

**Innovation policy in six candidate countries: The
challenges
Contract: INNO-99-02**

Innovation Policy Profile: Poland

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Final Version, September 2001



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**Study commissioned by the
Directorate General for Enterprise -
European Commission.**

***The views of this study are those of
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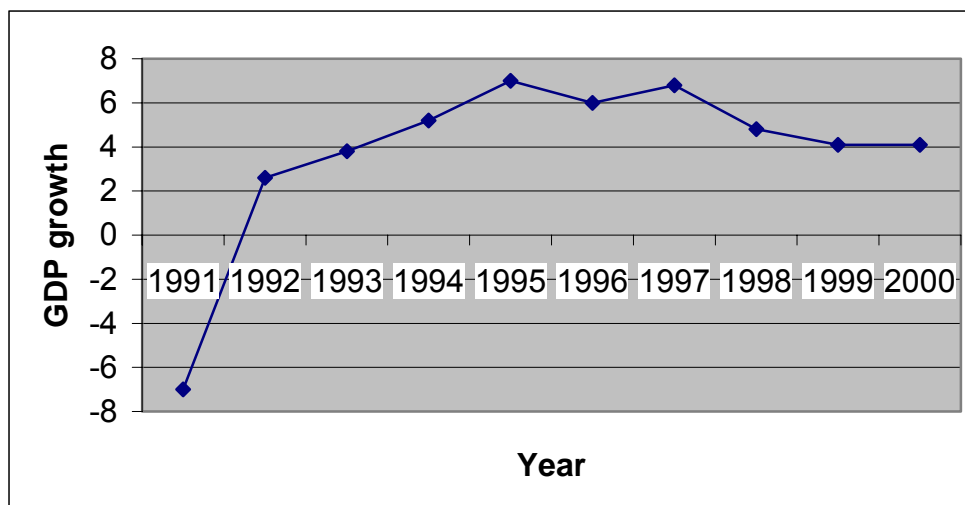
Section 1 - The Innovation Policy Framework

1.1 Introduction

“Poland managed to quickly overcome recession and it resumed rapid growth even though its macroeconomic situation in 1989. was much worse than in many other transition countries. However, at the same time Poland was much more advanced in many other areas, such as market institutions, and it also had many important pieces of necessary legislation that were already in place. Due to earlier reform attempts in the eighties Poland has abandoned central planning, largely liberalized prices, introduced partial convertibility and allowed for the freedom of business activities. It also had a long tradition of private ownership and small-scale private entrepreneurship, as well as open borders that allowed for contacts with Western countries. As a result, market concepts and associated behavioural patterns were much more present in Poland than in other countries, with the exception of Hungary and possibly Slovenia.”¹

Poland, with a population of 38.6 million, has a gross domestic product (GDP) of more than ECU 200 billion (expressed in purchasing power parity); the size of its population is close to 11% of that of the Union, while the size of its economy is only ca 3% of that of the Union. GDP per head is about 31% of the EU average, in purchasing power terms.² Polish GERD compared to the World GERD amounts ca 0,4% (and equals to 1/3 of the General Motors expenditures on R&D), the number of publications amounts ca 0,9% of world publications (and equals to the number of Harvard University papers) and the number of patents equals to less than 0,4% of the world patent production.

During the last years, **GDP growth** has expanded at rates of 6 to 7 per cent (1995-1997), inflation has declined gradually and living standards have improved. This growth largely reflects the dynamism of the private sector, as opposed to the mediocre results of the bloated state-owned enterprises.



Institution-building proceeded at a rapid pace after 1989. The entire *business environment* needed to be compatible with the requirements of a market economy, and all institutions had to be created almost from scratch. Though several shortcomings of the institutional background still exist, a great improvement has been made in recent years: the Warsaw stock exchange is now the biggest in the post-socialist world; numerous commercial banks have been created (mainly with foreign capital), various consulting and advertising firms have been started (both of Polish and foreign origin) and have opened offices in major cities; chambers of commerce positively influence economic life in several regions, together with over 60 agencies of regional/local development.

There were several factors shaping new market institutions in Poland after 1989: the restoration of pre-war institutions (like for instance Trade Code of 1934), the adoption of “EU compatible” institutions like the stock-market, VAT, excise duty, progressive personal income tax, the inertia and subsequent burden of maintaining institutions created during the communist era, the “return to communist-like” institutions (e.g. monopolisation of sugar industry), the application of theoretical ideas (anti-monopoly legislation and office), the existence of “transitory institutions” (where it is not possible to apply EU-based practices (the so called commercialisation of state-owned enterprises), the direct impact of lobbying groups (for instance in relation to special economic zones), pressure of international organisations such as the EU and the OECD, and finally the pressure of existing ideologies or value systems.³

In 1997-99, the authorities took important decisions in view of introducing **institutional reforms** and formulating macroeconomic policies in the context of a medium-term framework. In the area of monetary policy, steps were taken to strengthen the independence of the National Bank of Poland with

the establishment of Monetary Policy Council. The Act of Public Finances (1998) clarifies the responsibilities of various actors in the budgetary sphere, sets measures to improve transparency in public finances, establishes rules for local governments.

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The long economic expansion of Poland has been underpinned by several waves of **structural reforms**. Starting with price and trade liberalization in the early 1990's, this was followed by large-scale privatisation and product market deregulation starting in 1998, and the launch of four important structural reforms related to public finances (public administration, pensions, education, and health care) in 1999.

The state enterprise sector remains large and many state enterprises continue to accumulate financial losses due to inherited overstaffing and high salaries and lack of restructuring, notably in the sectors of coal mine, steel industries, and railroads.

Privatisation is the main process creating market institutions in an economy which was almost totally (with the exception of agriculture) owned by the state. It has gone through ups and downs. It picked up pace in 1998-99. In 1998 about 65% of value-added was generated in the private sector, and about of two-thirds of jobs were in private companies. Nevertheless, the state enterprise sector remains large and many state enterprises continue to accumulate financial losses due to inherited overstaffing and high salaries and lack of restructuring, notably in the sectors of coal mine, steel industries, and railroads.

The Polish **banking system** had become much healthier following the ambitious programme of bank recapitalisation and loan restructuring.

The size of arrears on taxes and social security contributions are very high. Tax exemptions are numerous.

The **tax system** has undergone significant changes in the last ten years and performed well in that time. It has produced strong tax revenue on a continuous basis. Nevertheless it has some features that might be harmful for the economic growth in long run. Tax system is less diversified in other OECD countries. Local governments receive only a very small portion of total revenue by OECD standards. The size of arrears on taxes and social security contributions are very high. Tax exemptions are numerous. The labour tax wedge is particularly high in Poland.

Deregulation and small-scale **privatisation** have led to the emergence of a vibrant sector of small and medium-sized enterprises. The share of SMEs (companies up to 249 employed, almost entirely private) in GDP was 48,2% (1999). More than two million **entrepreneurs** now operate in such sectors as retail and trade, construction, and light manufacturing industry. They

contribute substantially to the growth, the creation of new jobs and the formation of a new class of consumers. Inward **foreign direct investment** in Poland is the largest in Central and Eastern European (CEE) countries in absolute dollar terms, and is also an important factor behind the successful transformation of the country.

In spite of its several shortcomings the **political system** merits a positive evaluation. Though there have been several and frequent changes of governments, the course of institutional and economic reforms is clear and stable. The **governmental administration** has not been changed considerably since 1989. Regional level is still too weak politically and economically.

The **state budget deficit** only briefly exceeded 5% of GDP in early 1990 but since 1994 it has been much more balanced. In 2000, the budget deficit as a ratio to GDP was 2.2%. The deficit of the public sector comprises the central budget, the budgets of local governments, state-owned enterprises and state-funded social safety institutions, amounted to 3.5% of GDP (1999).

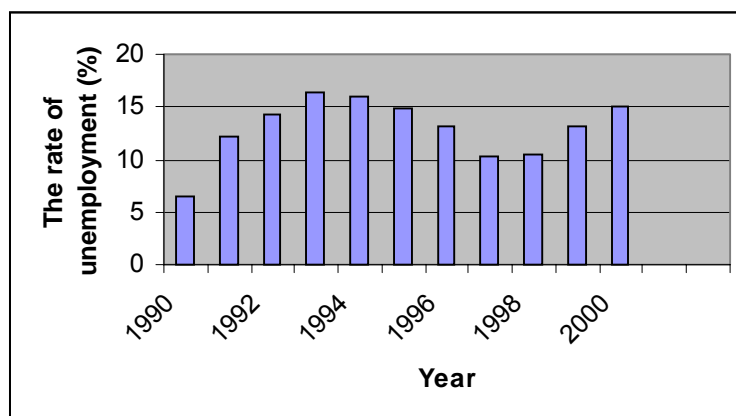
The structure of the budgetary incomes has radically shifted during the past decade, mainly as the result of a radical tax reform which took place at an early stage of the transition process. VAT income constitutes the major source of income of the state. The next best item on the list of income sources is the revenue from excises duties (which yielded half of VAT income), followed by revenue from personal income tax, corporate income tax, and custom duties. The above structure of budgetary revenues is in line with what is usually found in EU countries, but is very different from what has been traditionally recorded in the past. On the side of budgetary expenditures, the most important post is made of social transfers, followed by spending on socio-economic infrastructure and development of human resources.

Foreign debt is around ca 60 billion USD (both private and public) and remains a heavy burden on the economy. In 1999 the share of the State Treasury debt in percent of GDP was 42.8%, but it has been shrunk ever since.

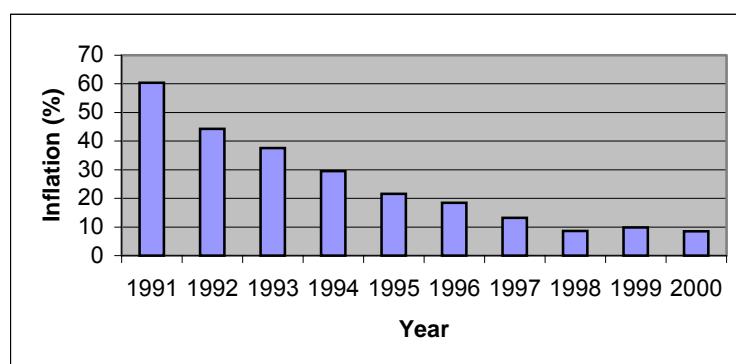
The situation on the Polish **labour market** worsened in 1999 and 2000. Total employment decreased. At the end of 1999 the number of registered unemployed persons exceeded 2.7 million and at the end of 2000 the unemployment rate reached 15%.

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Inflation has appeared to be one of the gravest impediments to the improvement of the economic situation. It has been constantly falling over the 1990s to 8.5 % in 2000.



In 1995-98 **investment** was the most dynamic determinant of Poland's general macroeconomic expansion albeit its growth considerably decelerated. However in 1999 and 2000 Poland recorded relative decline in the rate of investment growth. 1999 did not essentially change the unbalanced pattern of investment outlays. They tended to be biased, as in the past, towards physical assets; the investment in human capital continued to remain at relatively low level. Decelerating investment spending was coupled with decline in savings in both households and the corporate sector. The ratio of households' savings to gross disposable income further diminished in 1999 as compared with 1997 and 1998. Similar trends were recorded in the corporate sector, due to the worsening financial standing of Polish firms. As a result, the gap between domestic savings and total investment continued to widen. Savings to GDP ratio in Poland ranks among the lowest in all transition countries.

Foreign direct investment (FDI) is regarded as one of the most important factors of economic recovery. Foreign investors initially focused on the domestic market, which is the largest in the region, and labour-intensive sectors, but they are likely to step up exports

to western markets and to be involved increasingly in activities with a higher technological content. There is a shift in FDI in Poland during 1990. (from food industry, through labour and-capital intensive branches to services) connected with privatisation policy. Analysing categories characterizing the activities of entities with foreign participation as the number of entities, employment, incomes from all activities and from exports, investment outlays, fixed and working capital assets, and own and outside capital, the share of companies with foreign participation in the Polish economy can be estimated at 29% in 1998, compared to 23% in 1997. It can be assumed that in 1999 this share exceeds 30%. In 1999 FDI amounted 8,3 billion USD and in 2000 ca 10 billion USD. More than 30 major multinational corporations are currently involved in Poland. Compared to domestic investments, FDI is characterized by slightly higher innovation. More than 50% of the foreign capital is involved in the service sector, primarily trade, financial intermediation and real estate service. Up to now the inflow of capital is relatively small in technologically advanced industries.⁴

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In 1990-97 Polish **export** increased 7.7% per year, and Polish import – 16.1% per year. In 2000 export increase 15,5% and import 6,6%. The structure of export has being changing (gradual upgrading technology intensity). According to WTO data Poland is 35 at the list of the world exporters (0,48% of world export) and 26 at the list of world importers (0,76% of world import). In 1999 the level of foreign trade deficit was 14.4 billion USD. In the summer 2000 there are signs of its decrease.

Structure of Poland's foreign trade by manufacturing agent intensity (in %)

	Import				Export			
Intensivity:	1993	1995	1997	1998	1993	1995	1997	1998
<i>Land and forest</i>	26.6	26.7	27.9	29.2	36.7	36.8	36.6	39.5
Raw material	12.4	9.4	8.4	7.1	10.8	9.0	7.1	6.2
Capital	16.7	17.3	17.8	18.4	20.8	20.4	18.9	17.7
Technology	11.1	10.6	11.3	10.4	3.9	4.7	6.3	6.7
Other	31.3	33.9	32.6	32.9	25.0	25.8	28.0	26.6
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Poland. *International Economic Report 1999/2000*, World Economy Research Institute, Warsaw School of Economics, Warsaw 2000, p. 147.

Following threats of competitiveness of the Polish economy are recently discussed: expansion of social state (although wages and productivity are in Poland much lower than in the UE countries, the relative burden of employers connected with the social tax is more than two times higher than in EU and as compared with the UK, USA and Japan – 4 to 6 times higher) and maintaining of disadvantageous relations between labour costs and productivity.⁵ Looking for variables that could explain differences between “catching-up” and “falling behind” Eastern European countries in 1990, one must stress that “geography matters” and “history matters”.

Before 1989, CEE countries (esp. Poland and Hungary) were much more acquainted with the Western world than the countries of the Soviet Union. This was due to the greater share of trade with the West, the (relative) travelling freedom and temporary migrations. Studies on new entrepreneurs in Poland show that the majority of new owners and managers had acquired previous experiences in the West (either as employees in old foreign trade agencies, or as employees of foreign firms during temporary migrations or as small-scale importers, or so called “suitcase traders”). New trading SMEs in Poland played an important role in the re-orientation of Polish trade.⁶ Today Western clients and customers as well as co-operation with Western partners are the main variables explaining innovative approach of Polish managers.⁷ “Geography matters” not only with reference to the countries, but also very often to their regions. “Vistula river is the main line of division separating Poland’s more developed western territories from the less developed eastern part of the country”.⁸ Geography matters because the main challenge of post-communist countries is the disparity between level of life of their citizens and the level of life of the citizens of Western countries. Cultural import seems to be the single most important variable explaining changes in Poland.⁹

But not only geography, but also history matters. In their historical experience, which had and still has an adverse effect on economic growth, Eastern European countries followed a different path of economic and social development starting from the 16th century. In the part of Poland incorporated into the Russian empire soccage was not abolished until 1864 and large-scale industrialisation was not undertaken until the communist rule.¹⁰

The most important threats and opportunities may lie in the “factors which are usually ignored in sociological analysis because they are empirically intangible or difficult to operationalize”, says Piotr Sztompka¹¹ presenting two ideas close to the concept of “**social capability**” but at the same time different: “cultural imponderables” and “civilizational competence”. “[I]mponderables are a very broad category. They include social

mood, collective well-being, morale, typical habits, resentments, frustrations, mass boredom, overall disappointment, enthusiasm, apathy, and many other phenomena as well. Intuitively, we recognize that these are extremely important factors in our everyday lives and in the more large-scale social and historical processes.”¹² By “civilisational competence” Sztompka understand “a complex set of rules, norms, and values, habits and reflexes, codes and matrixes, blueprints and formats - the skilful and semi-automatic mastery of which is a prerequisite for participation in modern civilization”, especially in the sphere of economy, polity, social consciousness and everyday life.¹³

Factors described by Sztompka could be partly measured or explained by empirical surveys. Important explaining variables concern human capital. “Between 1970 and 1997 the share of inhabitants with high (...) education increased in Poland from 2% to 10%, whereas the percentage of those with utmost basic education fell from 50% to 33% respectively”.¹⁴ During the 1990s, the number of tertiary education students per 10 thousands population was 2,6 times higher than in 1990. “However, indices based on formal educational statistics do not suffice to appraise the capabilities of the people to cope with various every-day situations in the contemporary world with its modern techniques of communication, of banking services and of using information helpful in health care, in a search for employment, in self-education etc. According to the tests, conducted within OECD comparative research project, the grown-up part of Polish population has relatively insufficient qualifications to use written information in coping with (...) every day problems.”¹⁵

Polish empirical surveys of the local communities show a very high correlation between social mobilization (measured by the number of social and political organizations), economic mobilization (measured by the growth of a new private enterprises), level of education, level of political participation and the absorptiveness of foreign influences.¹⁶ Often it is the leader who sets in motion the “snow-ball effect”.¹⁷

All the factors described have an impact on restructuring strategies undertaken in the past decade by enterprises, households, or research institutions. Several taxonomies were built to describe diversity of efforts. E.g. one could discern three models of household behaviour (passive adaptation, active adaptation, lack of any adaptation)¹⁸, five strategies of research institutes (defensive, passive adaptation, pro-active, anticipative oriented towards protection of the strongest parts of institute and anticipative aimed at increasing future chances),¹⁹ four types of restructuring of enterprises (drifting, keeping the position, reckless, comprehensive)²⁰, and four enterprises` strategies (defensive, innovative, reactive, innovative-defensive)²¹.

Restructuring effort of enterprises is said to be carried out in a specific environment characterized by “[i]nstitutional immaturity and instability, inflation, shortage of capital, shortage of management skills, collapse and transformation of the markets, fragmentation of distribution channels and sudden opening to global competition.”²²

As entrepreneurial activity has been a significant factor driving economic growth, measures have been taken to foster the entrepreneurship climate in Poland. New Law on Business Activity sets up the legal framework for entrepreneurial activities in Poland and, in particular, restricts the scope for state interventions in the life of small business. According to survey carried out in 20 countries on sample by David Blanchflower and Andrew Oswald (Measuring Latent Entrepreneurship Across Nations) more Polish would like to be self-employed than in any other country (79.9% as compared to 73.3 for Portugal, 70.8 for USA, 64.5% for Switzerland, 64.2% for New Zealand, 64.0% for Western Germany, 63.3% for Italy; as concerns other CEEC: Slovenia 57.8%, Neue Landes 56.6%, Bulgaria 55.4%, Hungary 49.8%, Czech Rep. 36.8%, Russia 33.2%). Beneath Russia are Denmark (29.7%) and Norway (26.9%).²³

1.1.1 National Innovation Systems – basic statistics

In the second half of 1990. concepts of innovation, innovativeness of the economy, innovation policy and national innovation system became popular among policy-makers, journalist and the public opinion in Poland. “Innovation” issue appeared in numerous books and articles, university courses and conferences, statistics and analysis, policy programmes and instruments, centres and networks.

The strongest point in the innovation system is the growing innovation effort in the manufacturing sector. In the late 1990s, expenditure on innovation accounts for more than 4% of the turnover in this sector. In 1996, innovation intensity in Polish manufacturing sector was on par with the EU average.

“The strongest point in the innovation system is the growing innovation effort in the manufacturing sector. In the late 1990s, expenditure on innovation accounts for more than 4% of the turnover in this sector. In 1996, innovation intensity in Polish manufacturing sector was on par with the EU average.” Contrary to the highly developed countries innovation activity in Polish enterprises, both in manufacturing and in services, consists mostly in acquisition of disembodied technology. “Only 16% of service enterprises (marketed services: wholesale trade, transport, telecommunications, financial intermediation, computer and related activities, architectural, engineering and other technical activities) employing more than 9 persons, surveyed by GUS in 2000, reported having introduced technological innovations in the period 1997-1999 compared with 41% of innovating enterprises in the period 1994-1996 in service sector of EU.”

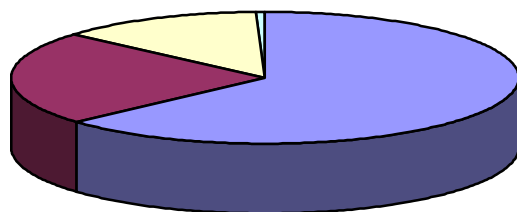
Enterprises. In 1999, a quarter of industrial enterprises (manufacturing, mining, energy, gas and water supply) surveyed by

the Main Statistical Office spent money for innovation activity. Expenditures were considerably greater than in previous years. The main part of innovation expenditures was devoted to the purchase of embodied technology. However, considerably greater was share of R&D expenditures (18,5% as opposed to 11,8% in 1998 and 12,9% in 1997). The structure of expenditures were as follow:

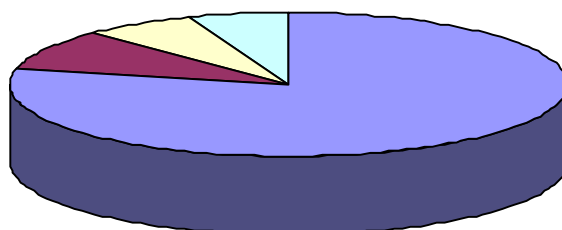
Source	Public	Private
Own sources	63,3%	78,6%
Bank credits	22,9%	8,9%
Foreign aid	0,5%	5,8%
Remaining	13,2%	6,7%

Source: *Science and Technology in 1999*, GUS, Warsaw 2001, p. 92.

Structure of the innovation expenditure in 1999 - public sector

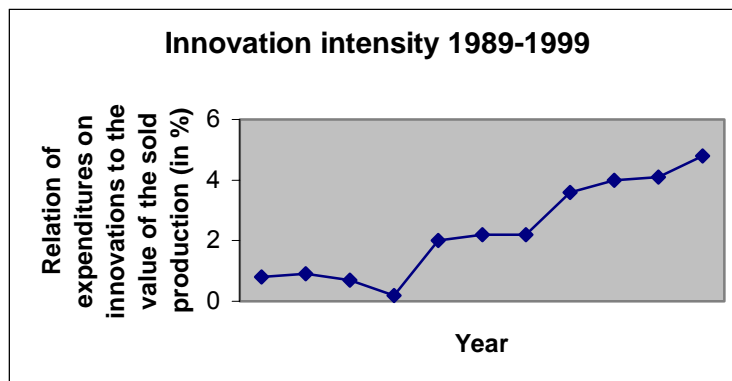


Structure of the innovation expenditure in 1999 - private sector



Source: *Science and Technology in 1999*, GUS, Warsaw 2001, p. 92. Blue – own sources, yellow – bank credits, green – foreign aid, red – remaining.

Since 1993 the value of *innovation intensity* (relation of expenditures on innovations to the value of the sold production) is steadily growing from 0,8% to 4,8% (1999):



Source: *Science and Technology in 1999, GUS, Warsaw 2001, p. 93.*

14% of surveyed enterprises reported that in 1995-1999 they have introduced technological innovation *new* for the Poland and 1,9% *new* for the world. 12% reported that in 1997 – 1999 they have implemented non-technological innovations.²⁴

In recent years, after a period of decline, the ratio GERD/GDP remains at a level about 0,7%. Main source of financing R&D is still state budget (about 58,5% of GERD). 498 enterprises in Poland (employed over 5 employees) reported to run R&D activity in 1999. Their expenditures on R&D amounted 10,1%. Remaining 31,4% of non-budgetary expenditures was covered by commercial activity of public research institutions (universities, Polish Academy of Sciences, branch R&D units) as well as by foreign funds (1,7%).

In terms of R&D intensity, there are significant regional disparities in Poland. Whereas in Mazowieckie voivodship (with Warsaw) the ratio GERD/GDP was 1,63% in 1998 (value close to Madrid Community in 1997) in the Podlaskie voivodship in North-Eastern part of Poland it was only 0,15%.

Over recent years corporate computerization and automation of production processes in Polish industry have progressed very fast. At the end of 1999 the number of computer controlled production lines in enterprises employing more than 49 persons was twelve times higher than in 1990. “As regards advanced manufacturing technologies (AMT), the most diffused one in Polish industry is the CAD/CAM system used in the recent years by almost 10% of manufacturing firms with more than 49 employees.”²⁵

According to the Institute for Research on Market Economy in 2000 there were 810 high-tech enterprises in Poland (311 up to 5 employees, 309 from 6 to 51 employees, 127 from 51 to 250 employees and 63 over 150 employees). Ca 34% of all enterprises is located in Mazowieckie voivodship.²⁶

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Polish small and medium-sized enterprises interviewed by the Grant Thornton European Survey of SMEs (2000) the main short-term obstacles for the expansion lie in the cost of the capital (57% as opposed to European average of 24%), laws and tax burdens (50% versus 28%), lack of working capital (42% versus 17%), lack of demand (36% versus 25%), R&D costs (14% versus 7%), and exchange rates (13% versus 5%). Other factors were mentioned less frequently than the European average (lack of production capacity: 3% versus 11%; lack of managers: 10% vs. 16%; lack of qualified personnel: 13% vs. 37%, and EU legislation: 3% vs. 6%). Long-term obstacles for expansion mentioned by Polish SMEs include cost of capital (59% to 28%), unavailability of long-term loans and credits (42% vs. 19%), lack of demand (59% vs. 28%), laws and taxes (44% vs. 26%), the R&D costs (16% vs. 7%) and access to the new markets (47% vs. 29%). Other factors are mentioned less frequently (EU legislation: 4% vs. 8%) or at a similar rate (management continuity: 18% vs. 18%, export barriers: 5% vs. 4%). As regards expectations for 2001 Polish firms forecast a decrease in employment, but an increase in other investment factors.²⁷

1.2 Innovation policy programmes and instruments

It can be argued that the Polish government, through its ministries and specialised agencies, has developed since 1994 a relatively important number of policy documents in the field of innovation (see table Main policy documents and consultative papers). There is also increasing awareness among governmental civil servants of the importance of innovation and innovation policy.

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Several **innovation policy tax instruments** has been implemented, like

1. Exemption of income tax:

- for institutions, whose statutory goal is R&D, to the extent concerning R&D activities (always),
- for institutions, whose statutory goal is R&D, to the extent concerning production of electronic products (only in 1998-1999),
- the right for natural persons and legal entities to deduct donation-related expenses from tax base, incl. donations on R&D up to 15% of income as well as expenses incurred by natural persons on purchasing equipment and learning aids, computer software and occupation-related publications directly connected with taxpayer's current occupation (since 1999 – 10%).

The objective of Polish tax measures is not, as is the case in the OECD region, to lower the threshold at which business investment in R&D is profitable, encouraging firms to create their own research potential and to undertake the full cycle of R&D work and bear the risk of failure, but rather to lower the costs of implementing the results of the national R&D effort. Surveys has shown that innovation policy instruments were used rarely.

2. Deduction from enterprise income of all capital expenditure on machinery and equipment needed to initiate manufacture of a product resulting from R&D work carried out within Poland which may not exceed 50% of revenue and is applicable in the year in which the investment costs are incurred (1994-96 – 50%; 1997 – 40%; 1998 – 35%; 1999 – 30%; 2000 – abolished. Instead other instruments were introduced, like reduction of the income tax for legal entities from 32% (1999) to 22% (2004) and 2% increase of accelerated depreciation rate on R&D capital assets.

3. Provisions allowing the costs of completed R&D work relating to either products or technologies (which meet certain conditions defined in the statute) to be included in expenditures for the year in which they are incurred. The results of development work (but not the results of research) may become the intellectual property of the firm, after fulfilment of certain conditions defined in the statute and after total R&D costs have been identified. Since 1994.

4. Exemption of customs duties on research and measuring equipment imported by research institutions, and exemptions of VAT tax and exercise tax on technology services (1994 – 2000).

5. State budget warranties and guarantees of repayment of bank loans drawn for implementation of new technologies (partly since 1997, fully since 1997).

6. Accelerated depreciation rate on R&D capital assets (for several decades, since 2000 2% increased).

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Main policy documents and consultative papers since 1994 (strictly innovation policy)

Title of document (and date of approval)	Organisation responsible	Legal status	Comments
Guidelines for Innovation Policy in (November 1994)	Komitet Badan Naukowych – State Committee for Scientific Research	A government document approved by the Council of Ministers on 22 November 1994	First governmental document using “innovation” in his title. Criticised by Polish and foreign experts for mostly declarative character. Introduced 10 mainly fiscal instruments.
The Supplement to the `Basis for the National Science and Technology Policy. The Preferred Directions of Scientific Research and Development Projects aimed at an Increase of Innovativeness of the Polish Economy	KBN	A government document approved by the Council of Ministers on 16 January 1996	First S&T priorities published by KBN. They were never applied in practice. Document is “unprofessional” and has a lot basic errors (e.g. lack of any criteria of choice, mixture of political and strategic priorities, lack of structural priorities necessary to achieve progress in selected areas, discordance with OECD terminology, etc.
Directions of National Innovation Policy till 2002 (December 1999)	KBN	A government document adopted by the Council of Ministers at its meeting on the December 6, 1999	Ideas clearly presented, content weak.
Increasing the Innovativeness of the Polish Economy Until the Year 2006 (July 2000)	Ministry of Economy Department of Economic Strategy	Project approved by the Council of Ministers on 11 July 2000. Programme constitute a part of the `National Development Plan until the year 2006`.	Document tries to fulfil criteria used in EU.

Two recent important policy documents are :

The KBN’s **“Directions of National Innovation Policy till 2002”** which identifies 19 tasks; and
the Ministry of Economy’s **“Increasing the Innovativeness of the Polish Economy until the year 2006”** consisting of 20 proposed measures.

An earlier KBN Basis for Innovation Policy in Poland included 17 tasks. Execution of so large number of very differentiated and only generally described tasks is difficult particularly as some measures are delegated to other ministries (like Ministry of National Economy, Ministry of National Defence, Ministry of Finance), governmental agencies (like Technology Agency, The Polish Agency for Entrepreneurship Development) or local and regional self-government (voievodships, powiaty, gminy). Up to now, no ministry has created a dedicated team to monitor and supervise policy programmes.

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The scope of innovation policy esp. in Ministry of Economy *Increasing the Innovativeness of the Polish Economy until the year 2006* is very wide and include also problems of design promotion,

There is a risk that such wide programmes are difficult to manage and their 'leading line' is lost in a large number of a very different tasks involving different stakeholders.

Agricultural Extending Centres, public understanding of science, education in innovative entrepreneurship, development of information technologies, support for cleaner production, energy-efficient production, information on domestic environmental protection technologies, renewable energy sources and support for venture capital. There is a risk that such wide programmes are difficult to manage and their 'leading line' is lost in a large number of a very different tasks involving different stakeholders. On the other hand, they prove that civil servants are aware of a current EU policy issues. Nevertheless they are still lacking good procedures for preparing policy programmes and proper ministerial structures for decision-making.²⁸

Other documents proposing innovation policy instruments

The Basis for the National Science and Technology (December 1993)	KBN	A government document approved by the Council of Ministers 22 July 1993	Document prepared to present and justify existing practices.
Industrial policy. Guidelines. Programme for 1993-95	Ministry of Industry and Trade		
Small and Medium Sized Enterprises in the National Economy. Policy Towards Small and Medium Sized Enterprises.	Ministry of Industry and Trade	Adopted by Council of Ministers on June 6, 1995	
International Competitiveness of Polish Industry. Industrial Policy Programme for 1995-1997	Ministry of Industry and Trade	Adopted by Council of Ministers on May 16, 1995	
Conception of the mid-term development of the Polish Economy until 2002	Ministry of Economy	A government document approved by the Council of Ministers on June 15, 1999	Document is a sign of upgrading governmental documents. Prepared on the basis of expertises supplied by three institutes. Include set of properly used statistics. One of the chapters tackle with innovations. Document stressed fundamental role of innovations in economic development and announce three other documents: Increasing the Innovativeness of the Polish Economy Until the Year 2006; Directions of National Innovation Policy till 2002, and Guidelines for Innovation Policy in Poland (the third one not yet prepared).
Directions of Governmental Actions Towards Small and	Ministry of Economy Department of	A government document approved by the	

Medium-sized Enterprises	Craft, Small and Medium-sized Enterprises	Council of Ministers on May 11, 1999	
Poland. National Development Plan 2000-2002		1999	

Policy evaluation. An interministerial Group for Preparing Innovation Policy created by Prime Minister's Decision in 1998 was e.g. obliged to evaluate effects of instruments introduced by previous KBN innovation policy document. For that Group State Committee for Scientific Research prepared document *Ocena stanu realizacji wynikających z dokumentu rządowego pt. Założenia polityki innowacyjnej państwa i przedstawienie wniosków w sprawie jego aktualizacji* [*Evaluation of execution of the tasks resulted from governmental document 'Guidelines for Innovation Policy in Poland' and recommendations concerning its upgrading*] Warsaw 1999. Document has 21 pages. First 14 pages presents all initiatives undertaken by KBN. Two pages summarize CIS innovation indicators. Next four pages discuss findings of the survey on the use of innovation policy instruments, made by OPI – Information Processing Centre. In last page proposals of new instruments are included.

KBN document preceded next KBN innovation policy document *Directions of National Innovation Policy Till 2000* (adapted by the Council of Ministers on the 6 December 1999).

In 1997 KBN ordered OPI - Information Processing Centre assessment of effectiveness of innovation policy instruments introduced under the government document *Guidelines for Innovation Policy in Poland*. In 1998 OPI presented report *Assessment of the efficiency systemic solutions for stimulation innovativeness of Polish economy*. Report presents findings that are not statistically robust since sample was not representative and too small.²⁹

Nevertheless it should be stressed that it was first evaluation of policy programmes ordered by KBN.

Use of innovation instruments were also surveyed by Chair of Economics of Lodz University (results were published in *Particular Problems of Innovation Policy in Poland*, Lodz November 1998, mimeo, pp. 18-20).

In 1999 KBN asked GUS [CIS] to include in its obligatory annual questionnaire on innovations questions concerning use of governmental innovation policy instruments by industrial enterprises. Results of the survey were published in *Report on Science and Technology in Poland*, Warsaw 2000, pp. 94-96. Questions concerned seven instruments:

- Deduction from enterprise income all expenditure on R&D (intramural and extramural, design, prototypes) – 3,6% of

total expenditure on innovations;

- Investment exemption of income tax (expenditure on purchase and installation of machinery and equipment needed to manufacture of a product resulting from R&D activity carried out within Poland and on purchase and installation of control and measurement apparatus necessary for introduction of iso 9000) – 3,3%;
- Exemptions of income tax – deduction from enterprise income expenditures connected with gifts made for R&D activity – 1,2%;
- Warranties and guarantees of bank credits repayment from the government budget for investments aimed at implementation of domestic technologies – 0,1%;
- Exemptions of vat tax and excise tax for technology services (like components, prototypes, design) made for research institutions – less than 0,01%;
- R&D capital assets depreciation rate – this instrument was used by 102 enterprises (a little bit over 1% of surveyed group).

No unit used insurance of export contracts for the sale of R&D results.

Innovation policy instruments were used mainly by bigger companies

Innovation policy instruments were used mainly by bigger companies (mainly from machine, chemical and television, radio and communication equipment).

According to Tadeusz Zoltowski, responsible (until 2000) for the PHARE SCI-TECH Programme “Innovation policy programmes in Poland are formulated without the necessary consultation with industry. Policy issues like innovation policy or SMEs development should be discussed and treated in a comprehensive way. Important innovation policy instruments could be included not only in innovation policy (in a narrow sense) but also in labour policy, customs duty or banking policy. Fiscal incentives are rarely known and used except for tax exemption for R&D activity.”

Major government funded programmes and initiatives in favour of innovation

Name of programme; initiative	Government body responsible	Objectives of programme	Funding available (mention if co- financed by external donor)
Technology Agency – founded under the Act of 12 April 1996	Ministry of the Economy	Main areas of activity: Implementation of innovation in production enterprises, Transfer of technology from research and development centres, Organization of the competition for the best product and technology. For implementation of innovation projects the Agency grants: loans up to 40% of the value of the project and the amount of one million PLN; guarantees of loans and credits granted by banks; additional payments to interests and credits.	Budget 2000 – different sources (own and governmental) – ca 13 mln PLN (ca 3 mln USD)
Targeted projects	KBN		Since 1991 2000 – 395 mln PLN (ca 90 mln USD)
TOR#10 (Micro- enterprise Development Project) sub-project of the TOR – Employment Promotion and Services Project	Ministry of Labour and Social Policy (with technical assistance of Ohio University)	Micro-enterprise Development Project aimed at support for existing small business development programmes consisted of 3 sub- projects: Centre for Supporting Entrepreneurship; Entrepreneurship Development Fund; Incubator. Main achievements: creation of the 42 small business assistance centres; 31 Entrepreneurship Development Funds; 25 business incubators.	Financed from the government and loan from World Bank 1994 - end of August 1996

Supporting participation of SMEs in trade fairs and exhibitions	Ministry of Economy Department of Craft, Small and Medium-sized Enterprises	Co-financing by Ministry of Economy selected trade fairs and exhibitions in 2000 - 2002	Follow-up of governmental document Assessment of state-of-the-art and proposals for actions for improvement of situation in foreign trade approved by Council of Ministers on 4 August 1999
Programme of Support to the Development of Regional Institutions for Technology Transfer	Ministry of Economy Approved by the Council of Ministers on 4 March 1997	“Implementation of the first phase task” “Support to the development of regional institutions for new technologies transfer” and “Development and implementation of financial system for the support of regional development agencies in their activities for the introduction of modern technology, especially to small and medium enterprises”.	
Supporting SMEs from Labour Fund	Ministry of Economy Department of Craft, Small and Medium-sized Enterprises	Loans from Labour Funds from Labour Fund – “Specials Programmes” Financing of Trainings necessary for the restructurization Preference credits for entrepreneurship in the country Local institutions supporting entrepreneurship	
Programme of Quality Promotion	Ministry of Trade and Industry, Ministry of Economy	Support of implementation ISO 9000 and EN 45001	From 1992 (in 1997 250 enterprises, 202 laboratories and 108 governmental R&D units participated in this programme)
INCOME PHARE	Polish Science Foundation	Technology transfer from public science to industry. To inspire introduction of the modern technologies developed by Polish science and to encourage financial institutions to take risk of investing in advanced technologies.	1995 - 2000
STEP I PHARE 95	Polish Foundation for the Promotion and Development of the Small and Medium-sized Enterprises	National System of Services (for SMEs) Supporting creation of instruments and regulations for development of SMEs Monitoring of SMEs Information for SMEs Promotion of entrepreneurship	3 mln ECU 1997-1999
STEP II PHARE 1997 – 2000	Polish Foundation for the Promotion and Development of the Small and Medium-sized Enterprises	National System of Services (for SMEs) Support for preparation of the SMEs to compete on EU markets Promotion of entrepreneurship	2.750.000 ECU 2000
EXPROM II PHARE	Polish Foundation for the Promotion and Development of the Small and Medium-sized Enterprises	Support for management and marketing of the exporting (ca 300) SMEs	7.250.000 ECU, ended 1999

PHARE SCI-TECH II	Co-ordination: Bureau for European Co-operation, Polish Science Foundation	A plan for S/TD sector adaptation to EU membership and a documented system for Technology Foresight to provide support for the programming of the S/TD administration. A national system for information, promotion and the support of Polish participation in EU RTD programmes. A system of S/TD institutions for the promotion of innovation, technological development and technology transfer to enterprises. A national Network of Technology Transfer and Advisory Centres to support particularly SMEs. Specific models for Centre of Excellence and a developed and tested collaboration mechanism between S/TD, education, and enterprise sectors.	Budget - 5 mln EURO for 1996 - 2000
FEMIRC PHARE	Co-ordination: OPI – Information Processing Centre	Innovation Relay centres aimed at information and advice on Community RTD activity and support in technology transfer. Since July 2000 there are three IRC in Poland: IRC East Poland, IRC South Poland and IRC West Poland	01.01.1997-30.06.2000 591.660 EURO
STEP II PHARE 95	Polish Foundation for the Promotion and Development of the Small and Medium-sized	E.g. advisory support for governmental agencies and business organizations trying to make Polish SMEs competitive at EU markets Information on EU markets and regulations for SMEs Co-financing of participation of Polish entrepreneurs at important (trade) fairs, exhibitions and entrepreneurs meetings Business services for SMEs Creation of SMEs in Silesia region (restructurization of mining industry)	2,75 mln ECU 1997 – 1999
Programme of the Development of Institutional Structures Supporting Entrepreneurship STEP – IFE PHARE 1997	Foundation for the Promotion and Development of the Small and Medium-sized Enterprises	Studies and analysis SMEs Information for SMEs Promotion of Polish SMEs at domestic and international markets Ca 900 services for 3 500 persons from SMEs were financed	2 800 000 ECU 1997-1999 Financed from so called “counterpart funds”
EXPROM II PHARE 1996	Foundation for the Promotion and Development of the Small and Medium-sized Enterprises	Upgrading of export capabilities of selected branches of the manufacturing industry SMEs (through improvement of their management, marketing, technologies and products.	7, 25 mln ECU 1996 - 1999

European Systems of Information and Training for Entrepreneurs PHARE 1997	Cooperation Fund (subordinated to European Integration Committee) Foundation for the Promotion and Development of the Small and Medium-sized Enterprises	Development of the Euro-Info centres aimed at supplying SMEs information on European markets	300 000 EURO Since 1997
INICJATYWA PHARE Ministry of Economy	Foundation for the Promotion and Development of the Small and Medium-sized Enterprises	E.g. creation of SMEs for ex-miners and ex-steelworkers	30 mln EURO 1999 - 2000
STRUDER PHARE Ministry of Economy	Polish Agency for Regional Development and eight Agencies for Local Development	In the framework of STRUDER programme three programmes has been launched: Grants for SMEs Local Guarantee Funds Regional Investment Funds	1996 - 1999 78,8 MLN ECU
PHARE - INRED	Polish Agency for Regional Development	Development of Regional Institutions Support for Investments in Malopolska region	1998 – 1999 15 mln ECU
PHARE PARTNERSHIP	LIEN – PARTNERSHIP financial and Administrative Office, Brussels	Support for local and regional developmental projects concerning e.g. innovations, technology transfer, entrepreneurship, trainings	1996 - 1999 7 mln EURO
EU V FRAMEWORK PROGRAMME KBN	Co-ordinator of the programme for innovation and SMEs: Fundacja Nauki Polskiej		
EU V FRAMEWORK PROGRAMME III PROGRAMME FOR SMEs	Co-ordinator: Foundation for the Promotion and Development of the Small and Medium-sized Enterprises	Euro Info Centres Europartenariat Interprise IBEX BC-Net (Business Cooperation Network), Programme supporting international contacts	
EU V FRAMEWORK PROGRAMME Leonardo da Vinci	Coordinator: Cooperation Fund	Support for vocational education.	

Other governmental programmes referring e.g. to innovation include: Poland 2025 – Long-term Strategy of the Sustainable Development (including e.g. stimulation of innovation in SMEs), National Programme for Preparation for UE Accession (including e.g. support for business services for SMEs), Ministry of the Economy: Strategy and Guidelines for subordinated R&D units until 2005³⁰ and Guidelines for Industrial Policy 1999-2002 (aimed e.g. at increasing innovativeness of the Polish economy).

Other EU programmes referring e.g. to innovation include: PHARE 2000 Socio-economic Cohesion and V Framework Programme.

There are numerous programmes supporting SMEs financed by USA (e.g. venture capital fund REINASSANCE or CARE Small Business Association, Firma 2000 (1996-2000, 6,6 mln USD), Polish-American Foundation for SMEs Consulting, FABRYKAT 2000 (1998-2000) aimed at supporting centres specialising in technology transfer manufacturing extension services, MIKRO Fund (since 1994, industrial investment loans for SMEs), UK (e.g. British Know-How Fund), Canada (Canadian-Polish Entrepreneurial Fund, Canadian-Polish Entrepreneurship Foundation), Switzerland, France, Denmark ("Business to Business" Programme), Sweden, Finland (FINFUND), Norway (BUNT, Business Development Using New Technology), Germany (Foundation for Polish-German Co-operation, Polish-German Association for the Advancement of the Economy, Otto von Guericke programme aimed at supporting innovations in SMEs), Japan (SPEED, Special Programme for Promoting East European Economies Development), by international organizations like UNDP, UNIDO, World Bank, EBOR, or by Polish non-profit organizations (like programme INCOME).

Among the USAID-sponsored addressed to local government in Poland **Local Government Partnership Programme** should be mentioned. The LGPP consisted in elaborating models of local government management, implementing them in 45 partner gminas and disseminating them to other local governments in Poland. The mission of LGPP was to promote a model of local government which is effective, responsive and accountable. To move towards this vision LGPP worked to: increase the capacity of the gminas to deliver services and manage resources efficiently; improve indigenous mechanisms supporting local government and to increase participation of the local communities in local government decision-making through increased inputs of citizens, NGO's and business organizations. The LGPP focused on the following areas of fundamental importance for the current well being and the future development of the gmina: strategic management, financial management, economic development, municipal service delivery, housing management and

development, public relations and citizen participation. Although rarely LGPP projects influence development of the technological innovations directly (e.g. by system of loans for SMEs (Pierzchnica), commercial park (Kobierzyce), mutual guarantee fund (Poznan)), they stimulated social innovations and contributed to improvement of the conditions conducive for local innovations.³¹

The Ministry of Economy is responsible for the economic part of innovations processes and de facto more strongly engaged in innovation policy (e.g. through supervising Technology Agency and Polish Agency for Enterprise Development.

1.3 Innovation policy actors

Main players in innovation policy at the governmental level are: KBN (State Committee for Scientific Research)³², formally responsible for innovation policy under Prime Minister and *de facto* responsible for scientific issues of the innovation process, and; the Ministry of Economy³³ is responsible for the economic part of innovations processes and *de facto* more strongly engaged in innovation policy (e.g. through supervising Technology Agency and Polish Agency for Enterprise Development).³⁴

Since 1997 at the governmental level several initiatives for co-ordination and development of innovation policy has been taken in the form of task groups, interministerial teams or conferences.³⁵

Main players at the meso level (governmental agencies subordinated to the Ministry of Economy) are Technology Agency (Agencja Techniki i Technologii)³⁶ and Polish Agency for Enterprise Development (Polska Agencja Rozwoju Przedsiębiorczości)³⁷.

Technology Agency created in 1997 is engaged in information, counselling, promotion and financing of applications of new technologies.

Polish Agency for Enterprise Development was created in 2001 on the basis of The Polish Foundation for Small and Medium Enterprise Promotion and Development, established in September of 1995. Apart from carrying out programmes financed from various sources (e.g. PHARE, USAID, International Financial Co-operation) aimed at creation of conditions conducive to the development of the small and medium enterprise sector as a strategic component of the Polish economy at the national, regional, and local levels. Agency serve as a forum of exchange of opinions between public and private sector as well as between business, government and parliament. Agency commissions research projects and analysis concerning SMEs in Poland.

Other players

Polish Business and Innovation Centres Association³⁸ non-governmental organization created in 1992 consisting of 150 members: persons, innovation and business centres, organizations aimed at the promotion of the local and regional development. Association organizes conferences and trainings as well publish reference books on the business incubators and innovation centres, co-operate with Working Group of Innovation Centres in

Central and Eastern Europe and with the European Network of the Innovation Centres, prepares analysis for the Polish government.

The Foundation for Polish Science³⁹ (Fundacja Na Rzecz Nauki Polskiej) registered in 1991 as an independent, self-financing, non-profit institution. Its mission is to support Polish science, humanities and technology. Statutory activities of the Foundation include those aimed at supporting the systemic reform of the domestic science and technology sectors, geared to preparing Polish science and scientific institutions for the implementation of the policies of the European Communities in the area of science and technological development upon Poland's accession to the European Union. During the years 1993-2000 these activities were entrusted to the FNP Office for European Co-operation acting through the PHARE SCI-TECH and the CRIT and FEMIRC projects financed from EU funds, and are now continuing within the framework of the Eksploratorium European Integration Programme, launched in 2001.

In innovation policy analysis area a new **European Integration Programme Exploratory**⁴⁰ started January 2001. Exploratorium carried out studies and research into the European integration process, focusing on the harmonization of the organizational framework and financial support of the sectors of science, technological development and innovation in Poland; as well as optimizing the use of the Structural Funds allocated for supporting these sectors. Research findings and analyses will be published in the form of opinions and reports; prepares analyses, evaluations and comparative studies, and setting tendencies in the strategies applicable to the science, technological development and innovation sectors in Poland, taking the European integration processes into account; keep and make available archival records and materials of Phare SCI-TECH programmes, and collecting records and data pertaining to the European integration processes in the science, technological development and innovation sectors.

Business Centre Club⁴¹ – the most prestigious of business organizations – and some of **think-tanks** like Market Economy Research Institute in Gdansk from time to time “take a floor” in innovation policy issues. Also from time to time daily press or political weeklies discuss it.

National, Regional and Local Innovation System Actors

In 1990, basic business and technology transfer infrastructure has been built in Poland. It is still discussed whether one can already speak about real innovation system at National, regional or local level in Poland.⁴²

R&D in enterprises. 1/4 industrial enterprises in Poland (manufacturing, mining, energy, gas and water supply) surveyed by the Main Statistical Office spent money for innovation activity in 1999. 498 enterprises in Poland (employed over 5 employees) reported to run R&D activity in 1999. According to the Institute for Research on Market Economy in 2000 there were 810 high-tech enterprises in Poland (311 up to 5 employees, 309 from 6 to 51 employees, 127 from 51 to 250 employees and 63 over 150 employees).⁴³

Higher schools. There are 115 higher schools in Poland that conducted R&D in 1999. Budgetary cuts press either universities or institutes and individual researchers to become “entrepreneurs” and to widen own sources of funds e.g. by contracting with companies.

Branch R&D Units. In 2001 Ministry of Economy supervised 115 R&D units. They represented the following branches: electric machinery – (mostly), chemicals, fuels and energy, light industry, pulp and paper. Being in line with priorities of the Soviet bloc and the nature of the technical and economic cycle dominating in 1950s, industrial institutes were mainly oriented (and to some degree still are) towards support for materials industry, heavy industry and defence (nuclear energy development). The main trends observed in R&D units are: reduction of their number as a result of mergers or liquidations; employment figures declined (in 1991–1992 employment fell by 50%, but now the decreasing trend has stopped); funding from central budget has been decreasing, and the share of funding from industry and business activities has been growing. No units have been privatised so far. It is, however, common for units to become “partially privatised”, i.e. to create new or join existing Commercial Code companies where a specific part of employees is transferred from R&D units to companies. Decline in public spending on the S&T sector in forced R&D units to undertake many adjusting activities. One may identify three models of restructuring in the units (often undertaken simultaneously): cost reduction; rationalisation of organisational structure and management; modification and expansion of production and services; intensification of pro-export offer.⁴⁴

Polish Academy of Sciences institutes. After 1989 most *PAN* institutes have adjusted themselves, successfully or less successfully, to the new “rules of the game” imposed by KBN (competing for A category in statutory funding and for research)

and by the market (work ordered by government and industry). In particular, they commenced teaching activities (8 university-level schools were established under the auspices of PAS) and they extended applied research. In over 30 PAS institutes applied research prevail. 10 institutes deal with technical sciences, 8 – agricultural sciences, 8 – earth sciences and 5 – medical sciences.

Non-profit organisations. The dynamic growth of the non-governmental sector after 1989 can be considered as an important token of fighting apathy in the society (as at end 1994 a total of 47,036 organisations were registered, most of them registered after 1989). At that time as many as 454 organisations declared undertaking “research activities”. It seems that those activities concern primarily expert’s opinions, consulting and advisory services and far less frequently – original research. It is also important to notice the growing number of foundations. Some of them, such as the Foundation for Polish Science (Polish: Fundacja na Rzecz Nauki Polskiej) or the Stefan Batory Foundation (Fundacja im. Stefana Batorego) became an important source of financing for science and technology. Others, such as the Adam Smith Centre, gained a strong position as regards research excellence. Unlike in state-controlled S&T institutions, non-governmental organisations combine work in the S&T area with practical activities (social, cultural, political and economic). One of the key advantages of non-governmental S&T institutions is that they overcome the academic style of research activity. Almost all scientific and professional associations that could sell their services enter market after 1989 (except that for basic sciences), e.g. local branches of the Federation of Scientific and Technological Associations NOT (publications, expertises, consulting, information).

Centres for Innovation and Entrepreneurship are exclusively local and regional initiatives. There are 142 advisory-training centres, 20 technology transfer centres, 57 local guarantee funds, 44 entrepreneurial incubators and technological centres, 4 technological parks (2000). At the central level there is (voluntary) Association of the Organizers of Innovation and Entrepreneurship Centres in Poland.⁴⁵

Status of the CIE (in %)

	training and consulting centres	technology transfer and information centres	local guarantee funds	entrepreneurship incubators, technological centres	technological parks	total
Association	24	0,4	9,5	5,7	0,0	39,5
Foundation	21,3	1	6,5	6,1	0,4	35,4
Joint stock comp.	6,5	3	3	2,7	0,8	12,9

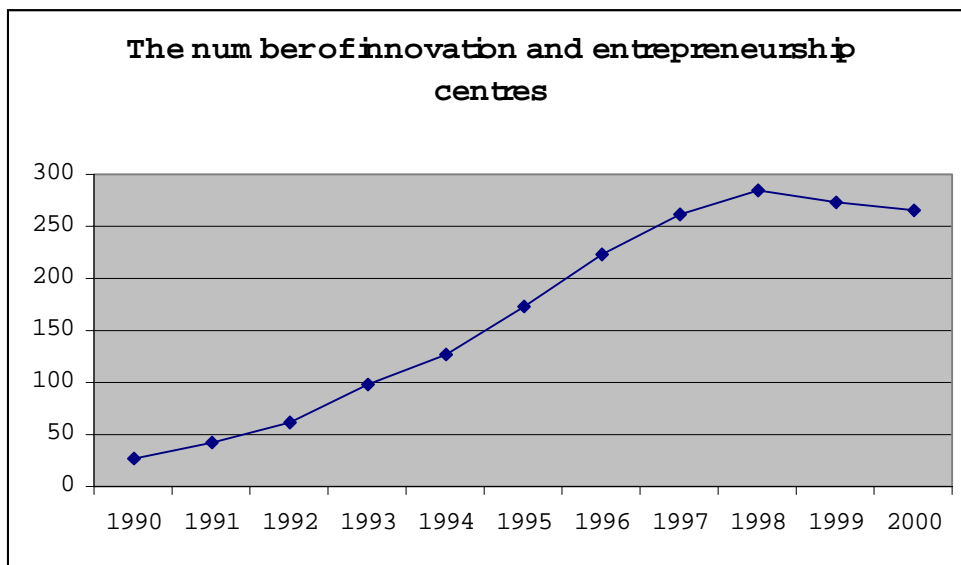
Limited liability comp.	1	0,8	0,8	0,8	0	2,7
Budgetary organization (e.g. scientific institution/ self-government administration)	1,5	0,8	0,8	1,5	0	8
Other	0,8	0,4	0,4	0,4	0	1,5
Total	55	20,8	20,8	17	1,2	100

Source: *Innovation and Entrepreneurship Centres in Poland. Łódź-Poznań 2001*

One could discern four phases of the development of in Poland:

1. Pioneer period 1990-92 – domination of Western experts' ideas. Stress put on technology transfer, cooperation with industry and aid for innovative firms.
2. Period of using of CIE as a mean to overcome unemployment (1993-95). Strict connections between CIE and Ministry of Labour and Social Policy and National Office of Labour. New units created in regions of restructurization of industry.
3. Period of a new ideas (1996-98). Higher specialisation and new niches, entering rural areas, return to the technology park conception.
4. Since 1999 “market verification” resulted from ending aid programmes. Increase of the profit-orientation.

The crucial success factors of Centres for Innovation and Entrepreneurship include: local business climate and support of local authorities; participation in a big governmental or foreign aid programme of support for entrepreneurship and technology transfer; market analysis. adjustment to the client's need. leadership and team capabilities; efficiency and effectiveness; market approach; wide network of local, regional, National and international co-operation; success in gaining self-financing.



Training and consulting centres (usually called “Centre for Entrepreneurship Promotion” or “Business Support Centres”, “Centres for the Support of Innovation”), organizations aimed at development of entrepreneurship, self-employment, technology transfer, technology audit and upgrading of SMEs. The main areas of activity are: support of creation of a new firms (97%), businessplan (89%), computer training (83%), financing and taxes (81%), marketing (81%), accountancy (72%), law (69%), language teaching (28%), support in cooperation (17%), patents and new technologies (6%). Average centre had 812 clients in 2000. Business Support Centres specialised in support SMEs in marketing analysis and promotions, financial analysis and financial planning international trade, international capital and technology exchange, application of computer technology.⁴⁶

Technology Transfer and Information Centres. The main area of activity: patents and new technologies (100%), marketing (58%), business plan (53%), support in cooperation (51%), law (50%), computer training (50%), creation of the firm (48%), financing and taxes (45%), language teaching (28%). Main tasks include evaluation of regional science and innovation potential, creation of the data-basis, development of the contacts between science and industry; assessment and feasibility studies for new products and technologies; technology audit; promotion of the technological entrepreneurship. Most of them are connected with scientific institutions. Average centre had 495 clients in 2000.⁴⁷

Entrepreneurship incubators and technological centres. Main tasks include space at special rate, business services and training. In all centres and incubators there are ca 1100 firms with 6500 employees. The interest for centres and incubators is declining.

For technology park the most important goal is to foster regional development by technology transfer, by technology creating - and what is key information to this rapport – to develop skills in innovation relay, innovation management and technology transfer young people (graduates of high schools and universities).

Technological Parks. Recently there are four parks: in Poznan (at Poznan University, first technological park in Poland, founded in 1995), Wroclaw, Krakow and Warsaw (at Warsaw Military Academy of Technology) six technology centres (Gdansk, Szczecin, Gliwice-Bytom, Koszalin, Torun and Warszawa. Several others (11) are in preparation. In all parks there are 25 firms with 1618 employees. Usually the initiative of creating park comes from high schools, local development agencies, local authorities, government and other organizations. For technology park the most important goal is to foster regional development by technology transfer, by technology creating - and what is key information to this rapport – to develop skills in innovation relay, innovation management and technology transfer young people (graduates of high schools and universities).⁴⁸

Agencies for the Local and Regional Development. There are 62 agencies, presumably more than in any other CEE countries. Local and regional development agencies basically operate in a single commune (*gmina*) or a group of neighbouring *gminas*. At a central level, there are three institutions which are important for the functioning of regional development agencies: Polish Agency for Regional Development, closely collaborating with agencies operating in regions included in complex financial aid programmes for the sake of restructuring and growth, Industrial Development Agency, which is stakeholder in many regional and local agencies, and National Association of Regional Development Agencies, which functions as an association, but is also an organizer of a number of training programmes and other projects. The total capital of RDAs can be assessed at about 25 million USD (1997).

In the opinion of most RDAs, their business activity is the least important, the most important activity being the promotion of the region among potential investors and tourists. Their areas of interest include: creating economic initiatives, regional restructuring, construction of regional and local development strategies, moderating local environmental workshops, development of regional contracts, appraisal of planned investment undertakings, feasibility studies, restructuring of enterprises, preparation of study cases for optimal restructuring methods and transformations in businesses, risk appraisal in economic undertakings, strategic planning, financing of economic undertakings, economic and financial advice, implementation of European Union regional programmes, market research, information gathering, processing and access, selection procedures of contractors to perform work on the basis of the Act concerning public tenders, as well as the European Union requirements, human resources management, promotion, fairs, exhibitions, training programmes⁴⁹. Agencies are supervised by the Polish Agency for Regional Development responsible e.g. for execution of PHARE programmes like STRUDER and INRED.⁵⁰

Special economic zones. There are about 20 zones offering tax concessions and other preferences for investors. Recently tax allowances have been limited in accordance to EU competition policy. In some zones technological parks and centres as well as high tech firms are located.⁵¹

The Polish Chamber of Commerce (Krajowa Izba Gospodarcza), which has 160 affiliating members and was established in 1990, is at present the biggest and the broadest-ranging institution of corporate self-governance in Poland. The PCC brings together more than 500,000 companies active in Poland and represents the interests of Polish entrepreneurs vis-à-vis the government and local bodies of State administration and cooperates with the parliament by providing opinions on new draft regulations concerning the economy. Among its tasks, the PCC inspires companies to apply a new management philosophy and corporate culture, embodied in the Total Quality Management (TQM) concept. The Polish Chamber of Commerce runs the InfoData Nationwide Business Information System. Training courses are an important part of the Chamber's activities.⁵²

The Euro Info Centres, non-profit organisations financed jointly by affiliating institutions and the European Commission. The Euro Info Correspondence Centre in Warsaw was set up in 1991 under the Cooperation Fund, a foundation of the Polish State Treasury. 12 Euro Info Centres in Poland are now recognised as a tool which serves the integration of Polish small and medium-sized enterprises with the European Single Market. To achieve this goal, the EIC Network in Poland offers a range of support services, such as: providing polish companies with detailed information on EU policies, structures, programmes and legislation with special focus on single market; promoting commercial cooperation with EU companies; information about the EU markets; organisation of events such as cooperation fairs, seminars and conferences; information about assistance projects which are underway in Poland (within PHARE and other European Programmes); assistance to Polish enterprises in contacting prospective partners via euro info centres located in all EU member states and through the BRE network (bureau de rapprochement des entreprises); assistance for Polish firms wishing to participate in European commission-sponsored events aimed at establishing or strengthening inter-regional ties, such as Europartenariat; offering detailed information on the Polish market to companies and institutions across the European Union. The main partners are governmental institutions such as Polish Agency for Enterprise Development, European Information Centre at the Office of the Committee for the European Integration, Regional Development Agencies, Chambers of Commerce, Associations and regional and local authorities. To facilitate access to the Euro Info services, in 1994 a network of Regional Representative Offices of the Euro Info

Correspondence Centre was established. The five Regional Representative Offices, located in Gdansk, Kraków, Szczecin, Kielce and Rzeszów and the EICC in Warsaw established a very close working relationship, processing some 10 000 queries per year.⁵³

Institute for Fundamental Technological Research⁵⁴ of the Polish Academy of Sciences manages National Contact Point for the Participation in V Framework Programme.

Employers Associations and Regional Chambers of Commerce and Industry **are e.g. used as a channel for innovation diffusion.**

Business Schools, there are recently over 100 private business schools in Poland. Many of them located in small urban areas have connections with the local business community.

The Information Processing Centre⁵⁵ (OPI) called into being in 1990 as a research and development unit supervised by the State Committee for Scientific Research. The statutory tasks of the Centre includes accumulation, storage, processing and dissemination of scientific and technical information on the condition of Polish science and results of the scientific research conducted in this country and abroad; conducting research and development projects regarding e.g. transfer of new technologies from science to economy and high-tech in small and medium-sized businesses.

A very important element of the innovation scene in Poland are networks: National System of Services, Business Information Network, INNOWACJE/REKIN, Innovation Relay Centres and Centres of Excellence (described in Part II and III).

Other: There is a bulk of pro-profit information, consulting and advertising agencies, including Polish branches of the “big five”: Andersen, Coopers&Lybrand, Ernst&Young, KPMG and PriceWaterhouse. All they offer partly the same services as Centres for Innovation and Entrepreneurship and partly other ones: economic analysis, market research, tele-address information, businessplan, training, law advising, marketing, linking enterprises, custom duty information, information on standards, information on commodities, products, information faires and exhibitions.⁵⁶

- Some main public libraries (not the local ones) and university libraries apart of making access to books and data basis (much fewer than in the West), apart of bibliographical information specialise in business information services (like e.g. Thorn Kopernik University Library or University Library in Szczecin).

- Patent bureaus at higher schools, under different headings, usually 2-4 persons, inform on patents, patenting and (sometimes) technology transfer.
- Network of 31 Regional European Information Centres, located mainly at universities, source of information on EU regulations e.g. for entrepreneurs, supervised by the Centre for The European Information established in 1997. Centres offer the special information service concerning the economic integration process of Poland with EU.⁵⁷
- Foreign embassies economic bureaus and advisers.
- Branch information centres, inherited from the previous system, much weaker than in the past. Reference book from 1997 describe 36 of them. Almost all are the part of industrial branch R&D units. Information on standards, patents, technologies, technological reports, professional journals and bulletins.
- International Organizations – UNIDO, World Bank, World Trade Centre.
- Non-profit organizations like Business Information Centre, Polish Business Consulting Service, and the others;
- Network of town/city/local or regional information, e.g. tele-address information, information on production, trade and services.
- Centre for information on acts of law and regulations (sometimes situated in law publishing firms or in governmental institutions).
- Information centres located in governmental agencies (e.g. Central Statistical Office, Centre of Economic Information of the Ministry of Economy, Library of the Patent Office or National Bank of Poland).
- Internet – hard to measure but growing fast, portals like Wirtualna Polska and the others. There is innovation network Web Site <<http://www.innowacje.pl>> and newsletter *Innowacje* available also On Internet. Information on Polish patents available on Internet but not free of charge.
- Economic Intelligence agencies.
- Research institutions, e.g. governmental branch R&D units offer technological services similar to the Western governmental laboratories, e.g. measurement, standards, certifications, quality control, prototypes, design, consulting, ISO advising, S&T information and consulting, R&D services.
- Professional press.
- Business and management private and public schools (over 100).

1.4 Assessing innovation potential: data collection, surveys and indicators

The main actor in monitoring and collecting data on innovation indicators, particularly those using or applying internationally accepted methods (e.g. OECD indicators, Community Innovation Survey, etc.) is Główny Urząd Statystyczny (Central Statistical Office). The general rule is that all the surveys in the field of R&D and innovation statistics have to be prepared in line with international OECD methodology. OECD methodology was adopted in 1994.

In the field of R&D and innovation **Central Statistical Office** collects the following statistics:

1. Annual PNT-01 Report on R&D activity;
2. Each three years Report on the activity of foundations, societies, political parties, trade unions, social organizations, employer's organizations, professional and economic associations – questions e.g. concerning R&D activity;
3. Annual PNT-02 Report on innovation. Each three years PNT-02 is broadened to include questions of the Community Innovation Survey (CIS): 1995 (for 1994), 1998 (for 1997);
4. Each three years PNT-02/u Report on innovation in service sector;
5. Annual PNT-03 Statistical cart on the use of foreign licenses;
6. Annual PNT-04 Report on the production technology indicators and the unit consumption of materials in production processes;
7. BR-04 - the number of electric/electronic devises in households;
8. Production and foreign trade in high technology (data taken from P-01 and SAD single administration document (concerning custom duty) documents);
9. HRST (there is no HRST survey made according to *Canberra Manual*; there are substitute data taken from PNT-01 and some other questionnaires;
10. TBP (data taken from National Bank of Poland);
11. Patents (data taken from Patent Office of Polish Republic);

The Central Statistical Office has been gathering data on R&D on a regular basis since 1960. Since 1994 survey has been based on the OECD Frascati methodology. Usually questionnaires are permanently revised. Some questions are included only once.

State Committee for Scientific Research publish each year Annual Report covering following topics budgetary expenditure on R&D/S&T: science budget according to group of tasks; science budget according to supervised institution; statutory funding of research institutes; statutory funding of higher schools; expenditure on: big equipment; investment; individual research grants; targeted projects; international co-operation (financed by KBN); science and technology services supporting research; expenditure on information technology infrastructure.

National Bank of Poland collect data on Technology Balance of Payment (send to CSO and publish in *Report on science and technology in Poland*).

Patent Office of the Republic of Poland collects statistics concerning patent granted and patent applications (send to CSO and publish in *Report on science and technology in Poland*).

Apart from obligatory statistics there are several *ad hoc* surveys on innovation-related topics undertaken by the opinion pool centres, like e.g. DEMOSKOP survey on the diffusion of the computer and the access to Internet in Polish SMEs (2000) commissioned by the Polish Agency for Enterprise Development.

There are also numerous data surveys and indicators produced systematically but on the basis of research grants and Innovation data surveys and indicators produced on ad hoc basis.

1.5 National innovation system – legal and administrative environment

Basic problems related to the functioning of law for all entities conducting business activity are related to: “the low level of legislation (unclear, complicated regulations), frequent introduction of changes (need for being continuously on the lookout for new changes in the law, multiple amendments of acts causing the inconsistency of the law), inefficient administration, and the judiciary system.”⁵⁸ In the case of SMEs, these barriers are especially arduous and often affect the functioning of companies and their development, which is the effect of a limited financial means (SMEs are unable to regularly use legal or tax advisory services).

At the end of 1998 there were over 600 legislative acts, decrees and pre-war regulations of the President of the Republic of Poland with legislative force, and almost 5000 regulations and orders. The extent of the law-making activities in 1998 was closed with the 1267 legal acts including 99 legislative acts. E.g. the list of legislative acts issued in 1997 which influence the activity of SMEs consists of 118 acts, and list for 1998 consists of 109 ones.

For many years, a basic problem related to the enforcement of law has been lengthy procedures, both judiciary and administrative.

“Besides national legislation, entrepreneurs must also watch the local law-making process, especially gmina regulations: e.g. the Warsaw-Centrum gmina issued 317 such local regulations in 1998. Part of the changes introduced are forced by the need to adapt law to EU regulations.”

For many years, a basic problem related to the enforcement of law has been lengthy procedures, both judiciary and administrative. Long proceedings, which in minor cases can last many years, their costs and loss of time make entrepreneurs abandon their claims, and the loss suffered especially by SMEs as a result are difficult to assess. “According to the report published by the US Department of State, which is a review of the observance of human rights over the world, the inefficient judiciary system is the biggest Polish problem from the point of view of human rights (Country Reports on Human Rights Practices, U.S. State Department, 1997). The report indicates the low level of trust of society in Polish courts, lengthy courts cases, inefficient judicial administration, and too limited budgets of courts, Court decisions, especially in the case of administrative courts, often do not become binding, and simple civil cases take two to three years in Poland, while in the U.S. similar cases do not last longer than a few weeks”.⁵⁹ Also *World Competitiveness Yearbook* assesses efficiency of the Polish government administration low.⁶⁰

In 1998 entrepreneurs hoped for the simplification of the legal system after the appointment of the Paper Work Reduction Committee upon the initiative of the Council of Ministers` Committee for Economy. However, after three year of the Committee`s operations the effects very limited. Paper work reduction plan in Poland was not effective mostly due to the fact, that Committee was not working in co-operation with Parliamentary Commissions. In result reduction of the administrative burden in e.g. tax compliance regulations was combined with extensive increase of the paper work in e.g. Social Insurance regulations. Besides Committee was composed of too many representatives of the administration and was too large to work effectively. Representatives of the state administration were not interested in limiting the bureaucratic burdens. Simultaneously business representation was too weak to lobby for requested changes. An important factor was also the weak political representation of the business circles. In result proposed changes in e.g. more flexible labour regulations were not accepted by the parliament.

Freedom of Business Activity. Among acts adopted that introduced changes affecting the scope of administrative intervention in the economy, the amendment to the Act on Counteracting Monopolistic Practices should be mentioned. The amendment makes the fusion of companies easier by restricting the obligation to obtain the permit in cases of major importance.

But in the same time, in last years new quotas (e.g. concerning free of duty import of cars) and restrictions were established within the scope of foreign exchange, and new permits (e.g. concerning oil import) with regard to business activity were introduced. The amounts, above which enterprises must notify their intention to merge, were increased, e.g. the level of total annual sales of goods in the year before the year of notification of the intended merger of enterprises was increases from EUR 5 to 25. If company has exceeded this level, it is obliged to submit an application to the Office of Competition and Consumer Protection. Moreover, the level of total value of assets of the enterprises taken over was raised from EUR 2 to 5 million.⁶¹

In November 1999 new **Business Activity Law**⁶² was decided to be introduced since 1 01 2001. It defines basis of economic law and is in accordance with international agreements. It widens the scope of economic freedom and facilitates conducting of the economic activity. The new law scaled down the discretion of the administration, limiting the number of licensed activities and making precise the conditions required for obtaining licences.⁶³ According to Tadeusz Zoltowski, former head of PHARE SCI-TECH Programme, 'The new law is good and adjusted to EU standards. But there are important administrative hindrances (e.g. for import of components).'

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Company creation in Poland is relatively easy in case of individual persons (companies of physical persons). It is sufficient to register company at the municipality, statistical office and at the tax office. Creation of legal entities is much more complicated and much more expensive. In this case court registration is necessary. Related costs include compensation for notary office, lawyer as well as court fees. Besides, last changes introduced on January 2001, increased significantly capital requirement for limited liability and joint stock companies. E.g. in case of limited liability company minimal capital was increased from 4000 to 50 000 PLN (respectively 1000 to 12 500 EURO). However, company creation procedures in Poland are not considered as an important hindrance to market entry. Acquisition land is relatively easy (ca 1 months) when state-of-the-art of the property is clear. Otherwise it might be very lengthy. Foreign investors require Ministry for Interior Affairs and Administration permits.

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Integration Strategy. On June 23, 1998, the Council of Ministers accepted the *National Programme of Preparation for the Membership in the European Union*. The "creation of favourable conditions for the development and improvement of competitiveness of enterprises, especially SMEs" has been accepted as one of the programme priorities within the scope of sector policies."⁶⁴

Industrial Policy Measures. Apart of instruments described in my previous reports, two governmental programmes should be

mentioned: Coal Mining Industry and Iron and Steel Industry Restructuring Programmes. Both consisted of the Social Package including e.g. the instruments addressed to workers who had been made redundant and were undertaking business activity, to entrepreneurs creating new jobs, and to local mining and steel industry communities.⁶⁵

Fiscal Policy. New law on income tax introduced decreased rate of corporate income tax (30% 2000, 28% 2001, 24% 2003). Apart from general forms of taxation, small enterprises could use simplified forms characterized by a lower level of the tax burden, simple construction, and easy application in everyday life. The simplified system of taxation consists of setting the tax in a legislative act as a percentage or certain amount, regardless of the income, up to the amount of costs incurred and income generated as defined by regulation. The amount of tax is defined in relation to the defined type of business activity conducted by an individual or, in some cases, an ordinary partnership. The simplified form of taxation is accompanied by simplified methods of setting with tax offices.” While this undoubtedly facilitates the business activity, it nevertheless is a hindrance in contacts with banks for especially small firms. Banks are distrustful of small firms due to the inability to review the actual status of the firm’s sales, income and expenditures. In case of physical persons companies, banks, which do not have full ledger, do not have necessary financial data. In Poland there is a shortage of seed capital (except for credit guarantees given by the ATT, Technology Agency) and venture capital is oriented towards big projects (and not small enterprises). In 1998, the rules for deducting investment expenses contained in the Personal and Corporate Income Tax were similar to those in the previous year. However, the amount of investment expenses which may be deducted from income in subsequent years by individuals was reduced. Special tax preferences are used in local communities which are considered with high structural unemployment, and in voivodships and local communities defined as ones threatened with structural recession and social degradation. In those areas, for corporate entities and individuals who conduct or undertake business activity some preferences are foreseen, e.g. payers of personal income tax and corporate income tax may benefit from increased depreciation rates allowing faster depreciation of certain fixed assets during the first years after the assets were purchased.⁶⁶ Research institutions do not pay VAT in Poland (it is less advantageous solution than VAT 0).

State Aid in Poland and Regulations Binding in the EU. “Depending on the addressee of the assistance and its purpose, State aid in Poland is of sector and horizontal nature. Enterprises with decreasing competitive abilities and belonging to so-called sensitive or strategic regions are offered the former type of assistance. The latter is of a super-sector nature and is mainly used to support exports, innovations, environmental protection,

regional development, and development of SMEs. (...) The most frequently used forms of assistance included: grants, tax subsidies, and deferment of payments to ZUS (Social Insurance Institution).” Tax subsidies accounted for the most significant share of State aid granted, and, among them, tax exemptions and relief and amortization of debts towards the budget were the most often granted forms (these types of “operating aids” are coming under increasing scrutiny from the European Commission).⁶⁷

Opinions of SMEs managers.⁶⁸

Very often business community in Poland is concerned about such prosaic problems as labour costs, fight for survival etc. Innovations are put aside “for better time”. As long capital could be invested with lesser risk and greater profit in short-term trade undertakings serious innovations investments should not be expected. From the point of view of the innovative SMEs the main barriers in innovation activity seems to lie in the tax burdens (which are high and time-consuming⁶⁹), stiffness and the rigidity of the banking system (not prepared for serving technologically advanced investments and enterprises), and low level of social capital (trust, reliability, respect for law) in business community. Tax system is considered too complicated, unclear and unstable. System of government procurements is criticized. Labour law works against the employer: laying a lazy worker off is hard, time-consuming and expensive.

It is very hard to distinguish acts of law that have especially strong impact on innovation activity (with possible exception for act of law on Personal and Corporate Income Tax (15 2 1992 and subsequent modifications) and act of law on credit guarantees given by the State Treasury (8 5 1997)).

Benefits from fiscal innovation incentives are relatively small. The best and the most innovative Polish firms have been sold to foreign investors. And foreign investors prefer to arrange R&D, technology and production networks around Western firms. So there are no important innovation network organizers.

Most of the best Polish inventions are commercialised in Western countries. As Western products they have better chances of being sold in Poland.

There is need to lower the level of the risk of new hi-tech spin-off companies. From the very beginning industrial research should be done with and for specific companies based on knowledge management that includes many partners and stakeholders (researchers, design, consulting, man of practice). Market research should precede most of technological research. Most of technological inventions are complex. They need to be made in enterprises in cooperation with production and marketing.

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In Poland there is a very low demand for advanced technology products: R&D sector, the army or health service sectors are poor, and advanced technology industries have often collapsed (electronics). Usually the most innovative hi-tech products designed in Poland are produced outside Poland. The best inventions are sold to foreign companies. They are hardly commercialised in Poland.

Creation of a new innovative company is relatively easy. However, there is no sufficient seed capital to survive the first stage. The banking system lacks advanced technology experts. Bank credits are hard to acquire. Banks still prefer to give credits to the firms equipped with machinery and buildings and not to highly talented people with promising idea. Patent information is not free of charge.

Governmental measures for support export (like business information on foreign markets, cheap export credits, trade brokerage by embassies) is considered to be weak.

There are significant positive changes in the patent law. Polish patent are protected in Europe. However, patent experts are expensive. There is a lot of discretion in patent regulations. Each research institute observes different rules.

"In opinion of companies and scientific technical institutes the taxation systems does not sufficiently stimulate innovations in the economy. Until 2000, companies that incurred investment expenditure on the purchase and installation of machines or devices connected with implementation of licenses, patents and results of domestic development projects could deduct the investment costs from the taxable revenue up to 30% of this revenue. As of 2000, this tax relief has been abolished in view of the current taxation policy which aims to gradually reduce the corporate tax rate over the next 4 years to 22% in 2004. As the falling general tax rate is expected to stimulate innovation and modernisation expenditure, the tax relief for investment is seen as unnecessary".⁷⁰

Separation between science and industry lowers innovativeness in industry. EU 5th Framework Programme is aimed at highly developed and not at pre-accession countries. The Polish science system is closed and dominated by hierarchy. High prestige of basic research and low prestige of applied research makes the latter less attractive. Main challenges in candidate countries to maintain a high level of R&D potential linked to innovation is to increase of the efficiency/effectiveness of the research in the context of innovation and reduce unnecessary research.

KBN (State Committee for Scientific Research) is a kind of professors' trade union. KBN does not know how to harmonize two different evaluation criteria: scientific merit and utility. KBN

should not decide upon applied research. There is lack of science policy based on understanding of the longer term National needs. Usually only researchers' short-term ambitions and interests influence the choice of research plans.

Section 2 - Measures to foster innovation in business

2.1 Training and human resource programmes of innovation

2.1.1 Introduction

The subject matter regarding training in innovation issues, innovation management, innovation transfer seems to be very new in Poland because of the well-known anti-innovation nature of command economy. "During the last ten years Poland has developed in the field of management training, the knowledge on the most important subjects such as marketing, sales, accounting, finance and project management. There is a need now to move past this level and start developing a more serious attitude towards the issue of staff development. For many senior managers and HRD managers the issue is still not important, however, as the market stabilizes, leadership and behavioural issues will become more important".⁷¹ One of the (relatively) neglected subject concerns training and human resource programmes of innovation.

The most serious weakness of the system is the vocational structure it inherited from the centrally planned economy. This structure was adapted to the structure of employment in an economy focused on heavy industry, including mining, and with a services sector which was underdeveloped in terms of both quality and quantity.

"Since the beginning of the transformation process, the education services market has been developing. (...) Associations and non-governmental organizations play an important role in continuing vocational education and organise a significant proportion of all courses. The rate of participation of employers in the organisation of courses for their staff is still very low. (...) Despite certain achievements, such as the development and diversification of the services offered, particularly out-of-school services, the importance of continuing education is still insufficiently recognised. The legal basis of this form of education is weak. (...) The most serious weakness of the system is the vocational structure it inherited from the centrally planned economy. This structure was adapted to the structure of employment in an economy focused on heavy industry, including mining, and with a services sector which was underdeveloped in terms of both quality and quantity"⁷²

These opinions could be supported by statistical data: e.g. public expenditures on labour market training programmes in 1995 were

only 0,04 (as compared to 0,02 for Czech Rp., 0,13 for Hungary and 0,34 OECD average).⁷³

However, there are proofs that situation in this respect is changing. According to report "Market for training 2000 – demand" prepared by Demoskop and Management Institute market for adult training start to grow exponentially.⁷⁴ It is estimated that in adult non-obligatory training over 300 000 institutions and millions participants took part in 1990. Annual value of the market is ca 170 mln USD. Also the number of training firms is growing very quickly.⁷⁵ One third of Poles above 15 years is convinced that life-long learning is necessary for their careers. However, only 13% decided to upgrade their professional competencies (mainly higher education graduates). 65% managers of small firms (5 employees or less) and 76% managers of bigger firms (over 5 employees) are convinced that personnel trainings are necessary for firm's competitiveness. In 2000 trainings were organized in ca 306 000 small and ca 88 bigger firms. The most often trainings were organized in foreign investment enterprises and big (over 250 employees) firms (90%). However, up to now only small part of firms have strategic training plans for their personnel.

The needs for the increase of educational and training effort are great because of the gap between Poland and European Union countries. The number of adults performing below of adequate threshold of literacy and literacy levels of workers are greater than in EU countries.⁷⁶ According to IMAS survey 42% of Poles does not understand word VAT, 44% - Internet, 51% - budgetary deficit, 59% - e-mail, 59% - quotation, 67% - GDP, 76% - recycling, 85% - New Economy, 89% - Home Page, 91% - e-commerce.⁷⁷ The cultural differentiations are much stronger in Poland than in Western countries. Poles with tertiary education read almost the same number of books as citizens of Western countries, but Poles have ended their education at the first or second education level read less. Moreover, they are much more numerous their better educated compatriots.⁷⁸

According to GUS census data at the end of 1999 almost 50% of manufacturing enterprises employing more than 49 persons reported using Internet in their activities.⁷⁹ A DEMOSKOP survey carried out at the turn of 1999 and 2000 shows that 99% of medium sized enterprises (employment 50 to 249 persons) have access to at least one computer. 56% have Internet access and the remaining 24% plan to get on-line in 12 months. Access to computers is positively correlated with firm size. A small business survey (covering business employing up to 49 persons) in December/October 2000 shows that only 27% of enterprises employing up to 5 people have a computer and about 11% are online. Computer and Internet usage is positively correlated with: education of the firm's head, co-operation with foreign partners

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and co-operations in urban areas. Larger firms use more modern hardware and software. Only 35% of all, small and medium size enterprises, have their own home page, and 32% use the Internet for advertising. Only a small fraction of small businesses use Internet for sale support (15%) as well for banking (18%) and advertising (18%). A survey carried out in 2001 by I-metria together with Arthur Andersen (a total of 1142 corporate respondents were interviewed) shows that approx. 90% Polish firms use computers and 88% are online. According to Grant Thornton, the smallest share of SMEs having own their e-commerce strategy in all European countries covered by the survey is to be found in Poland (17% compared to 52% in EU). Internet firms realize potentially huge market in computerization and Internet-networking of SMEs. Their strategy is based on two assumptions: a) sale of hardware and software should be preceded by training to presenting all the benefits of computers and the World Wide Web; b) new Internet services for SMEs should be offered to make the offer more attractive.⁸⁰

According to interviewed SMEs managers since grammar school levels innovation in Poland is separated from practice. There are some rare individual exceptions (e.g. a school that bought second-hand car to be taken to pieces by its students). Bookish knowledge prevails. The school should learn how to learn. There is need to teach innovation approach and creative thinking linked to innovation since grammar school. Each subject taught in school could be presented in the context of innovation.

To assess their own market position Polish SMEs are more likely to use monitoring of the competitors' activities and reports and are less likely to refer to consultants, advisors and past experience. Market research and information from the branch organizations are used with similar frequency. Polish companies also use business plans more frequently.⁸¹

The contribution of vocational education and training within companies in Poland is still poor. E.g. as concerns ISO, ISO report states, that 1) Poland together with Argentina, Greece, Mexico, Portugal and United Arab Emirates surpass "1000 threshold" in ISO 9000 certifications, 2) till the end of 1999 there were 1012 ISO 9000 certifications in Poland (compared to 1500 in Czech Rp., 3282 in Hungary, 560 in Slovakia, 521 in Slovenia and 8699 in Spain), 3) till the end of 1999 there were 72 ISO 14000 certifications in Poland (compared to 60 in Czech Rp., 121 in Hungary, 24 in Slovakia, 19 in Slovenia and 573 in Spain). Poland enter ISO path a bit later than Czech Rp. and Hungary and till now have smaller achievements.⁸² According to Wojciech Sumacz in Poland there 2717 firms has ISO 9000 certificationes, ISO 14001 – 189, QS 9000 – 61, VDA 61 – 32, other – 44, total – 3045.⁸³

2.2 Innovation Management Techniques

Innovation Management Techniques regarded as a packet of services seems to be new in Poland⁸⁴. There are several examples of firms using this kind of techniques, but separately, according to the needs (not as a packet) e.g. applying TQM based on E. Deming publications to company process. Discussing IMT, it is important to highlight that the majority of innovative SMEs are managed by entrepreneurs directly connected with innovation (author or co-author of innovation). This means that this kind of person has wide knowledge but limited by particular innovation discipline. Very often it is garage (hobby based) entrepreneurship. In very low number of cases hobby oriented entrepreneur is skilled in management (in general meaning of this word)⁸⁵. Usually entrepreneur manages innovation in intuitive way of learning on mistakes. There are also two groups of entrepreneur using innovation management techniques. Entrepreneur using IMT but not being aware of this fact - intuitive way of learning, and entrepreneur using IMT and being aware of it. This kind of entrepreneur mostly has wide range of knowledge from many different disciplines. In many cases also scientific experience. They are able to apply IMT into their firms without any external help.

It is important to highlight that the majority of innovative SMEs are managed by entrepreneurs directly connected with innovation (author or co-author of innovation).

There is huge gap between demand on innovation management techniques from SMEs and supply from active in providing support for SMEs organizations. Companies aware of possibility to use external services in IMT mostly are not willing to use them because of few reasons: lack of money for external services; low awareness of potential advantage possible thanks to IMT; and lack of trust in skills of external company expert who are not familiar with particular innovation discipline knowledge. For example Fundacja Inkubator – Łódź during all time of it's activity had only one case when company asked it for help in innovation value estimation.

In the framework of the PHARE SCI-TECH II (1997-2000) programme entitled 'Development of the National and Regional Innovation System in Poland' technology audit and technology investment analysis tools (TAIT) were prepared. SCI-TECH offered numerous trainings and workshops concerning economic, law, management and Internet issues. In the framework of programme 'Restructuring of Branch R&D Units' handbook of technology audit based on Business Excellence Model recommended by the European Foundation of Quality Management.⁸⁶

In the framework of PHARE TESSA Programme there was teaching and training programme in innovation management at Warsaw Technological University in 1994 – 1997. After coming to the end of European funds programme was ceased.⁸⁷

In the framework of FABRYKAT 2000 (1998-2000) programme financed by the USAID technology audits aimed at SMEs in selected branches and made by the Polish and American experts were offered.⁸⁸ FABRYKAT 2000 prepared programme of technology management that will be executed in three higher schools: Szkoła Główna Handlowa [SGH – Warsaw School of Economics], leader – Professor Wiesław Grudzewski; Wyższa Szkoła Biznesu – National Louis University in Nowy Sacz [Higher Business School - National Louis University], leader dr Krzysztof Pawłowski and Politechnika Wrocławska [Wrocław University of Technology] – leader Professor Edward Radosinski.⁸⁹

In the framework of Ministry of the Economy's Programme Promocji Jakości, PPJ [Quality Promotion Programme] aimed at dissemination of the quality systems compatibles with ISO 9000 and ISO 14000 (mainly through trainings, conferences, seminars and publications) and the creation of the Regional Quality Promotion Programme Centres. Up to now 455 companies and 200 laboratories have been engaged in the programme.⁹⁰ In last years numerous conferences in innovation and innovation management were held in Poland. At some higher schools there are advanced preparation of launching of innovation management programmes (e.g. at SGH – Warsaw School of Economics, Professor Anna Sosnowska).⁹¹ Dr Michał Jasiński at Wyższa Szkoła Biznesu – National Louis University in Nowy Sacz is running a seminar on using creative thinking in industrial innovations.⁹² Nevertheless in higher education institutes in Poland an academic-type lectures on innovation treated as a part of micro-economy (e.g. Stefan Kwiatkowski's lectures at the Leon Koźmiński School of Entrepreneurship and Management) prevails.

Section 3 - Business innovation interfaces and support measures

3.1 Business and academy-industry networks for innovation

3.1.1 Research community - industry co-operation⁹³.

Introduction

According to Central Statistical Office in 1999 18,4% of R&D in branch R&D units, 8,9% in higher education and 2,3% in Polish Academy of Sciences Institutes were financed by industrial enterprises.⁹⁴

Co-operation between research institutes and SMEs was the subject of a survey run in 2000. For 30 surveyed institutes co-operation with SMEs (R&D, advisory and technological support) is of minor importance (income from SMEs amount to only 3,7% of institute's turnover; income from R&D contracts from SMEs amount only 14% of all R&D contracts). Less than half of the interviewed institutes had any previous contacts with SMEs (in research, technology, trade or production). Contrary to Western countries, intermediary institutions like centres for innovation and entrepreneurship, chambers of trade and industry do not play a significant role in relations between research and SMEs.⁹⁵

<i>Opportunity</i>	<i>% of research institutes</i>
Personal contacts	90
Conferences and exhibitions	83
Fairs	83
Due to the collaboration with other firms	60
Distribution of written offers to SMEs	50
Visits of SMEs managers	41
Due to the collaboration with other research institutes	30
Meetings in business organizations	27
Meetings in centres for innovation and entrepreneurship	23

Source: Edward Stawasz, Problemy współpracy jednostek sfery nauki i techniki z małymi i średnimi przedsiębiorstwami, in: Ośrodki innowacji i przedsiębiorczości w Polsce, Łódź-Poznań 2001

The main areas of cooperation are: R&D and production (90%), consulting and training (83%), production services (74%), expert reports and information.

PHARE Programmes aimed at strengthening science – industry collaboration

Since the mid of 1998 three PHARE programmes leading to foster research community – industry co-operation and business networks for innovation creation has been realized:

Support for Polish Academy of Sciences institutes – University – Industry collaboration (Management of the Consortium)⁹⁶ (1998-1999). Among its goals were: to design and organize consortium for scientific, educational and industrial collaboration; to integrate foregoing achievements into educational programmes; and to apply to this project the latest methodology for management of R&D projects; to establish long term relationship regarding accessibility of equipment, facilities and human resources for educational and research purposes; to augment involvement of industry in education. All projects mentioned were realized over the period of 12 months having been subsidized to the amount between 38,000 and 50,000 EURO. The main objectives of Consortia was to provide training in the latest methods of R&D project management and to encourage exchange of experience gained on the way as well as give support to Polish research scientists involved in the EU's 5th Framework programme. As an effect of above described activity the beginning of the pro innovative firms network started. New devices, products and methods have been developed and introduced into the domestic market. Certain curriculums for graduate, research degree and postgraduate courses have been modified according to the findings learnt and experiences acquired while developing the inventions. Special importance has been attached to the end-users' (students, university instructors) judgement of the after mentioned materials.

Centres of Excellence⁹⁷ (1999-2000). The objectives of this initiative were to: design policy, managerial instruments and funding mechanisms promoting establishment of Centres of Excellence, paying particular attention to their regional dimension and co-operation with EU partners; design a pilot establishment of first Centres and support their implementation; monitor the process of the model Centre of Excellence establishment, and document results for further undertakings in this direction. The main achievements of the Project are: *Establishment of five pilot CoEs*. Their field of scientific research range from chemistry and neuroscience medicine to medical and information technologies and material sciences. Geographically the CoEs are located in 4 voivodeships and their partners,³⁵ all together, are based in 9 local governmental units of Poland. *Model and structure of CoE* was developed basing on the idea of networking research centres co-

ordinated by a Leading Institute and consisting of at least two research institutions and one or more industrial or other user organization; a consortium agreement between the partners forms the formal basis for operation. The *directed science policy approach* of Centres of excellence used in more than 20 OECD countries was found to fit to the present trends of Polish science policy and could be installed as a new instrument for it.

Continuation of the funding of the five pilot CoEs for 2001 – 2002 was decided by KBN in September 2000 by opening special projects ordered by KBN, one for each CoE. These projects will cover research, administrative a promotional expenses corresponding to the particular need of the CoE. Further research funding will come from participation in EU 5th FP projects and from research contracts with industry and other users of the research results. Contribution from regional and local level are also expected.

In the course of the project the enterprises, according to opinions heard during the evaluation process, have appreciated the experience and intend to continue the association. Even more encouraging is the fact that each CoE intends to try to increase industrial involvement in the future. Though none of the enterprises are as yet contributing financially to the CoEs, this is likely to occur in the future as involvement deepens. On the basis of the success of the project it is expected that current and future CoEs will act as a model which will change Polish industry's attitude to research to be more in line with that prevailing in western Europe and other industrialized countries. During first year of existence each of CoEs has developed several products, services and technologies, in many cases applicable in wider range than formulated in problem description.⁹⁸

It is expected that current and future CoEs will act as a model which will change Polish industry's attitude to research to be more in line with that prevailing in western Europe and other industrialized countries.

Development of a National and Regional Innovation System for Poland (1999-2000)⁹⁹. The main objectives of the network has been an integration of the innovation supporting environment in the regions, co-ordination of the activities, mutual learning, identification of the new fields of activity, preparation of the innovation – oriented projects for the different EU programmes, co-operation with the existing Polish initiatives e.g. National Service System (Krajowy System Usług – KSU¹⁰⁰) or FABRYKAT 2000¹⁰¹; dissemination and awareness building action for the support of innovations. The financial contribution of PHARE for the realisation of particular activities had covered up to 80% of total project cost. The amount of money allocated to the beneficiary varied from 25.000 to 40.000 Euro. There were selected 21 institutions and organisations to build an innovation supporting network, named INNOWACJE/REKIN. 18 members of the network have created consortia for the realisation of their activities.

	Public and private universities, Polish Academy of Sciences Institutes	Industry	Local and regional government	Others (Centres for innovation and entrepreneurship)	Total
Co-ordinator	11	3	1	6	21
Partners in consortia	23	4	2	24	53

The activities of the network members have been divided into three thematic groups: Internet (Internet, databases designing, searching for, processing and distributing information); Training (developing consulting instruments, audits, specialised training); Promotion and organisation of conferences. The groups were co-ordinated by selected network members – Centrum Badań Przedsiębiorczości i Zarządzania PAN, OPI¹⁰² and PIAP¹⁰³. Co-operation with and servicing the SMEs sector in sphere of technology transfer seems to be one of the most important elements of the network.

In numerous instances the one of the most important elements of technology transfer and innovation (TTI) activity is delivery of training services. Such training schemes usually takes as their subjects: rules concerning innovative venture financing, acquisition of financial resources from support sources and legal and economical matters of implementing new technical and technological solutions. One of the priorities of the present project was to support creation of locally and regionally anchored TTI networks. High successes are to be noted in that field in cases of the INNOWACJE/REKIN network members in: Kraków – The Foundation “Partnership for Environment” (6) together with local science units, several non-governmental organisations and the voivodship self-government have created so-called “Małopolska Technology Transfer Network”. Similar activity took place in Wrocław (2) in result of which regional innovation network has been created. Because of special character, for some network members it was extremely difficult to set-up local or regional TTI networks. On contrary such institutions concentrated their efforts on encouraging creation of industry branch – based networks, which refer not to a place of technology transfer but concentrate on technology type institutions. The most successful institutions in this sphere are: Technology Institute of Electronic Materials (8) and PIAP (9). An important element of activity of the INNOWACJE/REKIN network were editing and publishing services. In this sphere the most successful were the Institute of Mechanics and construction of Warsaw Technological University (7) – quarterly issued publication “Innowacje”. Since the technology transfer and innovation issues are not sufficiently present within the present syllabus of colleges and universities, very important are all initiatives directed at inclusion of those

issues (TTI and related problems) into current didactic schemes. In this sphere the leading network members are the Institute of Mechanics and Construction of Warsaw Technological University (7) and the University of Management and Social Sciences in Tychy (10).

The main achievements of the INNOWACJE/REKIN network is effective co-ordination of local and regional activities and initiatives in the sphere of TTI support and creation of advisory boards within structures of voivodship marshals' offices or local governments. The most important services that will be offered by the network members after the closing of the present project are: national and international technology transfer (information and consulting services); support in commercialisation of high tech projects; development of international co-operation in favour of regional SMEs; delivery of technology audit and assessments advisory services; technology trends monitoring; dissemination of information on technology developments; guide for "best practice" for implementation of innovative projects based on innovation programme and 5th EU framework programme; search for partners in the field of technology transfer and innovation co-operation. After ceasing of PHARE funds activity of INNOWACJE/REKIN network has declined.

Preparatory Action for SMEs Clustering/Networking¹⁰⁴

In 1997-1998 Polish Foundations for SMEs (recently Polish Agency for Enterprise Development) carried out programme financed from PHARE STEP II. In the framework of the programme ca 15 persons were trained as network brokers. The main aim of the programme was to increase co-operation between SMEs. Programme used the best practices of Italian, Danish and Dutch of SMEs clusters adapted to the Polish conditions. Network broker is thought as intermediary between SMEs, science sector (universities, branch R&D units), banks and guarantee funds. He/she was to initiate contacts, helps to identify solutions and advise how to implement them.

Domestic initiatives

Individual clustering initiatives¹⁰⁵

Industrial clusters are also created bottom-up, beyond EU initiative. E.g. in 1999 local Tarnow self-government created company Tarnow Industrial Cluster "Plastic Valley". Participants of the company are: Tarnow factories, local Chamber of Trade and industry, Tarnow Agency for the Local Development, as well as local self-government. The main aim of the company is to facilitate co-operation between existing plastic firms and to attract further plastic industry investments. Company provides firms with necessary infrastructure and with technical, financial and

managerial aid. It also stimulates co-operation between firms and between firms and scientific and ecological institutions.

Polish Academic-Industry Forum (Polskie Forum Akademicko-Gospodarcze) was founded for stimulating understanding and co-operation between academy and industry. Forum consists of the rectors of the biggest Polish universities and chiefs of the most known enterprises and economic organizations. Usually Polish Academic-Industry Forum organizes periodically in different regions academy-industry meetings devoted to the discussions about the current issues (like e.g. the state of the art of the private universities in Poland). Polish Academic-Industry Forum is run by Board consisting of representatives of the academy and industry.

Forums, workshops and conferences as quasi ‘incubator’ of networks and research-industry co-operation. In Poland relatively important “incubator” of networks/clusters are conferences like e.g. periodical *Forum for Innovation and Technology Transfer* (first in Lublin, March 2000), organized by Regional Lublin Foundation for Development, or Silesian Forum for Local and Regional Development (the second, January 2001), annual conferences of the Polish Business and Innovation Centres Association, and fairs like e.g. annual International Intertechnology Fairs in Lodz, annual Poznan International Fairs *Science for the Economy* or conferences organized under aegis of Leonardo da Vinci Programme like *Education and Innovations in the Regional Development* (Tychy, June 9 2001).¹⁰⁶ Usually technology fairs and exhibitions are accompanied by seminars and conferences.

Innovation network Web Site, <<http://www.innowacje.pl>> Web Site on innovation was created in the framework of PHARE SCI-TECH project “Fund for the Support of the National and Regional Innovation System in Poland” (System Wsparcia Krajowego i Regionalnego Systemu Innowacji w Polsce). Web Site is addressed to anyone interested in the carrying and disseminating of innovations. It includes the names and the addresses of all institutional actors and stakeholders of innovations in Poland, like Regional Development Agencies, non-profit organizations, foundations, associations, private equity and venture capital associations, governmental agencies and programmes, scientific institutions engaged in innovations, private consulting firms, technology transfer centres, technology parks, entrepreneurship incubators, innovation networks like Innovation Relay Centres. The other form of the dissemination of information is newsletter “Innowacje” available also in Internet: <http://imik.wip.pw.edu.pl/innowacje>.

Today science-industry interface institutions are quite numerous in Poland. They are too concentrated in large urban centres. They are not efficient enough because of the lack of the

government/regional/local support. Also there is no sufficient cooperation between them. Generally intermediary institutions are considered to be weak. Although they are hard to assess because they have not existed long enough. Often few success stories (like e.g. COMAQ computer firm, that started in Krakow Technology Park with 4 workers and now employees 700) justify numerous failures.

More than ten foreign R&D centres (mainly engaged in software development) are an important intermediary between science and (the global) industry. E.g. ABB Technology Centre signs many co-operation agreements with universities, branch governmental units and PAS institutes each year. There are many workshops and conferences with Polish public research institutions.

Innovation networks and industrial clusters are relatively new idea in Poland. Until recently there are only few articles on that subject and only one research project (Maria Curie Skłodowska University in Lublin, prof. Zbigniew Szlachetka team, empirical survey on industrial clusters in selected branches, based on Michael Porter's methodology).

3.2 Support for start-ups and new technology based firms¹⁰⁷

3.2.1 Introduction

In 1998 there were about 700 small technology firms in Poland, mainly university, branch R&D units or company's R&D departments spin-offs.

In 1998 there were about 700 small technology firms in Poland, mainly university, branch R&D units or company's R&D departments spin-offs. Less than 10% firms were founded by individual inventors that did not have any earlier professional experiences. Majority of firms are located in Warsaw, Lodz, Krakow, Wroclaw, Gdansk, Poznan, Szczecin and Lublin. Contrary to the majority of SMEs technology firms are very rarely family firms. Usually they are operating in following branches: scientific, medical and optical equipment; biotechnology; chemical and pharmaceutical industry; information technology and telecommunication; electronics; materials. They are engaged in production of final products or components; in technical services and consulting; design and software. Most of them employee 10-12 persons. Owner/founder is ca 42 years old. Own savings are the most important source of the initial capital (other: loans or credits).¹⁰⁸

Wieslaw M. Grudzewski and Irena Hajduk published study on the academic entrepreneurship in Poland (1996). Study was based on interviews with 56 entrepreneurs. Most of the surveyed firms were located in the biggest academic centres (Warsaw, Gdansk, Gdynia, Wroclaw, Szczecin). Majority of entrepreneurs decided to create

firms form the scratch while meeting barriers in commercialization of their own ideas in previous work (mainly university or branch research institute). The sources of funds were very diversified (family, friends, partners, bank loans, governmental/local grants).¹⁰⁹

Comparative Polish-British study on the new technology-based firms reveal problems that Polish entrepreneurs are meeting:

3.2.2 Sources of financing of the small technological firms at the first stage

Source	UK	Poland
Own savings	45	65,9
Credit	14	8,9
Shareholder's capital	21	6,6
Public sources	7	3,6
Other	13	15,0

Source: Marek Martin, *Źródła finansowania małych firm technologicznych w Polsce I Wielkiej Brytanii* [Sources of financing of the small technological firms in Poland and Great Britain], Ośrodki innowacji i przedsiębiorczości w Polsce, Łódź-Poznań 2001

To describe actual situation with respect to new technology based firms creation in Poland it's necessary to write few sentences about the development of support for NTBF providing organizations.

3.2.3 Organized support for start-ups and new technology based firms

Within the period of 1993 – 1995 many entrepreneurship centres and incubators started. Their main goal was to find the way to decrease unemployment. The structure of institutions, established in that period, contained training organizations, loan funds etc. The idea was to create small business and popularise self-employment in high unemployment regions. The organizational structure of incubators and services portfolio offered to new SMEs depended on local needs. The main initiator on state level of activity in field of traditional incubators creating was Ministry of Labour and Social Affairs and State Labour Office.

The characteristic feature of the period of 1996 – 1998 was appearing of specialized centres focused on local development. It was possible to notice increase of interest in innovation and technology transfer. First ideas and drafts of technology parks were prepared.

Most organizations supporting SMEs created until 1998 were financed from government, regional or local government or foreign programmes (including EU) funds. After 1999 the period of market verification became. External financial aid which has

been provided to above described institution became reduced. Only wide variety of services providing and financially strong organizations have chance for further development and existence.

Analysing existing in Poland organizations focused on providing support for start-ups and new technology based firms one can separate them by kinds of services offered to small and medium entrepreneurship. Since the mid of '90 University of Łódź, Chair of Economy with Polish Business and Innovation Centres Association cooperation keep monitoring of following SMEs support providing organizations development. The most actual research¹¹⁰ has identified 264 organizationally separated centres acting in the field of training, advisory, financial aid, technology transfer and incubating. The result shows following potential of subjected organizations at the mid of 2000:

Training and Advisory Centres (142 organizations). Main goals: to popularize and foster self employment and entrepreneurship idea; to provide help in technology transfer and commercialization, technology audit; supporting local initiatives in field of creating and developing SMEs; to create dialog platform between local and governmental administration and other organizations leading to achieve social and economic development of the region. In general the training offer of statistical T&AC includes subjects: entrepreneurship issues: new venture creation, business plan, market research computer and internet issues: basic software - office, financial, graphic etc. professional skills; how to find a job; health and safety at work legislation.

Technology Transfer and Information Centres (20 organizations). Technology Transfer Centres are non-profit organizations set to provide assistance in technology transfer and all issues regarding this subject. Main goals: to valorize regional scientific and innovation potential, data bases creation, developing networks between science and economy; feasibility studies for new product and technology, competitive advantage identification and comparing with products and technologies existing in the market, estimating market potential, distribution and production costs etc; technology audit; popularization and developing technology based entrepreneurship. Majority of Technology Transfer Centres are created by and located in science and research institutions. Statistical Technology Transfer Centre is divided into lecture rooms, class rooms, computer workplaces, reading rooms, libraries, consultant's rooms and offices. Statistical T&ITC employs 3,5 full time employee and additionally 30 is active as part time employees. The main activity of Centres focuses on patent and technology advisory. As the main barriers in Technology and Information Transfer Centres development managers used to rate: lack of funds for equipment and standard improvement problems with local and regional institutions cooperation lack of technologies to be fit to commercialisation.

Main partners to Technology and Information Transfer Centres are local level partners: universities, R&D institutions, other non-governmental institutions. State level partners: Komitet Badań Naukowych¹¹¹, Agencja Techniki i Technologii¹¹², Amerykańska Agencja ds. Rozwoju Międzynarodowego¹¹³, Polska Fundacja Promocji i Rozwoju MSP¹¹⁴.

Local Loan and Guarantee Funds (57 organizations). Non profit, financial institutions supporting local social and economical development by providing grants, preferential loans and credit guaranties for start-ups. Statistical Local Loan and Guarantee Fund employs 1,2 employee: director and loan expert. Other person is employed on part time. Mostly Local Loan and Guarantee Funds are organizationally and personally connected with Training and Advisory Centres or Incubators. The most popular support for SMEs provided by LL&GF is loan. Consumers of loans are unemployed people starting self-employment and entrepreneurs starting new ventures. Within a year statistical LL&GF provides to final customers 86 guarantees and 70 loans. As the main barriers in Local Loan and Guarantee Fund development managers used to rate: too low stock capital; customers searching for easy money; not precise low regulations. Main partners to Local Loan and Guarantee Fund: local level partners: labour offices, banks and financial institutions, local government; state level partners: Ministerstwo Pracy i Polityki Socjalnej¹¹⁵, Polska Fundacja Promocji i Rozwoju MSP, Krajowy Urząd Pracy¹¹⁶, Fundacja im. Stefana Batorego¹¹⁷.

Entrepreneurship Incubators (42), Technology Centres (2) and technology parks (4). In Polish practice incubators, technology centres and technology parks are multifunctional organizations which differ from other support for SMEs providing institutions by offering to customers area for rent. At the end of 2000 in all incubators and centres acted 1077 firms employing 6503 people. For today only technology parks one can separate as really NTBF support providing organizations. Other institutions used to provide support to every kind of firm including those technology based. It's a question of long time for the existing organizations to became oriented in offered support for narrow segment of customers. Actually following barriers make difficult development of support for SMEs providing institutions: market verification – since 1999 external financial support for above described organizations has became decreased, only market oriented and offering wide range of support institutions have a chance to survive and develop; weak organizations providing services far from market needs must change an offer or stop existence. New technology based firms run into following serious barriers caused by new technologies implemented: risk for potential investors; new technology or product is not market verified; no one can forecast exactly its' potential; long non production period for research and

development; during this period potential investor or firm has to invest for new, researched product or technology having at the same time no any income from it.

E-incubators (incubator for firms in IT). In 2000 first three e-incubators designed for a new IT firms were created. IncuBird founded by Internet Investment Fund; e-incubator, founded by DNS Polska, Cisco Systems, Oracle, RSA Security and Sun Microsystems, and e-Katyst (the major shareholder – Jupiter National Investment Fund). IncuBird offers funds up to 250 000USD, consulting and marketing (in exchange for minority shares). Management is left to the initiatives of the new entrepreneurs.¹¹⁸

3.2.4 Venture Capital Funds

Like in most countries banks are not inclined to loan seed and venture capital. Bank experts have financial and not technological competences. Market for loans for NTBF is still very limited. Return of the capital in technological ventures is relatively long. Credit guarantees are given by ATT (Technological Agency). In case of physical persons companies, banks, which do not have full ledger, do not have necessary financial data. In Poland there is lack of seed capital (except for credit guarantees given by the ATT, Technology Agency) and venture capital is oriented towards big projects (and not small enterprises). Banks are reluctant with giving loans to SMEs because SMEs rarely have sufficient guarantee funds. Banking procedures are considered to be lengthy and cumbersome.¹¹⁹

In Poland there is lack of seed capital (except for credit guarantees given by the ATT, Technology Agency) and venture capital is oriented towards big projects (and not small enterprises).

Up to now certain features of seed capital have KBN – State Committee for Scientific Research so called *targeted grants* (projekty celowe) and ATT – Technology Agency loans (In the near past also Phare INCOME PROJECT subventions). There is conception of seed capital presented by the Lodz University innovation researchers (K. B. Matusiak, E. Stawasz, M. Mazewska, M. Pietraszewski, Model funduszu zalazkowego typu seed capital w realiach prawno-ekonomicznych Polski, expertise for the Ministry of Economy, 1998).

Recently (June 2001) Ministry of the Economy on the basis of the governmental programme “Increasing of the effectiveness of the Polish Economy” plan to organize “Innovation Centre” aimed at supporting of the creation of the new technology based firms. Centre will select the best technological projects and provide founders with support (training, advising, financing, management, production, marketing) necessary for the market success. Governmental Agency for Industrial Development¹²⁰ will be responsible for the “Innovation Centre” project.

At the beginning of 2001 there were 28 investment *venture capital* funds in Poland. All together have 2 066 mln USD. The smallest were entirely Polish and the biggest entirely foreign. VC Funds are growing steadily. The share of the Polish capital in VC funds is growing. The sources of VC are diversified: banks, pension funds, governmental agencies, international organizations, enterprises, insurance companies. 72% of VC Funds sources were invested in economic ventures. There is growing interest for new economy firms, like Internet, computer and telecommunication firms and e-commerce (e.g. Polish Enterprise Fund invested over 1 mln USD in Computer Communication System SA). At the beginning VC firms in Poland (mainly FDI) invested in food, building and service industry. But now the interest for traditional branches is declining. VC funds in Poland invest mainly in second (26%) and later (23%) stages of investment. Investments in seed-up (7%), start-up (11%), or first stage (16%) are more rare. Dynamic development of VC funds results mainly from a new Law on Investment Funds (1998). VC Funds managers the main obstacles in investments see in regulations, the quality of firm's managers and the small supply of small technological firms with a great potential. There are also regional VC funds geared towards SMEs, like Mikro Funds, Podkarpackie Towarzystwo Inwestycyjne, Lubelski Fundusz Kapitałowy and Podlaski Fundusz Kapitałowy.¹²¹

3.3 Networks

Apart of all centres for innovation and entrepreneurship mentioned earlier (esp. training and advisory centres and technology transfer and information centres) there are three networks operating in Poland and offering e.g. training in human resource development for innovation in SMEs:

- National Services System (Krajowy System Usług),
- Innovation Relay Centres of Technology Transfer.

Additionally, one should also mention INNOWACJE/REKIN network consisting of the 21 organizations participating in PHARE SCI-TECH II (1997-2000) programme entitled 'Development of the National and Regional Innovation System in Poland' (kind of mutual-aid society aimed at supporting technology audit, IPR, access to funds for innovation, entrepreneurship, e-commerce, start-ups and consulting activity through trainings, conferences, exhibitions, and Internet).¹²²

The problem is that Polish SMEs often are not aware of possibility to use services provided by those networks.

The widest network is **National Services System** (Krajowy System Usług). This organization was founded in 1996 by Polish Foundation of SMEs Promotion and Development (since 2000

the Polish Agency for Enterprise Development) in the framework of PHARE STEP I and STEP II. Actually the network consist of 150 institutions, like Agencies for the Regional Development, Branch R&D Units, The Business Support Centres, Centres for the Support of Innovation, Loan and Guarantee Funds, Scientific and professional associations, Employers Associations, Business Schools, Regional Chambers of Commerce and Industry. Mostly members of National Services System provide simple services for small business e.g. help services in establishing self employment, help services in accounting, marketing etc. The main area of services includes: consulting, training, information and financing (loan and guarantee funds). Most of the institutions in NSS network implemented quality control system based on ISO 9000. Services are cheap (co-financed from the public funds) or free of charge (e.g. consulting in computer/Internet issues). Up to 2000 consulting services were provided up to 20000 clients. Only four organizations belonging to National Services System provide training thematically including innovation subjects: Fundacja Rozwoju Przedsiębiorczości [Foundation for the Entrepreneurship Development]¹²³ (series of training regarding innovation management in SMEs), Instytut Technologii Drewna [Institute for the Wood Technology]¹²⁴ – (training on the implementing systems of environmental management ISO 14000), Rada Federacji Stowarzyszeń Naukowo-Technicznych w Koninie [Council of the Federation of Science and Technology Associations]¹²⁵ (new technologies in house building) and Wielkopolski Klub Technologii i Racjonalizacji [Wielkopolska Province Club of Technological Improvements]¹²⁶ (law protection of ownership of patents, industrial designs, inventions). National Services System is co-ordinated by the Polish Agency for Enterprise Development. Since 2000 co-ordination is limited to the provision of information. In the framework of National Services System three subsystem are located: **Business Information Network** (BIN) consisting of 21 organizations offering information, training and advisory services necessary for creation and development of SMEs¹²⁷, **Business Co-operation Network**¹²⁸ and **Euro Info**.¹²⁹

The most active in providing innovation training are **Innovation Relay Centres**¹³⁰ network consisting of three centres: IRC East Poland, IRC South Poland and IRC West Poland with its own networks of co-operating institutions. Network was organized by the Foundation of Polish Science in the framework of PHARE FEMIRC Programme. IRC focuses on packets of services¹³¹: identifying technology needs in local firms; identifying potential partners offering needed technology; arranging technology transfer; identifying local firms with high developed technology and offering this technology to companies declaring need for it; creating link between R&D results and industry to apply new knowledge in practice use; consulting services regarding subject

matters of intellectual property, licenses, innovation financing, venture capital and joint international undertakings.

As an example, a short description of three IRC organizations is provided.

Hi-Tech Ltd¹³² (Hi-Tech is private owned company established in 1988 by Polish scientists) is concerned with promotion of new technologies developed in Poland; information on innovative technologies developed in R&D sector; technology transfer from research to industry; assistance to Polish partners in joining EU RTD projects as regional. As a technology fairs organizer Hi-Tech has published several catalogues providing information about Polish technologies and possibilities of technology transfer.¹³³

Wrocławskie Centrum Transferu Technologii [Wrocław Centre for Technology Transfer]¹³⁴ – Wrocław organizes regular training courses that have various forms. They range from one semester post-graduate studies to one day seminars. The target group are executives of a different management level and specialists. Participants of WCTT's courses have the opportunity to follow the practical part of the training in the modern laboratories of the Wrocław University of Technology and in enterprises. WCTT also offers courses tailored to your needs (also in companies). Recently organized was intensive training in American Lean Manufacturing programme addressed to industry management¹³⁵. WCTT¹³⁶ offers also organizational and technical consulting. Consultants elaborate analyses and suggest new solutions. They advise and facilitate innovation, understanding and implementation. WCTT prepares, assists and monitors the implementation of new technologies and organizational methods in enterprises. WCTT helps with finding industrial partners in Poland and abroad thanks to the participation in regional, national and transnational innovative networks. WCTT (as a Regional Contact Point for the 5th Framework Programme) provides information about possibilities for Polish enterprises, research and scientific units and other organizations to participate in research and technology development programmes of the European Union.

Fundacja Inkubator (Incubator Foundation) – Łódź works since 1992. The Technology Transfer Centre has been established in 1995 as department of Incubator Foundation. In field of IMT this Centre offers typical for other Innovation Relay Centres services: supporting of technology transfer process; seed-up young technology and spin-off firms; promotion of technology advanced engineering created in the region; seeking the engineering for local enterprises (all sectors); looking for financial sources for technological projects; impelling of the cooperation between universities, R&D sector and private industry; permanent monitoring of R&D institutions and identification of technology

advanced projects possessing commercialization possibilities; technical assistance in the field of manufacturing extension. Organization provides wide range of training for management (accounting, management, marketing, finances, foreign languages, business use of computers etc.). Activity focused on SMEs support. Training "Innovation as a basic condition of keeping competitive advantage of entrepreneurship". Fundacja Inkubator frequently organizes meetings with secondary vocational schools students to teach them how to implement innovation and how to create new entrepreneurship based on innovation¹³⁷Above listed offer received from the most outstanding IRC organizations is typical and similar for all IRC active organizations in Poland. This offer is directed mostly to high technology market and entities interested in share the international technology transfer.

Annex 1

Country specific indicators of economic and technological performance

Indicator	Source	Years	Comments
Age structure	OECD in Figures	98	Demographic prognosis shows that ageing trend in Poland is significantly delayed as compared to EU and CEEC. Young cohorts are Polish "hidden potential".
Structure of civil employment	OECD Economic Survey Poland, OECD in Figures	98	Backward structure, higher share of agriculture (20.6) than in OECD countries except for Turkey (41.9) and Mexico (23.2), similar to Greek (20.3)
Sectoral contribution to Gross Value Added	OECD in Figures	98	Contribution of agriculture to GVA in Poland (4.8) is at the level of Czech Rp. and even lower than in Hungary (6.1) share of employment is much higher: the sign of over-employment and the lack of efficiency
Unemployment rate	OECD in Figures	98	
GDP	OECD in Figures OECD Economic Survey Poland	97	Significant differences between OECD and EU estimation of GDP/PPP (due to different PPP methodology). GDP in Poland lower than in Netherlands but higher than in Belgium
GDP growth	OECD in Figures	98	Relatively high since 1992 (although in 1969-1989 only 1% per year!)
GDP per capita	OECD in Figures OECD Economic Survey Poland	98	Still only 37% of EU
Gross Domestic Savings as a % of GDP	World Development Indicators	97	Lower than in Hungary and catching-up countries like Ireland or Korea
Taxation	OECD in Figures	98	Total tax receipts as a % of GDP and the structure of taxation (except for Poland similar to EU average)
Private consumption per capita (PPP) as % of GDP	World Development Indicators	98	Relatively high as compared to developed and catching-up countries
Relation of Final Consumption Expenditure and Gross Capital Formation to GDP	Rocznik Statystyczny 1999	97	
Direct investment flows as % GDP	OECD in Figures	98	4.24 as compared to 4.62 (Czech Rp.) and 4.08 (Hungary)

FDI inward stock	World Investment Indicators	98	21 722 millions USD as compared to 13 457 (Czech Rp.), 18 255 (Hungary) and 13 389 (Russian Federation)
FDI inflow	World Development Indicators	98	5 129 as compared to 2 540 (Czech Rp.), 1 935 (Hungary) and 2 183 (Russian Federation)
Public expenditure on education as a % of GDP	OECD in Figures	98	Polish 5.8 as compared to 4.5 (Czech Rp. and Hungary)
Educational attainment of adult population	OECD in Figures	97	Low share of people with tertiary education, high increase of first time graduation rate
First time tertiary graduation rate	OECD in Figures, Rocznik Statystyczny		
Annual expenditure per student (USD PPP)	OECD in Figures	98	Lower than in Hungary and Czech Rp., higher than in Greece
GERD/GDP	OECD in Figures	98	
GERD per capita/PPP	OECD in Figures	97	The lowest in OECD countries (except for Turkey and Mexico)
Structure of GERD (government/industry)	OECD in Figures	98	Unbalanced relation like in almost all developing countries
Government budget appropriations as a % of GDP	OECD in Figures	97	
HERD/GDP	OECD in Figures	98	
Researchers per 10000 labour force	OECD in Figures	98	More advantageous indicator than other S&T indicators (overemployment?)
Patent applications total	OECD in Figures	98	Growing number, mostly due to foreign companies
Patent applications abroad	OECD in Figures	97	Very small numbers even compared to Hungary and Czech Rp.
Resident and abroad per 100 000 population	OECD in Figures		
Trade coverage ratio	OECD in Figures	97	Still typical for less developed countries (with some important exceptions, like Australia, New Zealand, Iceland)
Commodity structure of imports and exports	Rocznik Statystyczny	92 - 98	Agricultural-food stuff goods import decrease, export increase, raw materials excluding fuels import and export decrease, manufactured goods import and export increase, machinery and transport equipment import and export increase
Hi-tech export market share	OECD in Figures	97	Similar to Czech Rp., significantly lower than for Hungary
Internet hosts per 1000 persons	OECD in Figures	99	Very low as compared to Czech Rp. and Hungary

Books and pamphlets per 1 million inhabitants	GUS Rocznik Statystyczny	96	Higher than in Czech Rp. and Hungary, Australia, Denmark, Finland, Sweden
Passengers cars per 1000 inhabitants	OECD Economic Survey Poland	95	Lower than in Hungary and Czech Rp. (correlation with GDP per capita)
Telephones per 1000 inhabitants	OECD Economic Survey Poland	95	
Televisions per 1000 inhabitants	OECD Economic Survey Poland	94	
Cinema audience per 100 population	Rocznik Statystyczny	95	
Doctors per 1000 inhabitants	OECD Economic Survey Poland	96	
Beds per 1000 inhabitants	OECD in Figures	97	
Infant mortality per 1000 live births	OECD Economic Survey Poland	96	Higher than in Hungary and Czech Rp.
Health expenditure as % of GDP	OECD in Figures	97	
Export of goods as % of GDP	OECD Economic Survey Poland	98	
Imports of goods as % of GDP	OECD Economic Survey Poland	98	

Annex 2 - Central Statistical Office questionnaires

PNT-01

PNT-01	
Purpose	To collect data on: <ul style="list-style-type: none"> • Expenditure on R&D • Employed in R&D • R&D equipment
Data coverage	<ul style="list-style-type: none"> • public research institutions • public higher education institutions • enterprises which employ over 50 people (or in certain sectors at least 20 or 5 people).¹ • selected hospitals • selected NGOs
Years in which the data was collected	Since 1994
Questions	<ul style="list-style-type: none"> • Intramural expenditures • Extramural expenditures • Expenditure according to type of research • Sales of R&D results • Amortization of equipment • Employees according to position and level of education in FTE • Salaries according to position and level of education • Value of equipment • Expenditure other than R&D (S&T services, production, other services)

¹ „Dziennik Ustaw” [Journal of Law] 1999, no. 129, pp. 197-199. Questionnaires are sent to institutions which carry out R&D activity as well as to business units in the sectors of mining, quarrying and manufacturing (minimum 50 employees), agriculture, forestry, electricity, gas and water supply, construction, transport, storage and communication (minimum 20 employees) and other institutions, including museums, archives and libraries (minimum 5 employees). Questionnaires are unconditionally sent every year to all institutions for which R&D is the principal activity as defined in the European Classification of Economic Activities. As regards the remaining institutions, the CSO may apply other criteria in addition to the employment threshold.

Publishing of data	<ul style="list-style-type: none"> • CSO biannual Report on Science and Technology in Poland (with English Preface and Table of Contents) • CSO biannual Science and Technology in Poland (with English Preface and Table of Contents) • Annual Statistical Yearbook available in Polish • Annual Statistical Yearbook of Industry • Annual Statistical Yearbook of Higher Education • special publications e.g. presenting CIS-Poland survey
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PNT-02

Innovation surveys have in CSO long tradition going back to 1960. Manufacturing is based on the Second Community Survey and the recommendations of the Oslo manual as well as the recommendations of EUROSTAT. Most of the questions in the census are the same as the ones in the CIS I survey, some of them are omitted and some new are added. The next survey will be based on CIS-II (with some items taken from CISIII).

PNT-02 normal	
Purpose	<p>To collect the basic data on innovation activity and especially:</p> <ul style="list-style-type: none"> • how many companies in Poland are involved in innovation activities • how many innovations have resulted out of the innovation activity • how much is spent on the innovation activities in Poland
Data coverage	Regular, concise, yearly, census survey on innovation, covering all enterprises in the sectors of mining, manufacturing, electricity, gas and water supply (minimum 50 employees)
Years in which the data was collected	Since 1994
Questions:	<ul style="list-style-type: none"> • General information on innovation activity • Expenditures on innovation activity <ol style="list-style-type: none"> 1. R&D 2. Purchase of technology (documentation) 3. Equipment, industrial engineering and launching production 4. Training 5. Marketing of a new and modernized products • Use of instruments of innovation policy (like tax credits) • New and modernized products • Technology transfer (to and from): (license; R&D; automation of production processes; consultancy services) • Automation (e.g. <u>CAD/CAM</u> (COMPUTER-AIDED DESIGN, COMPUTER AIDED MANUFACTURING), robots etc.); • Computer networks (local and access to Internet).

Publications	<ul style="list-style-type: none"> • CSO biannual Report on Science and Technology in Poland (with English Preface and Table of Contents) • CSO biannual Science and Technology in Poland (with English Preface and Table of Contents) • Annual Statistical Yearbook • Annual Statistical Yearbook of Industry: <ol style="list-style-type: none"> 1. selected technical-production indicators characterising production and manufacturing processes in industry; 2. unit consumption of gasoline and energy in industry; 3. utilisation of selected raw materials and materials in industry 4. means of automating production processes by ownership sectors, sections and divisions, 5. share of advanced technology products in value sold industrial products 6. intramural expenditures on R&D activity and research equipment in industry by sections and divisions 7. employment in R&D activity in industry by sections and divisions 8. value of sold production of new and improved products in industry by kinds of innovation activities, ownership sectors, sections and divisions 9. protection of industrial property rights in Poland 10. patent applications and patent granted by division of technology 11. realization of foreign active licences in industry
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PNT-02 expanded	
Purpose	To collect the basic data on innovation according to modified CIS
Data coverage	Regular, concise, yearly, census survey on innovation, covering all enterprises in the sectors of mining, manufacturing, electricity, gas and water supply (minimum 50 employees).
Years in which the data was collected expanded PNT-02 (CIS survey)	Comprehensive, cyclic survey on innovation carried out in 3-year time intervals. 1993 (for the years 1990-92) based on Polish methodology
Years	1997 (for the years 1994-96) based on CIS-I methodology, census, ca 9 000 firms
	The next census in 2001 (for 1997 – 2000) based on CIS-II with some questions taken from CIS-III

<p>Questions</p>	<ul style="list-style-type: none"> • General information on innovation activity • Expenditures on innovation activity <ol style="list-style-type: none"> 1. R&D 2. Purchase of technology (documentation) 3. Equipment, industrial engineering and launching production 4. Training 5. Marketing of a new and modernized products 6. Source of funds for innovation (own; foreign; Polish bank's credits) • The value of sale of the new and modernised products (including export) • Sources of the foreign technologies <ol style="list-style-type: none"> 1. license agreement 2. franchising 3. collaboration or joint venture 4. FID • Does firm sold or purchase new technology? According to form (license; R&D; automation of production processes; consultancy services) and country • Automation (e.g. CAD, CADM, robots etc.); • Computers (according to types); • Computer networks (local and access to Internet); • Type of the use of Internet (e-mail; information retrieval; marketing of products and services; e-commerce) • Non-technological innovations • R&D <ol style="list-style-type: none"> 1. Does firm carried out R&D? 2. Does firm employed R&D workers? 3. Does firm used any R&D and innovation policy instruments? 4. Does firm send at least one patent application? • Aims of innovation activity • Sources of information • Collaboration in innovation activity • Barriers for innovation • Non-technological innovations
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Publications	<p>CSO biannual Report on Science and Technology in Poland (with English Preface and Table of Contents)</p> <p>CSO biannual Science and Technology in Poland (with English Preface and Table of Contents)</p> <p>Annual Statistical Yearbook</p> <p>Annual Statistical Yearbook of Industry:</p> <ul style="list-style-type: none"> • means of automating production processes by ownership sectors, sections and divisions, • share of advanced technology products in value sold industrial products • intramural expenditures on R&D activity and research equipment in industry by sections and divisions • value of sold production of new and improved products in industry by kinds of innovation activities, ownership sectors, sections and divisions <p>Wojciech Wiszniewski, Działalność innowacyjna polskich przedsiębiorstw przemysłowych w latach 1994 – 96 [Innovation activity of Polish enterprises], GUS, Warszawa 1998</p> <p>Badania statystyczne innowacji prowadzone przez GUS: stosowana metodologia i analiza wyników [Innovation surveys carried out by GUS – methodology and results]/ Grażyna Niedbalska .-Streszcz. w jęz. ang. //Zagadnienia Naukoznawstwa .-1998 z. 3 s. 303-320</p> <p>Wojciech Wiszniewski</p> <p>Innowacyjność polskich przedsiębiorstw przemysłowych : procesy dostosowawcze do polityki innowacyjnej Unii Europejskiej [Innovativeness of Polish industrial enterprises] Warszawa : Instytut Organizacji i Zarządzania w Przemysle "Orgmasz" 1999 140s.</p>
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CSO carried out survey of innovations in service sector:

PNT-02/u	
Purpose	To measure innovation in (market) service sector
Data coverage	Sample survey on innovation covering enterprises (minimum 10 employees) in the sectors of trade, transport, telecommunication, financing, software, architecture and technological consultation.
Years in which the data was collected expanded PNT-u	in 2000 for 1997 – 1999 based on CIS-II, sample, ca 17000 firms
Questions	<ul style="list-style-type: none"> • General information concerning innovation activity • Expenditure on innovation activity <ol style="list-style-type: none"> 1. R&D 2. Equipment 3. Software/documentation 4. Launching of production 5. Training 6. Marketing of a new and modernized products • Employment in R&D activity • Budgetary funds for innovation activity • Goals of innovation activity in 1997-99 • Sources of information for innovation in 1997-99 • Collaboration in innovation activity 1997 – 99 • Barriers for innovation 1997 –99 • Non-technological innovations
Publications	-----

PNT-03	
Purpose	To measure use of foreign licenses
Data coverage	Regular, concise, yearly, census survey on innovation, covering enterprises in the sectors of mining, manufacturing, electricity, gas and water supply (minimum 50 employees, chosen by CSO).
Years in which the data was collected expanded PNT-03	Annual census since 1970
Questions	<ul style="list-style-type: none"> • General data <ol style="list-style-type: none"> 1. Subject 2. Giver of licence 3. Period of validity of licence 4. Time of implementation of licence • Use of foreign licenses <ol style="list-style-type: none"> 1. Fee 2. Costs of implementation 3. Export of licensed products 4. Domestic sale of licensed production 5. Supply import
Publications	Annual Statistical Yearbook Statistical Yearbook of Industry (realization of foreign active licences in industry)

PNT-4	
Purpose	To measure production technology indicators and the unit consumption of materials in production processes
Data coverage	Regular, concise, yearly, census survey on innovation, covering all enterprises in the sectors of mining, manufacturing, electricity, gas and water supply (minimum 50 employees).
Years in which the data was collected	Annual census since 1946
Questions	There is a separate list of indicators
Publications	<ul style="list-style-type: none"> • Annual Statistical Yearbook of Industry: <ol style="list-style-type: none"> 1. selected technical-production indicators characterising production and manufacturing processes in industry; 2. unit consumption of gasoline and energy in industry; 3. utilisation of selected raw materials and materials in industry • biannual Report on Science and Technology in Poland (with English Preface and Table of Contents) • biannual Science and Technology in Poland • Annual Statistical Yearbook • Forestry [statistical yearbook] • Supply Management

Secondary data (based on P-01 and SAD documents).	
Purpose	To measure production and foreign trade in high technology products
Data coverage	Regular, concise, yearly, census survey on innovation, covering all enterprises in the sectors of mining, manufacturing, electricity, gas and water supply (minimum 10 employees).

Years in which the data was collected	Export/import data calculated on the basis of two OECD lists: list of high technology products according to SITC Rev. 3 1994 and its revised version 1995. Production of high technology products up to 2000 measured by the own list prepared by Andrzej Karpinski and Paradyz
Questions	<ul style="list-style-type: none"> • The volume and the structure of export and import of the high tech products; • Share of export and import of the high tech products in the overall volume of export and import; • The volume and the structure of export and import of ultra high technology products; • Share of export and import of the ultra high technology products in the overall volume of export and import • Share of high technology in industry turnover.
Publications	<ul style="list-style-type: none"> • Annual Statistical Yearbook of Industry; • biannual Report on Science and Technology in Poland (with English Preface and Table of Contents) • biannual Science and Technology in Poland

Export/import data calculated on the basis of two OECD lists: list of high technology products according to SITC Rev. 3 1994 and its revised version 1995. Production of high technology products up to 2000 measured by the own list prepared by Karpinski and Paradyz, since 2000 by adapted OECD classification of industries on basis of technology for 1980 – 1995.

All of presented statistics are collected through a census (are obligatory).

BR-04 Survey of households` budgets	
Purpose	To measure structure of households` budgets and equipment
Data coverage	Regular, yearly, sample survey
Years in which the data was collected	Since 1993 (some like tv satellite introduced later)
Questions	<p>The share of</p> <ul style="list-style-type: none"> • personal computers • satellite TV • microwave kitchen • video recorder • video camera • printing machine • radio - compact disc – tape recorder set <p>in households according to socio-economic groups and according to voievodships</p>
Publications	Raport o stanie nauki i techniki w Polsce - Report on Science and Technology in Poland Budżety gospodarstw domowych [Househoklds` budgets]

Up to now there is neither separate information technology survey nor separate IT statistics unit in CSO, but data on IT are collected in different surveys by CSO and Ministry of Communication:

Questions	<ul style="list-style-type: none"> • Internet Hosts • Internet host density • Internet access cost • ICT technology investment/GDP • WWW servers for e-commerce • Secure Web servers per 1 000 000 inhabitants • ICT expenditures • Cellular mobile subscribers per 100 inhabitants
Publications	The Knowledge-based Economy: A Set of Facts and Figures, Paris 1999; OECD Science, Technology and Industry Scoreboard 1999. Benchmarking Knowledge-based Economy, Paris 1999; OECD Communications Outlook 1999

- ¹ Dariusz Rosati, A Decade of Transformation in Poland: 10 Lessons After 10 Years [in:] Poland. International Economic Report, Warsaw School of Economics, Warsaw 2000, p. 189-190. If not mentioned otherwise based on: Raport o stanie sektora małych i średnich przedsiębiorstw w Polsce w latach 1999-2000 [Report on the state of the Small and Medium Size Enterprises in 1999-2000, Polish Agency for Enterprise Development, Warsaw 2001; Bilans płatniczy Polski. Wyzwania i zagrożenia [Balance of payment of Poland. Challenges and Threats], pod red. Urszuli Płowiec i Witolda M. Orłowskiego, Warszawa 1999; Raport o stanie sektora małych i średnich przedsiębiorstw w Polsce w latach 1999-2000, Warszawa 2001; Dynamika Transformacji Polskiej Gospodarki [The Dynamics of Transformation of the Polish Economy], red. M. Belka, W. Trzeciakowski, Instytut Nauk Ekonomicznych PAN, Warszawa 1997, t. 1-2; Foreign Investment in Poland, Foreign Trade Institute, Warsaw 2000; Gospodarka Polski w procesie transformacji 1999 r. [Polish Economy in the Period of transformation 1999], Instytut Rozwoju i Studiów Strategicznych, Warszawa 2000; Grzegorz Gorzelak, Regional and Local Potential for Transformation in Poland, European Institute for Regional and Local Development, Warsaw 1998; Katarzyna Żukrowska, Rola bezpośrednich inwestycji zagranicznych w procesie transformacji w Polsce [The Role of FDI in Transformation Process in Poland], Ministerstwo Spraw Zagranicznych, 1998; Konkurencyjność polskiej gospodarki. Eksport – bilans płatniczy – polityka kursowa [Competitiveness of the Polish Economy. Export - Balance of Payments – Exchange Rate Policy], red. J. Winiecki, „Zeszyty Towarzystwa Ekonomistów Polskich”, z. 1, 1998. Krzysztof B. Matusiak, Tomasz Niesiołowski, Ośrodki Innowacji i Przedsiębiorczości w Polsce [Centres for Innovation and Entrepreneurship in Poland], Warszawa 1999; OECD Economic Surveys. Poland, Paris 2000; Poland. International Economic Report 1999/2000, World Economy Research Institute, Warsaw School of Economics, Warsaw 2000; Raport o stanie nauki i techniki w Polsce [Report on science and technology in Poland 1999], Warszawa 2000; Sławomir Sztaba, Czynniki kształtujące instytucje w Polsce w okresie transformacji [Factors shaping institutions in Poland in the period of transformation], Instytut Nauk Ekonomicznych PAN, Warszawa 2000; Tadeusz Markowski, Edward Stawasz, Krzysztof B. Matusiak, Particular Problems of Innovation Policy in Poland, Lodz 1998; Zagraniczna polityka gospodarcza i handel zagraniczny Polski 1999-2000 [Foreign trade policy and foreign trade of Poland, 1999-2000], Foreign Trade Institute, Warsaw 2000; Grant Thornton, Europejski sondaż małych i średnich przedsiębiorstw [European Survey of Small and Medium Sized Enterprises], Polish Agency for Enterprise Development, Warsaw 2001 (soon available at Internet, see <http://www.parp.gov.pl/publikacje.php3#13>); Władysław Welfe, Country Report: Poland, <http://www.chass.utoronto.ca/link/ctryrep/pol0401.htm>.
- ² Stan nauki i techniki w Polsce [Science and Technology in Poland], Warsaw 1999, p. 11, 33.

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- ³ Sławomir Sztaba, Czynniki kształtujące instytucje w Polsce w okresie transformacji [Factors shaping institutions in Poland in the period of transformation], Instytut Nauk Ekonomicznych PAN, Warszawa 2000, p. 8-18;
- ⁴ "Foreign-controlled firms generated competitive pressure on labour markets. The domestic enterprises have both to pay higher wages and improve labour productivity. From the policy point of view, it is important to ask, whether the domestic sector is capable to adjust, i.e. are domestic firms driven out from some economic sectors or, alternatively, could they make use of the positive spillover effects, which would help them to adjust to standards set by foreign companies. Moreover, the question cannot be analysed without considering the sources of productivity growth in foreign-controlled firms. In particular, those firms were able to attract employees with higher skills from non-foreign owned firms due to the higher wages, but also by better screening procedures and selection criteria." Tomasz Mickiewicz, Foreign direct investment: job creation or job destruction? Evidence from transition economies, http://iaes.org/conferences/past/montreal_48/prelim_program/o40-2/mickiewicz.htm
- ⁵ In Poland share of net average wages in productivity (GDP by the number of employment) is estimated at the level of 35% and is even by 2% higher than in EU (33%). Relative level of wages (in PPP) accounted for 32% of average EU level while productivity accounted for 30%.
- ⁶ Jan Winiecki, Bilans płacniczy w okresie liberalizacji gospodarki: doświadczenia krajów Europy Środkowo-Wschodniej [in:] Konkurencyjność polskiej gospodarki. Eksport – bilans płacniczy – polityka kursowa, ed. J. Winiecki, „Zeszyty Towarzystwa Ekonomistów Polskich”, nr 1, 1998.
- ⁷ Mikołaj Herbst, Przedsiębiorstwa „uczące się” w krajach Europy Środkowo-Wschodniej, „Studia Regionalne i Lokalne” vol. 1 nr 2 2000, p. 116.
- ⁸ Dynamics and Factors of Local Success in Poland, European Institute for Regional and Local development and Centre for Social and Economic Research, Warsaw 1999, p. 10.
- ⁹ Janusz T. Hryniewicz, Endo- i egzogenne czynniki rozwoju gospodarczego gmin i regionów, „Studia Regionalne i Lokalne” vol. 1 nr 2 2000, p. 58. One of the most powerful channel for the “cultural import” is FDI that accounts in Poland in 1999 ca 30% of the Polish economy.
- ¹⁰ It could be said that the most of the Eastern European countries are peasant societies with close roots in the rural economy and rural consciousness, ideas, and values. See Jacek Wasilewski, Społeczeństwo polskie, społeczeństwo chłopskie, „Studia Socjologiczne” 1986 nr 3, p. 41.
- ¹¹ Piotr Sztompka, The Cultural Imponderables of Rapid Social Change: Trust, Loyalty, Solidarity, “Polish Sociological review” 1998 nr 1.
- ¹² Op. cit. In the footnote Sztompka says, that some historians attribute the disintegration of great empires, like Roman or Soviet, to the fall of morale, resignation, and the exhaustion of motivation of the elites and social masses. Also enthusiasm of the masses at the beginning of the First World War is interpreted in terms of their `boredom` with over four decades of peace and prosperity.
- ¹³ “Four substantive sub-categories of civilizational competence coincide with four main areas of modern developed society for which they are immediately relevant: economy, polity, social consciousness and everyday life. First, there is *enterprise culture*, indispensable for participation in market economy. Some of its components include: innovative push, achievement orientation, individualistic competitiveness rational calculation and the like. (...) Second, there is *civic culture*, indispensable for participation in democratic polity. Some of its components include: political activism, readiness to participate, concern with public issues, rule of law, discipline, respect for opponents, compliance with the majority and the like. (...) Third, there is *discursive culture*, indispensable for participation in free intellectual flow. Some of its components include: tolerance, openmindedness, acceptance of diversity and pluralism, scepticism, criticism and the like. And four, there is the *everyday culture*, indispensable for daily existence in advanced, urbanized, technologically saturated and consumer-oriented society. Some of its components include: neatness, cleanliness,

- orderliness, punctuality, body care, fitness, facility to handle mechanical devices and the like." P. Sztompka, *Civilizational Incompetence: the trap of post-communist societies*, „Zeitschrift für Soziologie”, Jg. 22, Heft 2, April 1993, s. 88.
- 14 Krzysztof Porwit, *The Role of Institutions and Human Values on the Road to “A Knowledge-based Economy” in Poland*, in: *The Knowledge-based Economy. The European Challenges of the 21st century*, ed. Antoni Kukliński, Warsaw 2000, 153-154.
- 15 Krzysztof Porwit, op. cit.
- 16 Hryniewicz, op. cit.
- 17 Among many case studies of successful leadership: Jerzy Surdykowski, *Odwaga wizji*, „Wprost” 11 October 1998, p. 28-29.
- 18 Krystyna Gutkowska, Marzena Jeżewska-Zychowicz, Irena Ozimek, *Polskie gospodarstwa domowe w perspektywie integracji z Unią Europejską*, Wydawnictwo SGGW, Warszawa 1999, pp. 20-21.
- 19 Julita Jablecka, *Financial Threats to Organizational Survival*, in: *East European Academies in Transition*, ed. By R. Maynz, U. Schimank and Peter Weingart, Kluwer Academic Publishers, 1998, p. 30.
- 20 Bogusław Galski, *Rodzaje restrukturyzacji przedsiębiorstw*, „Annales UMCS” 32/33 1998/1999, pp. 122-123.
- 21 Włodzimierz Jaśkiewicz, *Polskie przedsiębiorstwo w procesie transformacji*, mimeo.
- 22 Andrzej K. Koźmiński, *Lessons from the Best-Run Companies in Central and Eastern Europe*, in: *Globalisation and Change: Ways to the Future*, Warsaw 2000, p. 150.
- 23 Leszek Balcerowicz, *Duch przedsiębiorczości*, „Wprost” August 27, 2000.
- 24 *Science and Technology in 1999*, GUS, Warsaw 2001, p. 89-108.
- 25 *Science and Technology in Poland in 1999*, GUS, Warszawa 2001, pp. 177-179.
- 26 Tomasz Piekarec, Przemysław Rot, Elżbieta Wojnicka, *Sektor przedsiębiorstw wysokiej technologii w Polsce [High-tech enterprises in Poland]*, Gdansk 2000.
- 27 Europejski Sondaz Małych i Średnich Przedsiębiorstw, Polish Agency for Enterprise Development.
- 28 In June 1997 several experts reports were published by Zespół Zadaniowy ds. Polityki Strukturalnej w Polsce [*Ad hoc* Group for Structural Policy in Poland], e.g. *Instrumenty transferu technologii i pobudzania innowacji [Instruments for technology transfer and stimulation of innovation]*, *Instrumenty pobudzania konkurencyjności oraz instrumenty pomocy publicznej [Instruments for stimulating of competitiveness and instruments for the public aid]*, *Instrumenty polityki rozwoju regionalnego [Instruments for regional development policy]* or *Sektorowe programy restrukturyzacji i prywatyzacja majątku państwowego [Sectoral programmes of restructurization and privatisation of the stat property]*. Because three months later left political coalition that prepared these documents lost majority in Parliament documents were not used. The first report was also published as a book in 1997. Chapter based on: *Raport o stanie sektora małych i średnich przedsiębiorstw w Polsce w latach 1999-2000*, Polish Agency for Enterprise Development, 2001; *Programy i fundusze wspierające rozwój małych i średnich przedsiębiorstw*, Ministry of Economy, 2000; *Finansowanie rozwoju małych i średnich przedsiębiorstw* Ministry of Economy, 2000; *Programy i fundusze wspierające rozwój małych i średnich przedsiębiorstw*, Ministry of Economy, 2000, and information received from ministries, agencies, and interviewed businessman.
- 29 Questionnaires were sent to 205 units, mostly from science (205 research institutions and 120 industrial enterprises). Rate of return was ca 50%.
- 30 <http://www.orgmasz.waw.pl/w/strategia/wprowadzenie.html>
- 31 <http://www.lgpp.pl/us/onas/default.htm> and <http://www.lgpp.pl/pl/innowacje/przyklady/sm4pol0999debno.html>
- 32 <http://www.kbn.gov.pl/en/index.html>
- 33 <http://www.mg.gov.pl/english/index.htm>
- 34 In Poland principal-agent structure is still blur. Although there are ministries and subordinated governmental agencies (like e.g. Technology Agency) there is no so clear

divisions of tasks and responsibilities as in e.g. in Netherlands. Public – private and governmental sphere are also somewhat blur; e.g. Polish Foundation for Science is non-governmental organization provided at the beginning with initial governmental funds, Technology Agency (governmental agency subordinated to Ministry of Economy with Chairman nominated by Prime Minister) have two different sources of income – governmental (prevailing but decreasing) and commercial (increasing). Therefore on the list below I will put all organizations. The term of 'policy programme' seems to differ as compared with Western experiences: KBN's *Directions of National Innovation Policy till 2002* or (to lesser degree) Ministry of Economy *Increasing the Innovativeness of the Polish Economy until the year 2006* are lists of obligations undertaken by ministries for future work (of very different character) for the government and parliament, but not separate undertakings with clear missions and separate (controlled) bureaus.

35 In 1997 Task group on structural policy [Zespół Zadaniowy ds. Polityki Strukturalnej] has prepared reports with recommendations for government. One of the sub-group tackled with problems of upgrading region's competitiveness through increase of their innovativeness. In 1998 Interministerial Team created for preparation of governmental document *Directions of National Innovation Policy till 2002*. In 1998 conference in Krasiczyn organized by the Ministry of Economy discussed ideas put forward in *Conception of the mid-term development of the Polish Economy until 2002*. In conference participated Polish and foreign experts from science and industry. Presentations and discussion was published. In 1999 project of document *Increasing innovativeness of the Polish economy until the year 2000* was presented and discussed at conference in Baranów organized by the Ministry of Economy. In conference participated Polish and foreign experts from science and industry. In 1999 Interministerial Team for the preparation of governmental report on advanced technologies was created. Recently another team has been working on governmental document on information society. The Ministry of Economy and KBN undertake actions for the increase of the participation of enterprises in V Framework Programme. In June 2001 Ministry of the Economy organized a conference in Krasiczyn aimed at discussing innovation policy issues from both academia and business.

36 <http://www.att.gov.pl/>

37 <http://www.parp.gov.pl/en/index.php3>. Agency offers e.g. grants for trainings, consulting, preparation for certificates, and all types of initiatives supporting entrepreneurship.

38 http://www.sooipp.org.pl/index_ang.html

39 <http://www.fnp.org.pl/english/eng.htm>

40 <http://www.fnp.org.pl/english/explorat.htm>

41 <http://www.bccnet.com.pl/angielski/statut/stat-an.htm>

42 E.g. B. Wawrzyniak states the regional level, Polish systems of innovations, as compared with that of developed countries, is said to be immature. "Firstly, there are no – so called – regional organization. Many autonomous activities are observed both on administrative level, in business practice, education and R&D institutions. Secondly, practically there are not regional policies. Thirdly, innovative practices of the investigated firms are not region-oriented." Bogdan Wawrzyniak, *Innovative Practices of Polish Firm. Regional Perspective*, in: *Lessons*, p. 248.

43 See e.g. description of the R&D department in pharmaceutical factory in Pabianice:

<http://www.polfa.pabianice.pl/pol/badania.html>

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