

**Andrzej H Jasinski,**  
School of Management,  
University of Warsaw, Warsaw, Poland  
[ahj@onet.pl](mailto:ahj@onet.pl)

## **INNOVATION POLICY IN TRANSITION: Lessons from a Central and East European country**

**Sub-theme S5; Session XIII: Government's roles**

**Keywords:** innovation, innovation policy, countries in transition

### **Introduction<sup>1</sup>**

Two turning points have occurred in the modern development of Central and Eastern Europe: the first one in 1989/1990 - a collapse of a centrally planned system and the beginning of building of a free-market economy in most Central and East European countries (CEECs), and the second one in 2004 (1<sup>st</sup> May) - formal membership of eight CEECs in The European Union<sup>2</sup>.

By the end of the 1980s, the centrally planned system was functioning as the main regulation mechanism in most economies in Central and Eastern Europe. Market mechanisms played, generally speaking, an indirect role, although bigger – in some countries, and smaller – in other ones.

At the beginning of the 1990s, fundamental, economic and political reforms started in the majority of those countries. The essence of the transformations has been the introduction of free-market forces into national economies together with their deep restructuring. A crucial element of the economic transformation should be a technological transition aiming at the modernization of the given national economy. So, innovations are expected to play a key role in the economy's restructuring and modernization.

Moreover, global markets become more and more competitive. To compete globally, Central and Eastern European countries need world-class innovations. The level of a country's innovativeness is a result of activities of various actors in the modern economy. There are three main actors on the innovation scene: (1) science/the R&D sector, (2) industry/the business sector and (3) government/the State. So, one of them is government. **The main aim of this paper** is then to evaluate major changes in public innovation policy in the period of transition. Poland here will be a case-study.

This paper is based on the author's chapters in: Jasinski, ed (2010). The paper's general conception was laid out in the author's Spotlight Article *Innovation in transition: What role for government?* published in the website ([www.triplehelixinstitute.org](http://www.triplehelixinstitute.org)) of The Institute for Triple Helix Innovation, Honolulu, Hawaii, USA, 2008.

### **The potential role of government**

As far as the third actor is concerned, at least three arguments can be identified for an adequate public innovation policy in Poland and in other CEECs in the period of transition (Jasinski, 2003):

- \* **firstly**, since technological innovation is a phenomenon that, nowadays, receives public support (in various forms) in numerous advanced market economies, innovation should also receive such support in Poland;
- \* **secondly**, the vast majority of Polish research institutions and of large firms continue to be state-owned; and
- \* **thirdly**, without the government's positive and active attitude towards science and technology, both market transformation of the Polish economy and its integration with the European Union would proceed more slowly.

We should add here that, when Poland and seven other CEECs became members of the EU in 2004 (the second turning point), additional challenges appeared. Among them a crucial challenge is the scientific and technological integration by which we understand an incorporation of science and technology in Central and Eastern Europe into the EU by adoption of Western norms, institutions and other experiences.<sup>3</sup>

---

<sup>1</sup> The author thanks Dr David A Dyker, SPRU, University of Sussex, Brighton, UK for his comments to the draft of this text.

<sup>2</sup> Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia, Slovenia and The Czech Republic. In the case of Bulgaria and Romania – 2007.

<sup>3</sup> More about it in Jasinski (2006).

Here we deal with ‘innovation policy’ or, in other words, ‘science and technology (S&T) policy’. There are slight differences between the two terms. Briefly, the former is focused more on innovation/technology, while the latter focuses more on science. Nevertheless, numerous authors use these concepts, in principle, as synonyms (see e.g. Rothwell and Zegveld, 1985; Stoneman, 1978; Gibbons et al, 1994). In this paper, both terms are used interchangeably.

A government’s financial effort is the main evidence of the scale of state intervention in the field of science and technology. Budget appropriations for R&D are, of course, the result of political decisions. Table 1 gives data on R&D expenditure in Poland in 1989-2007. It can be seen that all three indicators showed a systematic downward trends in the whole period and stabilised at very low levels at the end of the period analysed. This indicates a very small financial effort on the part of the Polish government in S&T. For comparison, the average GOVERD/GDP ratio in the European Union is about 0.7% while in Poland 0.33%, and GERD/GDP – about 1.9% for the EU and 0.57% for Poland (EIS, 2007).

**Table 1. Expenditure on R&D in Poland, 1989-2007**

Years	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
GERD as % of GDP	0.90	0.96	0.81	0.81	0.86	0.82	0.69	0.71	0.71	0.72	0.75	0.67	0.65	0.58	0.56	0.56	0.57	0.56	0.57
GOVERD as % of GDP	.	.	0.76	0.64	0.57	0.55	0.47	0.48	0.47	0.43	0.44	0.44	0.42	0.35	0.34	0.34	0.33	0.32	0.33
GOVERD as % of the state budget	3.6	2.5	2.5	1.9	1.8	1.7	1.6	1.7	1.7	1.7	1.9	1.9	1.8	1.5	1.4	1.5	1.4	1.5	.

\* GOVERD means Government expenditure on research and development or budget appropriations for R&D  
Source: GUS (1998, 2002, 2005, 2008)

### **Innovation in the period of transition: Poland, 1989-2007**

Before going further, let us check what changed in the field of technological innovation in Poland in 1989-2007; see Table 2. The table shows that:

- as far as new and modernized products development is concerned (column 2), substantial improvement was achieved from 3.0% in 1990 to 9.5% in 1999, and then the newly calculated by GUS (Central Statistical Office) indicator stabilized at average level of 18.4% which may be estimated as 6.1% in terms of the old definition;
- so-called innovation intensity (column 3) was declining at the beginning of the period, then improved between 1994 and 1999, and from 2000 shows a slight decline year by year, and so returned to the level achieved in 1994;
- technology-transfer processes, measured here by the number of firms participating in domestic transfers of technology (column 4), showed a tendency to decline in 1996-1999 and then, from 2000, its scale is bigger and bigger with slight fluctuations;
- both domestic patent submissions (column 5) and patents issued (column 6) tend to decrease during the whole period analyzed, although the latter started to increase from 2004;
- the growth rate of total factor productivity (TFP) shows no visible tendency (column 7).

Summarizing, in the period of transition, Poland did not achieve significant improvement in innovation performance. The general picture of changes is ambiguous: neither good nor bad; both positive and negative tendencies can be identified. At the same time, several indicators showed no visible change.

However, one must remember that inflows of new technologies via foreign direct investments to Poland intensified throughout the whole period: from ca 100 mln USD in 1990 to over 110 bln USD, cumulatively in 2007 (GUS, 2008), which played some positive role in modernizing the national economy.

Moreover, it is hard to say whether Poland’s accession to The European Union (EU) caused any improvement in innovation performance. Firstly, the membership period is too short to observe any tendencies: the first full year of Poland’s membership was 2005, and secondly, there is no clear evidence of changes in 2004-2007; statistical data on S&T in 2008 and 2009 are not available yet.

**Table 2. Innovation performance in Poland, 1989-2007**

Year	New and modernized products (in %) <sup>4</sup>	Innovation intensity (in %) <sup>5</sup>	Firms participating in technology transfer <sup>6</sup>	Number of domestic patent submissions	Number of domestic patents issued	Growth of total factor productivity (in %)
1	2	3	4	5	6	7
1989	5.3	0.8	•	5294	2854	•
1990	3.0	0.9	•	4105	3242	•
1991	3.3	0.7	•	3389	3418	•
1992	3.4	0.2	•	2896	3443	•
1993	4.8	2.0	•	2658	2641	•
1994	6.9	2.2	•	2676	1825	•
1995	5.4	2.2	•	2595	1619	5.4
1996	8.4	3.6	1070	2411	1405	3.7
1997	7.9	4.0	883	2339	1179	3.7
1998	8.2	4.1	714	2407	1174	2.6
1999	9.5	4.8	679	2285	1022	4.8
2000	16.4	3.4	884	2404	939	4.4
2001	18.0	3.2	885	2202	851	1.9
2002	16.7	3.3	814	2313	834	1.7
2003	20.7	3.4	885	2268	613	2.6
2004	20.9	2.2	1521	2381	778	4.0
2005	21.8	2.1	1392	2028	1054	1.7
2006	18.0	2.1	1978	2157	1122	3.5
2007	14.7	2.3	1615	2392	1575	3.0

Sources:

- columns 2 to 4 – own calculations based on GUS (1998, 2008)
- columns 5 and 6 – GUS (1998, 2002, 2005, 2008)
- column 7 – M. Weresa, ed (2006)

### Innovation policy after the first turning point<sup>7</sup>

In Poland, when the new democratic government decided to introduce free-market mechanisms into the national economy, a belief in the invisible hand of the market started to prevail universally. The new authorities eliminated almost all previous policy tools and incentives for innovation. Unfortunately, this invisible hand did not bring any progress in firms' innovation activities; the business sector did not fill this gap and the science sector used its all forces to defend a previous *status quo*. So, after a couple of years the government started thinking on how to stimulate innovation in Poland.

To analyze public policy measures for science and technology, relevant official documents, approved by the Council of Ministers, have been traced in a chronological order. These are as follows:

1. *The Basis for the National Science and Technology Policy*, KBN, 1993,
2. *Guidelines for Innovation Policy in Poland*, KBN, 1994,
3. *The Supplement to 'The Basis for the National Science and Technology Policy'*, KBN, 1996,
4. *Support Programme for the Development of Regional Institutions Acting for Technology Transfer*, Task Force on Regional Development, 1997,
5. *Directions of National Innovation Policy till 2002*, KBN, 1999,
6. *Increasing the Innovativeness of the Polish Economy until the Year 2006*, Ministry of Economy, 2000.

1. *The basis for the national science and technology policy* had as its main aim to provide activity guidelines for improving the functioning of the R&D sector in relation with other areas of the national economy. The document was a kind of wish list concerning mainly legal regulations: what should be improved, changed or

<sup>4</sup> The share of new and modernized products in aggregate industrial output in a given year (data for 1989-1999) and in last three years (data for 2000- ). The indicators are much higher in 2000-2007 due to a change in the Polish statistics.

<sup>5</sup> Firms' expenditures on innovation activities as a percentage of aggregate industrial output.

<sup>6</sup> Number of firms participating in technology-transfer processes, both buying and selling the transfer objects.

<sup>7</sup> See Jasinski (2003)

amended. An important goal was set: to achieve, in 2000, a GERD/GDP ratio of 2-2.5% (*de facto* was 0.75% in 1999) with GFR&D at half that level, i.e. 1-1.25% (was 0.44%). Also, six main streams of budget financing were formulated and implemented, and deep structural reforms were announced regarding mainly branch R&D units. Moreover, the need was mentioned to introduce such initiatives and tools as (KBN, 1993):

- tax instruments,
- cheap credits and insurance,
- assistance in establishing intermediaries/bridging institutions,
- establishment of some government agencies,
- support to science parks and business incubators,
- elaboration of training system for people dealing with the transfer of the R&D results.

Thus, the intentions were very reasonable and plans ambitious. The programme was implemented in 1994, i.e. in the final year of the recovery period in the national economy.

2. In *Guidelines for innovation policy in Poland*, a more detailed document, three appropriate public policy goals were posed to intensify the introduction of innovations:

- 1) stimulating and promoting innovation-oriented attitudes in society and among economic entities,
- 2) supporting the development of organizations acting for the benefit of innovation, and
- 3) creating a legal base enabling ownership transformation of research institutions.

Within tax regulations, one instrument (the possibility of including R&D expenditure into the costs of obtaining income) was maintained and its application even broadened. One new tool was introduced, i.e. the deduction, in whole or in part, of investment expenditures connected with the implementation of patents, licences, know-how and domestic research results, from income before taxation up to 50% of income. Each subsequent year this percentage was reduced by 5 points. The document also announced several other financial tools which were gradually introduced into practice in 1994-2000, namely (KBN, 1994):

- guarantees of bank credits repayments, from state budget, for investments aimed at the implementation of domestic technologies,
- insurance on innovative export contracts guaranteed by the state,
- preferential credits offered by state-owned banks for production modernization through the implementation of domestic R&D results,
- corporation/income tax relief on donations for scientific-technological purposes,
- relief on VAT and excise tax for technical services offered to research institutions,
- accelerated depreciation rate on R&D capital assets,
- a system of Prime Minister's scientific awards.

This was quite a long list of financial incentives, containing mainly supply-side tools, the richest set among all the documents analyzed here. In *Guidelines*, implemented in a first year of high growth (1995), we also find the announcement of some other policy instruments which, however, were never introduced into practice.

3. The supplement to *The Basis*, formulated 55 preferred research directions classified into five groups. However, formal procedures to translate those priorities into granting decisions were never worked out. Moreover, the list of priorities was too long. This document together with the subsequent one, were officially adopted in 1996 and 1997 respectively, i.e. in the second half of the high-growth period.

4. The *Support Programme* posed a concrete, clearly defined policy aim: growth of innovativeness in SMEs via an intensification of the transfer of contemporary, sustainable technologies. The expected result was to be, first of all, the development of regional systems of innovation. Emphasis was primarily placed on the activities of voivodship authorities; also the Ministry of Economy was the focus of great expectations.

This was a very sensible and ambitious programme but mainly of a declarative nature. Seven directions of action were planned; the measures were supposed to be financed via the establishment of Regional Investment Funds, where the main source of money would have been the central and voivodship governments' funds together with aid funds. The programme was proof that the government had started to appreciate the role played by technological change in a modern economy. Twelve tasks were addressed to the central government, at least half of which were not fulfilled and some were fulfilled only in part.

5. The main aim of *Directions of national innovation policy till 2002* seemed very appropriate but was a bit too general: to increase innovativeness and encourage the socio-economic development of the country. Also, the four priorities specified in regard to technological development (information technology, biotechnology, new materials, and contemporary transport technology) seemed reasonable. According to this document, one policy instrument, i.e. investment relief on corporation tax, was liquidated but no new tool was introduced. Three further announcements can also be found in *Directions* (KBN, 1999):

- a system of information and expert assistance, concerning the use of international funds for R&D projects, particularly under the EU Fifth Framework Programme (fulfilled),
- a system of insurance against the risk of the implementation of new technologies, and
- support for local initiatives in the development of regional innovation systems.

In general, the document – implemented during the third year of slow-down - declared policy improvement, rationalization, dissemination and continuation. It contained nineteen important tasks, mainly of legislative nature. However, frankly speaking, it was a step backwards: instead of looking for new tools to replace those not effective in practice, the number of policy instruments was narrowed down.

6. The government document *Increasing the Innovativeness of the Polish Economy until the Year 2006*, prepared in the Ministry of Economy in 2000, was not put into practice because of a lack of financial resources. So, this programme may here be omitted.

Let us try to evaluate all the S&T policy tools mentioned earlier:

- the vast majority comprised financial instruments; other types of measure, e.g. organizational, seem underappreciated,
- supply-side tools clearly predominated over demand-side,
- most of them were addressed to firms/industry as a whole, not specified for big or small enterprises,
- there was a lack of policy tools specifically geared to high-tech sectors,
- too much emphasis was placed on supporting new scientific achievements instead of their industrial implementations, and
- instruments supporting innovations were oriented to innovation creation rather than to its diffusion; it is hard to find among them any one focused exclusively on technology transfer.

These characteristics may mean that the government has tried to support both the market-pull model of innovation as well as science-push processes. However, due to the fact that the science-push model predominated in *ancien regime*, by inertia it has remained in force.

The actions undertaken by the central government were addressed to all entities in general. The measures were not regionally differentiated in order to liquidate territorial disproportions in scientific and technical development of the country. The Polish government provided some support for **uttis** (units making up technology-transfer infrastructure), which act as the points of contact between science and industry but the money mainly originated from foreign aid funds, i.e. Phare and The World Bank. Assistance from local/regional governments was rather weak and differentiated between voivodships: urban authorities in a few voivodships became aware of the large potential role of technology centres, bridging institutions and spin-off firms, and helped to establish them.

The government documents indicate **four phases** in the Polish policy towards science and technology:

1. Up to 1989, there existed numerous financial incentives such as policy regulations addressed mainly to companies, especially small firms, to stimulate their research and innovation activities.
2. From 1990, when fundamental, political and economic reforms began in Poland, to 1994, almost all the previous instruments were liquidated.
3. Between 1995 and 1999, some of the 'old' incentives for R&D and innovation were restored; the list of fiscal preferences was even quite long.
4. From the beginning of 2000, some of the tools were again cancelled and no new instruments introduced.

As can be seen, a kind of **wavering** occurred in the current innovation policy. This was a short-term oriented policy. Perhaps the reason for this was **the lack of a long-term strategy** for science and technology in Poland, especially for the transition period.

In summary, several major features of Poland's public S&T policy can be identified in 1990-2004:

- \* a lack of long-term strategy for science and technology,
- \* wavering in the current policy,
- \* poor co-ordination between government agencies,
- \* a relative decrease in budget R&D expenditure,
- \* quite strong centralization of policy, especially with regard to finances for R&D, as well as the lack of a regional approach,
- \* too little support for applied research within funding decisions,
- \* too great an emphasis on the support for science rather than for innovation *per se*, and
- \* a lack of policy for technology transfer/innovation diffusion.



## Innovation policy after the second turning point

After accession to The European Union, three strategic government documents, referring to innovation, were adopted in Poland:

1. *Parliamentary Bill on Selected Forms Supporting Innovation Activities*, June 2005,
2. *Guidelines for Increasing the Economy's Innovativeness in 2007-2013*, August 2006,
3. *Operational Programme 'Innovating Economy, 2007-2013'*, October 2007.

1. *The Bill*, which became valid in 2006, restored three of the previous policy tools (financial incentives) and introduced three new instruments:

- technological credits, very convenient for entrepreneurs who plan to undertake new investments based on new domestic technologies,
- possibility for entrepreneurs, who run innovation activities, to get the official status of Research and Development Centre (RDC). After getting such status the firm will be released from payment of various taxes,
- VAT tax levied on the sales of R&D services<sup>8</sup>; this tax did not exist before.

These changes reflect, at least theoretically, some desirable improvement in public innovation policy. Unfortunately, only a few entrepreneurs have been interested in technological credits and in getting the RDC status.

2. *Guidelines* represent a continuation of the government programme adopted in 2000 which did not really come into force. This document has formulated a strategic objective for innovation policy, i.e., 'growth of the innovativeness of enterprises in order to maintain the fast development of the economy and to create new, better jobs', and five strategic axes: human resources for the modern economy; research for the economy; intellectual property for innovation; capital for innovation; and infrastructure for innovation. Both the objective and the axes seem right.

The *Guidelines* may be treated as a kind of long-term national innovation strategy. The strategy's implementation is based on the implementation system for Operational Programmes (OPs) included in The National Strategic Reference Framework 2007-2013. The principal programmes, implementation of which will be of a key significance for science and technology development, are OP *Innovating Economy* (see below) and sixteen Regional Operational Programmes, one for each voivodship.

The document as a whole has the character of a Government declaration and is a kind of catalogue of wishes. Moreover, it assumes that the economy's modernization will be financed mainly from foreign (European) sources.

3. *Innovating Economy*, which came into force only recently - in 2008, is a kind of executive document to *Guidelines*. The Programme's main objective is formulated very generally: 'the development of the Polish economy will be based on innovative firms', with an emphasis on small and medium-sized enterprises. The document contains eight priority axes that correspond with the axis in the previous one.

An integral element of OP *Innovating Economy* is a supplement named 'Donations for Innovations'. The total amount of public resources devoted to this very ambitious programme for 2007-2013 is projected at 9.7 bln Euros, 85 % of which will come from EU Structural Funds. So, this will be a great financial injection to Polish enterprises. But someone might ask: Where is here the native financial effort for science and technology, especially from the side of the business sector?

So, we can identify a **fifth phase** in public innovation policy in Poland which started in 2005. It is too early to evaluate an overall impact of these three documents although the first effects of Operational Programme *Innovating Economy* are very positive and promising.

In 2009, The National Foresight Programme 'Poland 2020' was completed. The programme's main results are (MNiSzW, 2009):

- \* Four integrated development scenarios for Poland until 2020 as follows: civilization leap, demanding adjustments, difficult modernization and declining growth,
- \* Four groups of factors/challenges of key importance for Poland's future development, i.e. international integration, internal reforms, knowledge-based economy and public acceptance,
- \* List of major subject areas (114) and R&D priorities (680),
- \* List of priority technologies.

---

<sup>8</sup> This was a disincentive to R&D.

Summarizing, one can speak about the following policy phases in the country's transition period:

1990-1994 - a lack of policy

1995-1999 – numerous instruments

2000-2004 – a shrinking policy

2005- - a new speed-up, especially from 2008

Moreover, in connection with the accession to the EU, Poland had and still has to adjust to the European Commission's policies; among them, policy for S&T. As a result, new challenges together with dilemmas have emerged in this field (Jasinski, 2006). For instance, the Commission calls for a gradual reduction in state aid for innovation (EC, 2005). However, a fear is real that such actions might cause further decreases in the GERD/GDP ratio which has dropped in Poland dramatically and cannot exceed the level of 0.56-0.58 since 2002. This lies at the root of the low level of the country's innovativeness.

### **Has innovation policy had an impact on innovation?**

Let us try now to answer the question: Did innovation policy have any influence on innovation in Poland in the transition period? If we compare innovation policy conducted in 1989-2007 with innovation performance in the same period, it would be difficult to give a fully positive answer to this question. Indeed, the author's detailed empirical research proves that no clear correlation between the two can be observed in the period under analysis.

In our opinion, there were two main reasons, on the side of the government, that the present state of innovation in Poland is so unsatisfactory: (1) relatively declining budget expenditure on R&D and (2) an unstable, inconsistent and wavering policy towards S&T.

Hence, the situation in the field of technical change in Poland has been two-dimensional. On the one hand, market forces are still too weak and market mechanisms are not yet fully efficient: the state sector has a relatively large share, the SME sector is weak, and there is a shaky equilibrium in some markets, a high level of monopolization, and so on.

On the other hand, there is the government, which is still learning how to conduct S&T policy in the transition from a centrally planned economy to a free market economy, but is not consistent enough. However, **a positive evolution** has taken place in the government's approach, from a belief in the role of the invisible hand of the market in the process of technological change, to an appreciation of the role played by science and technology policy in the development of the modern economy. This growing awareness among politicians concerning the role of public S&T policy was a kind of driving force in this evolution.

### **Policy recommendations and lessons for other countries in transition**

The policy recommendations, resulting from this analysis concerning Poland, may also be useful for other countries in transition. The proposals apply mainly to public innovation policy (Jasinski, 2006).

First of all, **a good 'climate' for innovation** is necessary and should be created by macro-economic policies oriented at growth, employment, equilibrium and market competition. Such climate ought to create general economic conditions that are favourable for technological change.

A country's long-term **strategy for science and technology** is equally important. The government should impose realistic strategic goals and be responsible for their consistent implementation. Current S&T policy ought to result from the strategy.

The key method of counteracting the decline in the R&D expenditure seems to be activating firms' research and innovation activities. **The innovation-oriented entrepreneur/firm should now be the main object of S&T policy** rather than the scientific institution. The science sector ought to be treated – in this context – as the key element of the firm's environment. So, re-thinking is needed among policy-makers.

The scale of state intervention in the S&T system ought to be reduced together with the strengthening of market forces/mechanisms in the process of transition, a growing role of the private sector in R&D spending, and an increasing share of the banking system in financing R&D and innovations.

Science and technology policy should have a more **regional character**, that is, it should become decentralized and regionally diversified. This will serve to limit territorial disproportions in R&D potential and to create regional systems of innovation.

Finally, **integration of innovation policy** is needed via the **six Cs**. The policy should be (Jasinski, 2006):

- (1) co-ordinated: the policy should be well co-ordinated among the various government agencies responsible for close co-operation in science and technology;
- (2) consistent: the policy should be stable in the long-run without the kind of wavering that has happened in the past,
- (3) correlated: the policy measures addressed to the science sector should be correlated with measures addressed to industry within innovation policy. Since Poland at present does not need more scientific discoveries but more

practical applications of R&D results in the form of new products or processes, the policy priorities must be focused on applied research and, especially, on experimental development and implementation work;

(4) comprehensive: important components of the policy-mix should address: high-tech sectors; technology transfer in a broad sense, that is, including 'uttis' and foreign direct investment; and R&D and innovation in small and medium-sized enterprises, especially private ones. Policy instruments ought to be much more differentiated to include not only fiscal measures but also other financial tools and organizational measures, training, etc;

(5) compatible: the policy should be compatible with, or adjusted to, the macro-economic policy-mix. Government documents concerning macro-policy and S&T policy ought to be prepared concurrently; and

(6) coherent: the national innovation policy should be coherent with the EU policy for research and technology development (RTD). Such coherence is of significant importance in the process of Poland's integration with the European Union.

At least some of the six Cs could be adopted in other countries in transition too.

On the basis of this, we can draw the following **lessons for other countries in transition**:

- Public innovation policy here should play a different role than in advanced market economies where we can observe a tendency to limit the role of government in S&T,
- The authorities cannot rely only on the invisible hand of the market; Poland has bitter experience here. Unless there exists a free, balanced and competitive national market, the State must play a crucial, irreplaceable role in stimulating innovation,
- The role of the government can and should be limited gradually but on condition that the other two actors (industry and science) will make bigger and bigger efforts in reforming the S&T sector; they cannot show a passive attitude like in Poland,
- Governments cannot count mainly on foreign funds; massive domestic financial efforts are crucially necessary,
- Innovation policy should be well co-ordinated, consistent, correlated, comprehensive, compatible and coherent.

## References

- EC (2005): *More research and Innovation: Investing for Growth and Employment*, COM (2005)488, Brussels
- EIS (2007): *European Innovation Scoreboard 2007*, European Commission, Brussels (www.cordis.lu/trendchart)
- M Gibbons et al (1994): *The New Production of Knowledge*, SAGE, London
- GUS (1998), *Report on Science and Technology in Poland*, Central Statistical Office, Warszawa
- GUS (2002), *Science and Technology in Poland 2001*, Central Statistical Office, Warszawa
- GUS (2005): *Science and Technology in 2004*, Central Statistical Office, Warszawa
- GUS (2008): *Science and Technology in 2007*, Central Statistical Office, Warszawa
- A H Jasinski (2003): *Has Innovation Policy an Influence on Innovation?: A Case of a Country in Transition*, Science and Public Policy, No 6
- A H Jasinski (2004): *Innovation Performance and Public Policy in Transition: The Polish Perspective*, International Journal of Technology and Globalization, No 1
- A H Jasinski (2006): *Integrating Science and Technology in Eastern Europe with Western Europe: Dissimilarities, Challenges and Recommendations*, VEST, No 3-4
- A H Jasinski, ed (2002): *Innovation in transition: The case of Poland*, The Warsaw University Press, Warsaw
- A H Jasinski, ed (2010): *Innovation in the Polish economy in transition: Selected economic and managerial issues*, The University of Bialystok Press, Bialystok
- R Rothwell and W Zegveld (1985): *Reindustrialization and Technology*, Longman, London
- P Stoneman (1987): *The Economic Analysis of Technology Policy*, Clarendon Press, Oxford