalization of R&amp;D activity is one of the most challenging issues in the area of S&amp;T policy</li> </ul>
Absorptive capacity of knowledge users	<ul style="list-style-type: none"> <li>• Low absorptive capacity of the enterprise sector in Poland (especially SMEs)</li> <li>• Limited access to capital financing innovative projects</li> </ul>

An important change in governance structures with regard to knowledge circulation is the establishment of the national R&D centre (NCBR, see also previous chapter). Among its tasks will be the commercialisation and other forms enabling transfer of research results to the economy as well as implementation of international programmes aimed at researcher mobility. In addition, there is a new programme on academic entrepreneurship to support innovation based on R&D activities (OECD, 2007).

#### 5.4 Assessment of policy opportunities and risks

The programmes, which are going to be financed by the structural funds can significantly improve the present situation in the field of knowledge circulation. On the other hand too easy access to public money can reduce the incentives for the public research sector to cooperate with business sector - having an easy access to public funds no pressure to cooperate on the commercial basis with the companies.

Main policy opportunities	Main policy-related risks
<ul style="list-style-type: none"> <li>• Implementation of the Innovative Economy and Human Capital Operational Programme for the period 2007 to 2013 will enhance cooperation and transfer between PRO, universities and private enterprises</li> <li>• Support for international activities in the Framework Programmes and beyond might produce leverage effects.</li> </ul>	<ul style="list-style-type: none"> <li>• Modest scope of reform of institutional setting for facilitating knowledge circulation may limit effectiveness of measures</li> <li>• The policy measures implemented are not yet sufficient to significantly enhance absorptive capacity of private actors</li> <li>• Too large dependence on the public sources by the public PRO and universities – having an easy access to public money (structural funds) lack of incentives to develop inter-sectoral cooperation</li> </ul>

#### 5.5 Summary of the role of the ERA dimension

ERA is one of the most important factors facilitating knowledge circulation among university, PRO and business sectors. It is also the key factor stimulating internationalization of Polish R&D sector. Additionally, in case of the most innovative Polish companies (especially SMEs), a participation in the ERA initiatives gives an opportunity to increase the innovative (and in some cases even R&D) capacity. EU initiatives created also very effective mechanisms aimed at enhancing inter-sectoral knowledge-circulation - a creation of Polish Technology Platforms for cooperation between industry and research is an example of such successful case. On the other hand the overall level of the internationalization of Polish research is highly unsatisfactory. Participation of Polish researchers and research teams in international research programmes is still low, similarly as patenting activity abroad. For example, the share of financing of the Polish R&D centres by foreign funds in the total R&D expenditures in 2006 accounted for only 7% (GUS, 2007), which is still below the EU average. Moreover, Poland is the least open for foreign researchers in the EU. And although the pull factors for Polish talented researches dominate, and some – especially young researchers – are mobile and migrate to the world’s leading R&D destinations, the overall share of Polish researchers engaged in research tasks abroad (in the total number of Polish researchers) is alarmingly low. The total domestic funding for international cooperation at the ministry’s disposal constitutes only 6% of overall resources for science and research in 2008. Even within this 6%,

the majority of resources goes for the co-financing of various EEA or EU initiatives, so if one excludes the initiatives at the EU level, only 2% of the overall budget for science and research goes for domestically-driven international cooperation.

## 6 - Overall assessment and conclusions

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### *6.1 Strengths and weaknesses of research system and governance*

Poland's society and economy have undergone a profound transformation over the last 18 years. For a long time, transforming the Polish research system was not a priority for either political or private actors in this process, and this was reflected in a low and shrinking R&D intensity as well as a low societal pressure for stronger resource mobilisation for research. Nevertheless, over the last five years this situation has begun to change. Poland has started to adjust and reformulate the role of the research system in the economy and society. The table below summarises the ways in which Poland can build on existing strengths in this process and which weaknesses remain relevant.

Mechanisms are in place to ensure the provision of sufficiently large and well qualified human resource base for R&D as well as a solid, quality-criteria-based system to enhance basic research in universities and the institutes of the Polish Academy of Science. Nevertheless, some of the key elements of a smooth-running research system are not yet in place. Resource mobilisation continues to be low and this hampers possibilities for long-term investment. On the other hand longer-term strategies have been discussed and start to be implemented. There is also still little demand for sophisticated R&D from the private sector due to the dominant medium- and low-tech orientation of the economy. However, R&D demand from foreign-based companies recently seems to have started growing significantly. Until recently, research policy was rather passive and lacked prioritisation. This has changed and priorities are set, in accordance with the European Framework Programme. Moreover, systematic instruments to identify drivers of knowledge demand have been introduced. Evaluation culture and systematic monitoring of the fulfilment of this demand is yet to be developed. Statutory or block funding remains to be the main instrument of financing research, as opposed to competitive project grants. The mechanisms to gear knowledge production towards commercial applications are still weak (e.g. although national IPR laws are in accordance with best international practices, internal IPR regulations at public research institutes are disincentive to gear knowledge production towards commercial applications), and the same is true of public knowledge demand, and the absorptive capacity of knowledge users and in particular SMEs. Related to this, to some extent, the challenge of ensuring knowledge circulation between universities, public research organisations and enterprises has not been resolved. Not surprisingly, the resulting mismatch between knowledge production and the requirements and needs of business as well as the need for improved co-operation between science and industry actors is perceived as one of the main outstanding policy challenges. The analysis suggests that all these factors need to be addressed if improvements are to be achieved. The gap and lack of linkages between knowledge production and knowledge use is mirrored in the governance structure of the Polish research system, in which ministerial

responsibilities for science and higher education are separate from those for innovation and the economy. Responsibilities for public research funding and political demand for applied research are also divided. On the other hand a lot of initiatives have been recently raised by the public administration on the central and regional level to change the present situation.

Domain	Challenge	Assessment of strengths and weaknesses
Resource mobilisation	Justifying resource provision for research activities	Resource mobilisation has not been high on the policy agenda but there are signs that this is slowly changing. There is greater recognition of a need to invest in R&D in order to innovate.
	Securing long term investment in research	Resource mobilisation still low and there is scope for improvement of long-term planning.
	Dealing with barriers to private R&D investment	Private actors still face difficulties in coping with the risk of R&D investment. Yet some supporting measures started to be introduced (guarantee and loan funds for innovative SMEs, support of commercialisation of research etc.).
	Providing qualified human resources	Increasing number of young graduates yet still lack of perspectives for young researchers and conditions for foreign researchers are not attractive.
Knowledge demand	Identifying the drivers of knowledge demand	Knowledge demand constrained by the low- and medium-tech profile of the production. Systematic instruments to identify drivers of knowledge demand have only been introduced in recent years.
	Co-ordination and channelling knowledge demands	Policy makers started to coordinate and channel knowledge demand only recently.
	Monitoring of demand fulfilment	Evaluation culture and systemic monitoring not strongly developed.
Knowledge production	Ensuring quality and excellence of knowledge production	Need for restructuring and consolidation of the public R&D sector. Effective evaluation system of research units is still required. Statutory or block funding still the main instrument of financing research, as opposed to competitive project grants. Starting with FP5 competitive EU funding mechanisms started to play a role. Solid system to enhance basic research underpinned by quality criteria
	Ensuring exploitability of knowledge	Weak mechanisms (even disincentive system) to gear knowledge production towards commercial applications at public research units. Majority of internal IPR regulations pose huge barrier for simulation of R&D activity.
Knowledge circulation	Facilitating circulation between university, PRO and business sectors	Well-developed institutional setting exists, yet the quality of services is low on average. The challenge to bolster links between public and private R&D actors remains.
	Profiting from international knowledge	Despite supporting policies, level of internationalisation of Polish R&D is still low. This in turn limits absorptive capacities.
	Enhancing absorptive capacity of knowledge users	Low absorptive capacity of knowledge users and in particular SMEs but a number of initiatives launched in order to improve absorptive capacities of Polish companies.

## 6.2 Policy dynamics, opportunities and risks from the perspective of the Lisbon agenda and the ERA

The table below summarises the main opportunities and risks concerning recent policy dynamics. It shows that recent policies address many of the weaknesses of the Polish research system. The policy coordination and monitoring process of the Lisbon Strategy has helped to develop more explicit targets and to give a higher priority to research and innovation. Opportunities emerge from the joint implementation of:

- increased public resource mobilisation for R&D (including stimulation of private R&D funding through a range of new support measures), which will benefit both science and business - in terms of resource mobilisation, opportunities are created by public commitments (meeting Lisbon objectives) and by the availability of the EU structural funds,
- an improvement of the absorptive capacity of knowledge users and strengthening of additional institutions to improve co-operation between public research organisations and industry, through the new Innovative Economy Operational Programme jointly designed and managed by the ministries for science and for economics and supported by Structural Funds,
- an introduction of the instruments aimed at identification of the research priorities and concentration of the public funds and research potential
- structural reform of the present public science funding system,
- strengthening centres of excellence in knowledge production, increase the economic exploitability and circulation of knowledge through the development of the new structures (e.g. Technology Platforms) replacing and stimulating the competitive pressure to restructure of the present system (e.g. JBRs)

Domain	Main policy opportunities	Main policy-related risks
Resource mobilisation	<ul style="list-style-type: none"> <li>• Increased public resource mobilisation for research due to significant budget increases in response to the Lisbon Strategy and the availability of European Structural Funds</li> <li>• Enhanced private R&amp;D investment due to a range of new support measures, which may also contribute to further foreign R&amp;D investment</li> </ul>	<ul style="list-style-type: none"> <li>• Leverage effects from public towards private resource mobilisation might not be achieved to the extent expected</li> </ul>
Knowledge demand	<ul style="list-style-type: none"> <li>• New instruments preparing research policy priority setting including major scientific and private stakeholders, e.g. through the "Poland 2020" National Foresight Programme</li> <li>• More effective public demand through the joint Operational Programme for an Innovative Economy and improved implementation mechanisms for multi-annual strategic programmes</li> <li>• Impact assessments evaluating the use of EU funds may help to target better future R&amp;D support and make business community more involved</li> </ul>	<ul style="list-style-type: none"> <li>• Possible improvement of effectiveness of public expenditure by increased involvement of the regions through regional operational programmes threatened by a lack of adequate regional governance capacities</li> </ul>

Domain	Main policy opportunities	Main policy-related risks
Knowledge production	<ul style="list-style-type: none"> <li>Enhancing excellence as well as effectiveness of public expenditures through decentralization of the financing system (e.g. including creation of NCBR)</li> <li>Shift of the funding system towards more project than statutory based funding, what will stimulate the concentration of the R&amp;D potential and the quality increase of the produced knowledge</li> <li>Development and modernisation of the R&amp;D infrastructure</li> <li>Development of the cluster's structures</li> </ul>	<ul style="list-style-type: none"> <li>Slow pace of concentration of the R&amp;D sector</li> <li>Too large reliance of R&amp;D institutions (mainly public) on the structural funds, what may blocks the process of matching the knowledge production with economic purposes</li> </ul>
Knowledge circulation	<ul style="list-style-type: none"> <li>Implementation of the Innovative Economy and Human Capital Operational Programme for the period 2007 to 2013 will enhance cooperation and transfer between PRO, universities and private enterprises</li> <li>Support for international activities in the Framework Programmes and beyond might produce leverage effects</li> <li>Development of the cooperation among PRO, universities and private enterprises through development of the technology platforms</li> </ul>	<ul style="list-style-type: none"> <li>Modest scope of reform of institutional setting for facilitating knowledge circulation may limit effectiveness of measures</li> <li>The policy measures implemented are not yet sufficient to significantly enhance absorptive capacity of private actors</li> <li>Too high dependence on the public sources by the PRO and universities - having an easy access to public money (structural funds) lack of incentives to develop inter-sectoral cooperation</li> </ul>

However, despite recent policy responses some risks remain. Although there is a policy goal of one third of R&D funding coming from the private sector, the balance between public and private resource mobilisation seems increasingly biased towards public investments (leverage effects from public towards private resource mobilisation might not be achieved to the extent expected). Given the private R&D demand structure and low absorptive capacity of private actors, as well as the policy focus on technology acquisition, the effectiveness of the scheduled measures to enhance private R&D remains to be seen. Additionally, the new funding opportunities resulting from the structural funds may cause too large reliance on public funding. Also, the limited scope and significant delays in the reforming process of the state R&D sector can be considered as serious risks. Finally, not satisfactory coordination of the innovation policy can decrease the effectiveness of the last policy responses.

### **6.3 System and policy dynamics from the perspective of the ERA**

Relevance of the European Research Area (ERA) dimension has increased in recent years. It is the key factor stimulating an internationalization of R&D sector in Poland. In last worked out strategies (e.g. "Strategy for the Development of Polish Science until 2015" or "Directions for the increase of innovativeness of the economy for the period of 2007-2013") Polish active contribution into ERA development is described as one of the most important challenges. Strategic goals of these documents were formulated in the context of increasing of international competitiveness (also on the EU level) of the Polish research and business sector.

Both the European Research Area, with the Framework Programmes as the main instrument, as well as the European Structural Funds have contributed significantly for the improvement of the Polish research system. Despite not satisfactory results of Polish research institutions in a participation in the FP programmes, in terms of a mobilisation of resources contribution of the EU funding started to be important for the most vital research units since Poland joined the EU (2004). Systematic instruments to identify drivers of knowledge demand modelled on the EU ones have been introduced in recent years. These are foresight and strategic research agendas. Poland also has joined many European infrastructure initiatives, and for instance became a member of CERN.

The role of the EU funding and programmes in the process of high quality knowledge production is also significant. Participation in the EU programmes is a stimulus for concentration of the research potential as it is one of the most important success factors allowing to compete with other foreign institutes for the European funding and to apply for the large EU projects. ERA is one of the vital factors facilitating knowledge circulation among university, PRO and business sectors.

Growing recognition of the ERA's positive influence on the quality of the Polish research system is also evidenced by the increasing number of mobility programmes (financed by the SF as well as MNiSW's own sources: Homing or Welcome Programmes) and by openness of the national programmes to foreign researchers – e.g. the selection criteria applied for the R&D projects, which are going to be financed within the framework of the Operational Programme Innovative Economy – in particular Priority I and II (the applications can be awarded up to 10% of points for the declared scope of cooperation with national and international research teams and entrepreneurs; the next 10% of points can be awarded to the applicants for description of the project importance in the context of the development of international cooperation in the field of science and technology).

Despite above mentioned initiatives the overall level of the internationalization of Polish research is highly unsatisfactory and there is still significant room for improvement. For example, the share of financing of the Polish R&D centres by foreign funds in the total R&D expenditures in 2006 accounted for only 7% (GUS, 2007), which is still below the EU average. Moreover, Poland is the least open for foreign researchers in the EU. Additionally the total domestic funding for international cooperation at the ministry's disposal constitutes only 6% of overall resources for science and research in 2008. Even within this 6%, the majority of resources goes for the co-financing of various EEA or EU initiatives, so if one excludes the initiatives at the EU level, only 2% of the overall budget for science and research goes for domestically-driven international cooperation.

## References

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- CREST (2007): Internationalisation of R&D – Facing the Challenge of Globalisation: Approaches to a Proactive International Policy in S&T. Analytical Report: Policy Approaches towards S&T Cooperation with Third Countries. Brussels, December 2007. [http://ec.europa.eu/invest-in-research/pdf/download\\_en/report\\_international.pdf](http://ec.europa.eu/invest-in-research/pdf/download_en/report_international.pdf)
- Dabrowa-Szeffler, M.; Jablecka-Pryśłowska, J. (2006): OECD Thematic Review of Tertiary Education. Country Background Report for Poland. Warsaw, July 2006.
- EIT PLUS (2007): <http://wah.wroc.pl/artykuly/172/EIT-Plus-Programme-----summary/>
- ERAWATCH Network (2006): ERAWATCH Country Specialisation Report. Country: Poland. <http://cordis.europa.eu/erawatch/index.cfm?fuseaction=home.downloadFile&fileD=265>
- ERAWATCH Research Inventory (2007/2008): Country information on Poland, <http://cordis.europa.eu/erawatch> (ERAWATCH Network main country correspondent: Jacek Walendowski)
- European Commission (2008): Monitoring industrial research: 2008 EU Industrial R&D Investment Scoreboard. DG JRC and DG Research
- European Trend Chart on Innovation (2006): Annual Innovation Policy Trends and Appraisal Report: Poland 2006. European Commission, Enterprise Directorate-General. [http://www.proinno-europe.eu/extranet/upload/countryreports/Country\\_Report\\_Poland\\_2006.pdf](http://www.proinno-europe.eu/extranet/upload/countryreports/Country_Report_Poland_2006.pdf)
- Goldberg, I. (2004): Poland and the knowledge economy: Enhancing Poland's competitiveness in the European Union. The World Bank, Rewasz Publishing House.
- GUS – Central Statistical Office (2007): Nauka i Technika w 2006 r. (Science and Technology in 2006). Central Statistical Office, Warszawa.
- IPTS (2006): ERAWATCH country related information working paper in view of the National Reform Programmes – Country: Poland. Seville: Institute for Prospective Technological Studies.
- Kozłowski, J. (2006): Can Europeanisation improve the CEECs' research systems? Paper for the SPRU 40<sup>th</sup> Anniversary Conference: The Future of Science, Technology and Innovation Policy, 11th-13th September 2006. <http://w3.freeman-centre.ac.uk/?q=node/33>
- Ministry of Regional Development (2007): Innovative Economy Operational Programme 2007 – 2013. National Strategic Reference Framework 2007 – 2013, Warszawa, 5 February 2007.
- Ministry of Science and Higher Education (2006): Bariery współpracy przedsiębiorców i ośrodków naukowych (Barriers in cooperation of enterprises and scientific institutions; in Polish), [http://www.nauka.gov.pl/mn/gallery/24/08/24087/20070213\\_raport\\_bariery\\_ws\\_polpracy.pdf](http://www.nauka.gov.pl/mn/gallery/24/08/24087/20070213_raport_bariery_ws_polpracy.pdf)
- Ministry of Science and Higher Education (2007): Uzasadnienie zmiany obowiązującej ustawy z dnia 8 października 2004 r. o zasadach finansowania nauki (Justification of proposed changes to the 2004 act on financing science)

- [http://www.nauka.gov.pl/mn/gallery/25/25/25257/uzasadnienie\\_zasady\\_finansowania\\_nauki.pdf](http://www.nauka.gov.pl/mn/gallery/25/25/25257/uzasadnienie_zasady_finansowania_nauki.pdf)
- Ministry of Science and Higher Education (2008): Strategia Rozwoju Nauki w Polsce do roku 2015 (Strategy for the Development of Polish Science until 2015), [http://www.bip.nauka.gov.pl/gallery/37/35/3735/20080416\\_strategia\\_wersja\\_o\\_stateczna\\_wyslana\\_do\\_ugodnien\\_miedzyresortowych\\_i\\_konsultacji\\_spol.pdf](http://www.bip.nauka.gov.pl/gallery/37/35/3735/20080416_strategia_wersja_o_stateczna_wyslana_do_ugodnien_miedzyresortowych_i_konsultacji_spol.pdf)
- Nill, J. (2008): ERAWATCH Analytical Country Report 2007: Poland. JRC Scientific and Technical Report, European Commission Joint Research Centre, Institute for Prospective Technological Studies and Directorate General for Research, EUR 23389 EN/2; download: <http://ipts.jrc.ec.europa.eu/publications/pub.cfm?id=1680>
- OECD (2007): Policy Mix for Innovation in Poland – Key Issues and Recommendations. OECD, DSTI/STP/TIP(2006)13/FINAL, [http://www.nauka.gov.pl/mn/gallery/28/81/28814/20070627\\_PolishPolicyMix\\_final.pdf](http://www.nauka.gov.pl/mn/gallery/28/81/28814/20070627_PolishPolicyMix_final.pdf)
- Republic of Poland (2006): National Reform Programme for 2005-2008 to implement the Lisbon Strategy. First Annual Progress Report. Adopted by the Council of Ministers on 13 October 2006. Warsaw.
- Republic of Poland (2007): National Reform Programme for 2005-2008 to implement renewed Lisbon Strategy in Poland. Report 2007. Adopted by the Council of Ministers on 11 October 2007. Warsaw.
- Siemaszko, A., Supel, J. (2006): TEZY DO DYSKUSJI na konferencję „Uczestnictwo w Programach Ramowych UE”. Analiza uczestnictwa w 6.PR – przygotowania do 7.PR. Uczestnictwo polskich zespołów w Programach Ramowych. Badań, Rozwoju Technologii i Wdrożeń UE (Thesis for discussion prepared for the conference: "Participation in EU Framework Programs." Analysis of participation in FP6 - the preparation for FP7. The participation of the Polish teams in the EU Framework Programs). Krajowy Punkt Kontaktowy Programów Badawczych UE, Warszawa, kwiecień 2006; [http://www.6pr.pl/pliki/4143/6i7PRanaliza\\_kwie06.pdf](http://www.6pr.pl/pliki/4143/6i7PRanaliza_kwie06.pdf)
- Supel, J. (2007): Udział Polski w 6. Programie Ramowym Wspólnoty Europejskiej w dziedzinie badań, rozwoju technologicznego i wdrożeń, przyczyniających się do tworzenia Europejskiej Przestrzeni Badawczej i innowacji (2003-2006). Statystyki - raport końcowy (Polish participation in the 6 Framework Program of the European Community for research, technological development and implementation, contributing to the creation of the European Research Area and Innovation (2003-2006). Statistics - Final report). Krajowy Punkt Kontaktowy Programów Badawczych Unii Europejskiej, Warszawa, grudzień 2007; <http://www.kpk.gov.pl/statystyki/6.pr/raporty/Raport%20statystyki-zalaczniki-vnet.pdf/view?searchterm=None>
- Walendowski, J. (2007): Monitoring and analysis of policies and public financing instruments conducive to higher levels of R&D investments. The "POLICY MIX" Project. Country Review Poland. Technopolis Belgium, January 2007. [http://ec.europa.eu/invest-in-research/pdf/download\\_en/poland.pdf](http://ec.europa.eu/invest-in-research/pdf/download_en/poland.pdf)
- Walendowski J. (2008): Monitoring and analysis of policies and public financing instruments conducive to higher levels of R&D investments: The "Policy Mix" project. Case study. Poland. Technopolis Group, July 2008 [http://rid.intrasoft-intl.com/PolicyMix/UserFiles/File/UploadedDocs/Policy-Mix\\_CaseStudy\\_Poland1.pdf](http://rid.intrasoft-intl.com/PolicyMix/UserFiles/File/UploadedDocs/Policy-Mix_CaseStudy_Poland1.pdf)

- Wintjes, R. (2004): Priority issues for the innovation system of Poland. System analysis and recommended directions for change. Position Paper. MERIT, University of Maastricht and ECORYS.
- Żołnierski, A. (2005): Potencjał innowacyjny polskich małych i średniej wielkości przedsiębiorstw (Innovation potential of the Polish SME sector). Polska Agencja Rozwoju Przedsiębiorczości, Warszawa.

## List of Abbreviations

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ABP	Agencja Badan Poznawczych (Agency for Basic Research)
BERD	Business Expenditures on R&D
BGK	Bank Gospodarstwa Krajowego (Bank of the National Economy)
CERN	European Organization for Nuclear Research
ERA	European Research Area
ESA	European Space Agency
FP	Framework Programme
GUS	Główny Urząd Statystyczny (Central Statistical Office)
GBAORD	Government budget appropriations or outlays on R&D
IE OP	Operational Programme Innovative Economy, 2007-2013
IPTS	Institute for Prospective Technological Studies
JBR	Jednostki Badawczo-Rozwojowe (state-owned R&D units)
KFK	Krajowy Fundusz Kapitałowy (National Capital Fund)
KPK	Krajowy Punkt Kontaktowy (National Contact Point)
KPR	Krajowy Program Ramowy (National Framework Programme)
MG	Ministerstwo Gospodarki (Ministry of the Economy)
MNiSW	Ministerstwo Nauki i Szkolnictwa Wyższego (Ministry of Science and Higher Education)
MRR	Ministerstwo Rozwoju Regionalnego (Ministry of Regional Development)
NCBR	Narodowe Centrum Badań i Rozwoju (National Research and Development Centre)
NOT	Naczelna Organizacja Techniczna (Polish Federation of Engineering Associations)
NSRO	Narodowe Strategiczne Ramy Odniesienia (National Strategic Reference Framework)
OECD	Organisation for Economic Co-operation and Development
PAN	Polska Akademia Nauk (Polish Academy of Science)
PARP	Polska Agencja Rozwoju Przedsiębiorczości (Polish Agency for Enterprise Development - PAED)
PLN	Polish zloty

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### **Abstract**

The main objective of ERAWATCH country reports 2008 is to characterise and assess the performance of national research systems and related policies in a structured manner that is comparable across countries. The reports are produced for each EU Member State to support the mutual learning process and the monitoring of Member States' efforts by DG Research in the context of the Lisbon Strategy and the European Research Area. In order to do so, the system analysis focuses on key processes relevant for system performance. Four policy-relevant domains of the research system are distinguished, namely resource mobilisation, knowledge demand, knowledge production and knowledge circulation. The reports are based on a synthesis of information from the ERAWATCH Research Inventory and other important available information sources. This report encompasses an analysis of the research system and policies in Poland.

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