FACTORS AND IMPACTS IN THE INFORMATION SOCIETY
A PROSPECTIVE ANALYSIS IN THE CANDIDATE COUNTRIES

REPORT ON POLAND

Author:
Marcin Piątkowski

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Preface

The Institute for Prospective Technological Studies (IPTS) of the Directorate General Joint Research Centre of the European Commission contracted the International Centre for Economic Growth, European Centre (ICEG EC) to act as the coordinator of a consortium of 11 research institutes to carry out this project.

The main objective of the project was to provide a series of national monographs studying the development of the Information Society (IS), including both the positive and negative impacts, in each of the candidate countries. These monographs offer an assessment of the strengths and weaknesses of each country regarding the development of IS, and a view on their possible outcomes; both strongly rooted in factual quantitative data. They provide a clear, contextualised, multi-factoral and multi-causal picture of the input factors that contribute to the success or failure of IS developments, and the relevant output parameters that support mid- and long-term impacts on economic growth, employment and other relevant aspects of the future of each country. Each monograph concludes with a set of alternative scenarios for the development of IS in that country.

This report was carried out by the Leon Koźmiński Academy of Entrepreneurship and Management, and aims to study the factors and impacts of the Information Society in Poland. The report reflects the research results, comments and opinions of the team of authors. It does not necessarily reflect the opinion of the European Commission. It is organised around 9 themes – economy, demography, government policies, industrial development and competitiveness, relevant economic activity, IST penetration rates, institutional capacity and regulatory background, education, and culture. The section on each of these themes concludes with a specific SWOT analysis. Finally, a general diagnosis is made of Poland's potential for IS developments, followed by a brief section on possible scenarios for the future and policy recommendations.

A Synthesis Report was also prepared by the Project Coordinator, the International Centre for Economic Growth, European Centre (ICEG EC), on the basis of all the country studies. This offers an integrated and prospective view on the future outlook for the Information Society in the Candidate Countries and can be found on the FISTE (Foresight in Information Society Technologies in Europe) website: http://fiste.jrc.es/

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COUNTRY PROFILE

Population (million, 2002)	38 232
Area (sq. KM)	312 685
GDP per capita PPS (EUR - 2002)	9500
GDP (real growth rate 2002)	1.3
GDP Composition (2002)	
Agriculture	5.1%
Industry, Construction	28.8%
Services	66.1%
International trade (in million EUR)	
Export (2001)	40374.67
Import (2001)	56222.65
Currency reserves (2002) (in million EUR)	28259310.79
Currency Units 2002 average	1 EUR =3.8557 PLN

Source: EBRD (2002) and author's calculations

Geographical Location and Administrative Structure (NUTS2)

A. NATIONAL AND REGIONAL ECONOMY

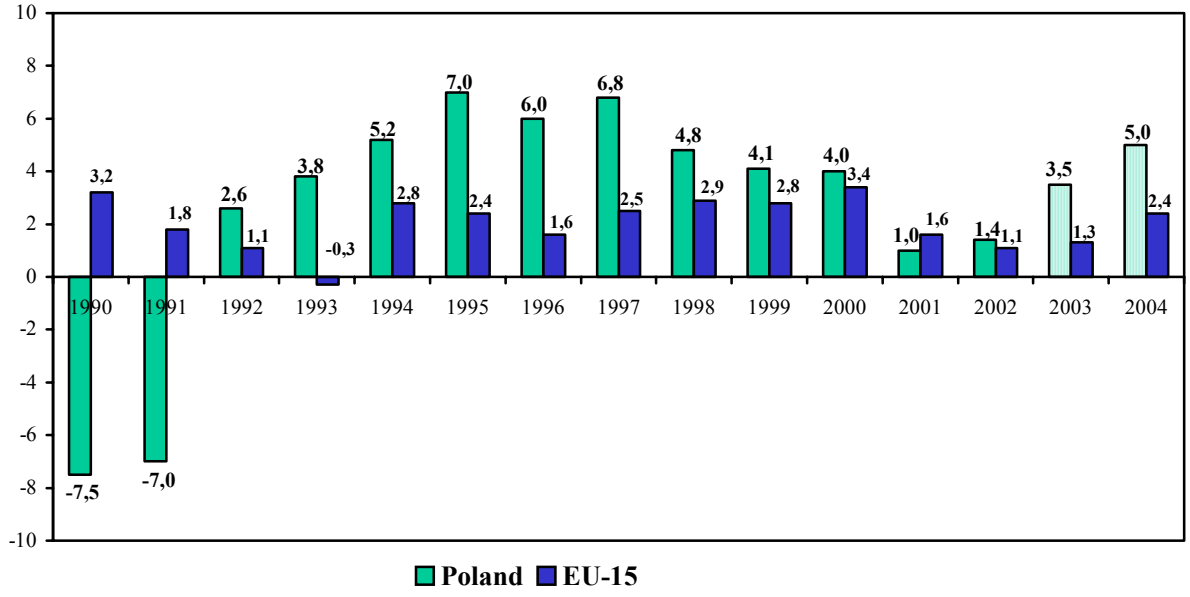
A.1. National and regional economy: Growth-related data, unemployment and trends

Poland started the transition process in 1989, although – similarly to Hungary and contrary to most of the post-communist countries – some liberal reforms had already been introduced by the communist regime during the 1980's in an effort to improve the performance of the then-socialist economy.

The first two years of transition witnessed a sharp decline of economic activity: GDP decreased by 11.6% in 1990 and 7.0% in 1991 in what was to be called the "transformation recession" or "shock therapy" masterminded and implemented by the erstwhile minister of finance Leszek Balcerowicz (Graph A1).

In spite of the depth of the economic contraction, due to heavy microeconomic restructuring, liberalization of the product markets and foreign trade, and elimination of hyperinflation, Poland was the first of all transition economies to return to positive rates of economic growth. In 1992 a recovery started with a pace of GDP growth accelerating to more than 6% annually in the middle of the 1990's. After beginning of the recovery in 1992, the average rate of growth in Poland has been much higher than in the EU countries (Graph A1). A continued process of disinflation accompanied high GDP growth rates. At the same time, unemployment declined to what was to become the lowest level in the whole decade (see Graph A7).

Graph A1. GDP – rates of growth 1990-2004 in Poland and in EU.



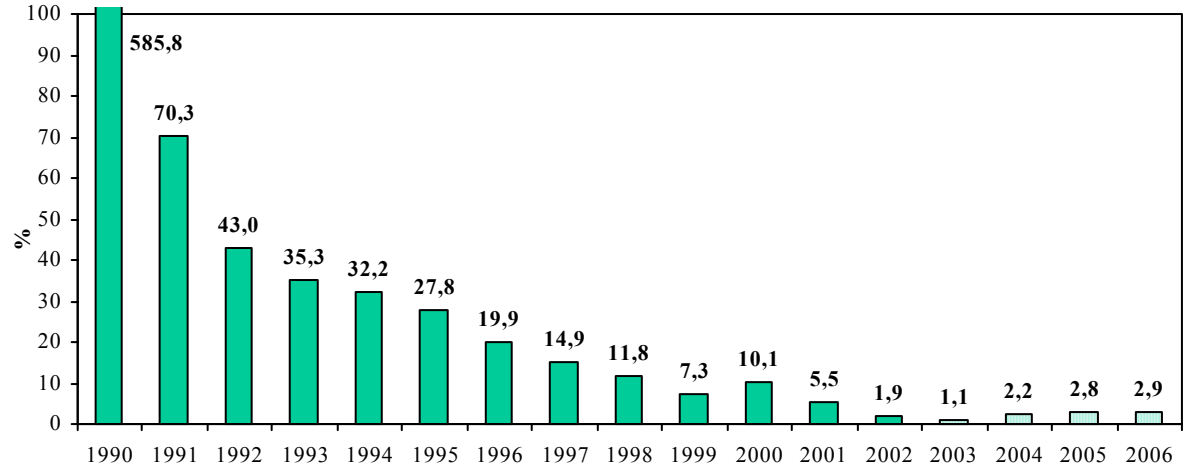
Source: EBRD (2002)

Unfortunately, the period of extra rapid growth lasted only until 1998. Apparent overheating of the economy led the Central Bank of Poland to espouse very strict monetary policy (nominal interest rates in 2000 reached 19% with inflation of less than 10%). This led to subsequent overcooling of the economy with GDP growth dramatically slowing down to 1.0 and 1.4 in 2001 and 2002, respectively. The long-awaited recovery started in mid-2002. GDP

growth in 2003 is projected to reach 3.5%. The government projects much faster growth rates for the years 2004-06 due to positive effects of the EU accession, rebound from the bottom of the economic cycle, positive effects of the restructuring of the economy and favourable exchange rate (Polish zloty nominally depreciated by more than 25% against the euro since mid-2002).

Restrictive monetary policy, aside from overcooling the economy, has nonetheless led to a remarkable decrease in inflation down to 1.9% in 2002 and projected 1.1% in 2003 (Graph A2) from hyperinflation in the early 1990's.

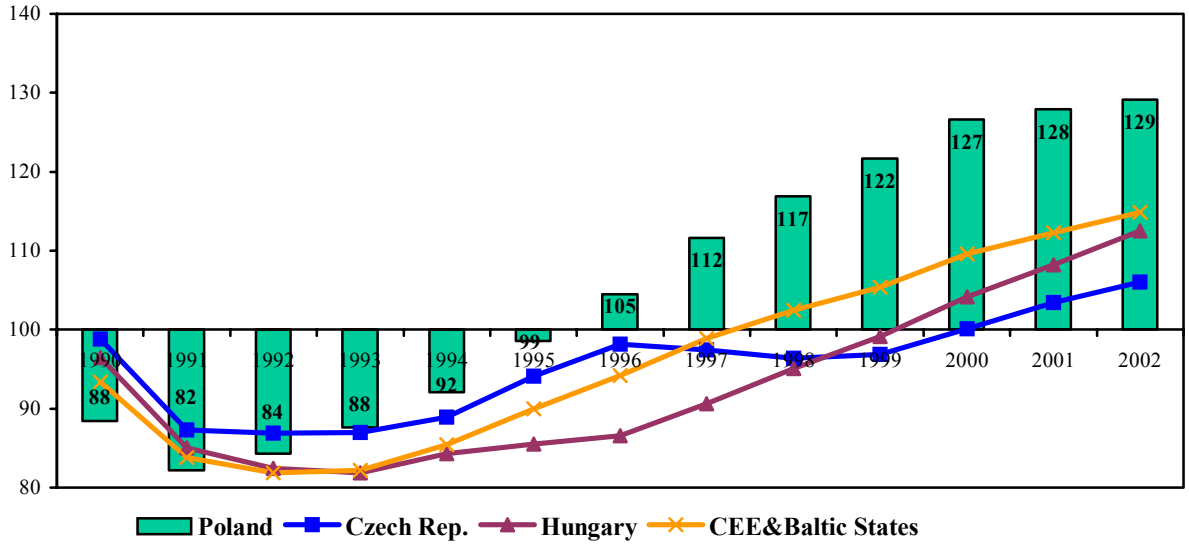
Graph A2. Inflation rates 1990-2006 (year average)



Source: EBRD (2002) and government's projections.

In terms of the level of GDP in 2002 compared to 1989, Polish GDP was at 129.0% of the 1989 level, compared to Hungary at 112.5% and Czech Republic at 106% of the 1989 level. From this perspective, Poland can be considered to be one of the most successful countries among all transition economies (Graph A3).

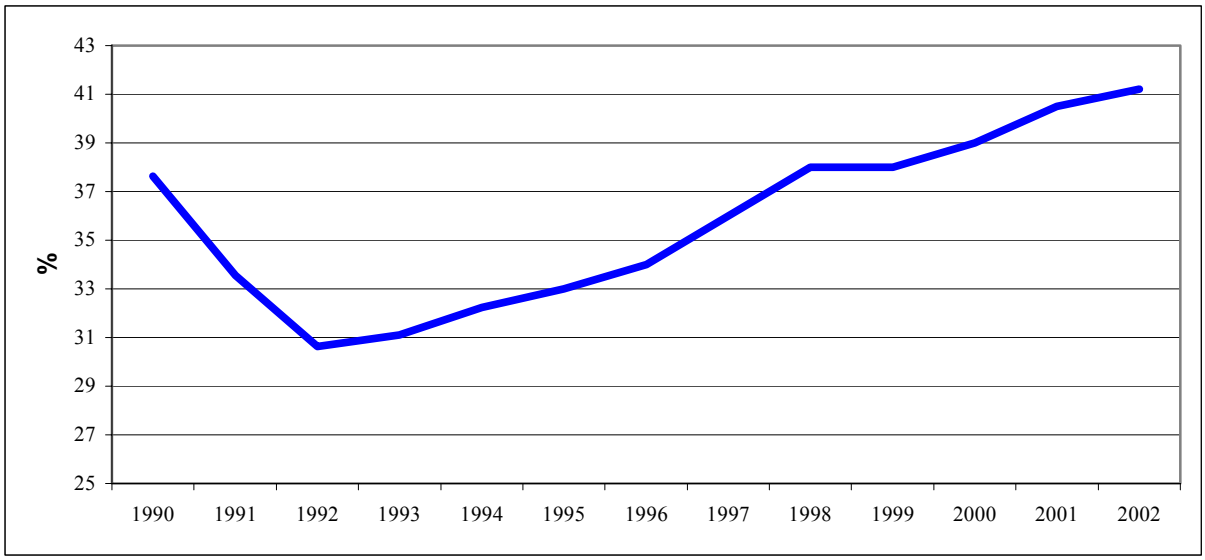
Graph A3. Real GDP (year 1989 = 100)



Source: EBRD (2002) CEE – Central and Eastern Europe (Poland, Czech Rep., Slovakia, Hungary)

Fast economic growth combined with a real appreciation of the local currency against euro allowed Poland to shorten the distance to the EU in terms of GDP per capita: its GDP per capita in PPP terms in 2002 amounted to some 41.2% of the EU average versus 30.6% in 1992, the lowest level in transition period (Graph A4).

Graph A4. Polish GDP (per capita PPP) as % of the EU average



Source: author's calculations based on Eurostat Yearbook 2003 and World Economic Outlook (IMF 2003)

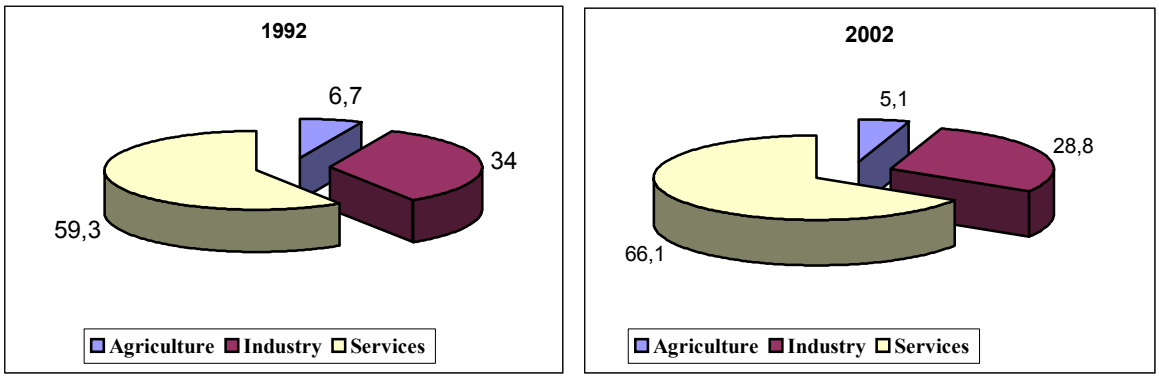
Further sustained catching-up of the Polish economy will be however dependent on the state of public finances in Poland. During the last couple of years Poland has experienced large budget deficits (more than 5% of GDP in 2002 and 2003, projected more than 6% of GDP in 2004), which resulted in quickly growing public debt, which as of the end of 2002 amounted to 47.9% of GDP and – without reform - is likely to exceed 50% in 2003, 55% in 2004 and 60% of GDP in 2005. Fast rate of growth in public debt destabilizes the foreign currency market and may lead to significant increase in the cost of public debt together with foreign exchange market turbulence. Poland's Constitution, as very few constitutions in the world, very resolutely sets a 60% limit of the proportion of public debt to GDP. The threshold is meant to prevent politicians from bankrupting the state through excessive borrowing. Should this threshold be exceeded in any given year, the following year's budget would need to be in balance, i.e. would post no deficit. This would necessitate drastic cuts in public spending (some 30% of total spending), including social transfers, outlays on education, health care, defense etc. In all likelihood, such cuts could lead to great social unrest and nationwide protests, which could seriously disrupt the economy. The government recently adopted "Hausner Plan", named after the current deputy premier and minister of the economy, a plan which aims at rationalizing public spending so as to avoid the debt crunch. The Parliament is scheduled to vote on the program in the first quarter of 2004.

The reform of the public finances should also allow for a shift from economically inefficient social transfers to investments in infrastructure, education, R&D, innovation, and other purposes, which are at the foundation of the development of the information society. Should the public finance system not be reformed, public spending on social transfers and on subsidies to ailing industries will continue to prevent growth in IST investment. In addition, inability to lower the budget deficit to below 3% of GDP would preclude Poland from joining the euro zone. The government plans to replace zloty with euro already in 2007, yet most economists project that Poland is not likely to enter the euro area before 2010.

A.1.1. Supply side of growth

Owing to structural changes (privatization, liberalization of products markets, demonopolization) and substantial pent-up demand for services, which were not available or were hardly accessible during the communist times (travel services, hotels, repairs etc.), the share of the service sector in the total GDP has grown from less than 50% before 1989 to 59.3% in 1992 and up to 66.1% in 2002 (Graph A5). Most of the increase in the share of services reflected a decrease in a share of industry in the total GDP due to the transformation recession, which obliterated a significant part of inefficient and uncompetitive manufacturing capacities (further details in Chapter C). The composition of GDP in Poland is quite similar to that in advanced countries, which suggest that the process of transition from a command to a market economy in Poland viewed from this perspective is virtually complete (Graph A6)

Graph A5. Changes in composition of GDP, 1992-2002



Source: EBRD (1992 and 2002)

As for the so-called "grey economy", i.e. not registered or not-tax paying part of the economy, the Polish Statistical Office (GUS) estimates that about 14% of GDP is created outside of official economy (various think-tanks provide different results; some report that the grey economy to be even twice larger than official estimates). While overall size of the Polish grey economy is not unique in Europe (Italy and Greece report similar shares of the grey economy in total GDP), the unofficial economy in certain sectors of the economy (for example construction) are much higher.

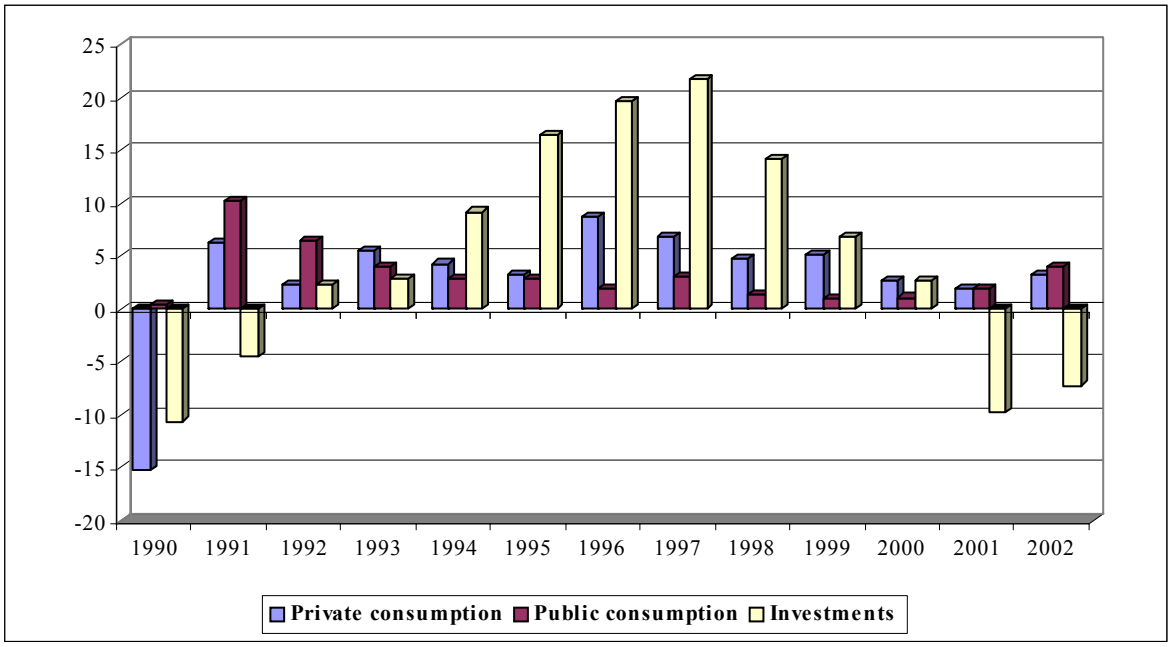
A.1.2. Demand side of growth

The recession in 1990-92 led to a substantial decline in private consumption and investments. A collapse in private consumption was caused by declining real incomes (by about one third between 1990 and 1993), which reflected increase in unemployment due to the transformational recession and very high inflation - consumer prices were growing much faster than wages. The economic slowdown was not the only reason of collapse in investments in the first period of transition. The propensity to invest sharply declined due to also:

- macroeconomic instability (high and unpredictable inflation),
- imposition of tough budget limits on state-owned companies,
- failure of the financial system to finance investments due to capital shortage (collapse of domestic savings) and lack of know-how of the how to operate in the market-based economy.

The negative trend was reversed in 1993. Between 1993 and 2000 Poland experienced high rates of growth in all three components of GDP, with particular importance of investments, which in 1997 alone increased by more than 20% in real terms. The economic slowdown of 2001-02 contributed to a substantial decline in investments of more than 10% in 2001 and 7% in 2002 (Graph A6). It is however projected (government and analysts' estimates) that year 2003 will witness a return to positive rates of growth in investment (projected 3% increase in 2003). In 2004-06 growth in investments is projected to accelerate to 10% per annum.

Graph A6. Dynamics of consumption and investment (y-o-y in %)



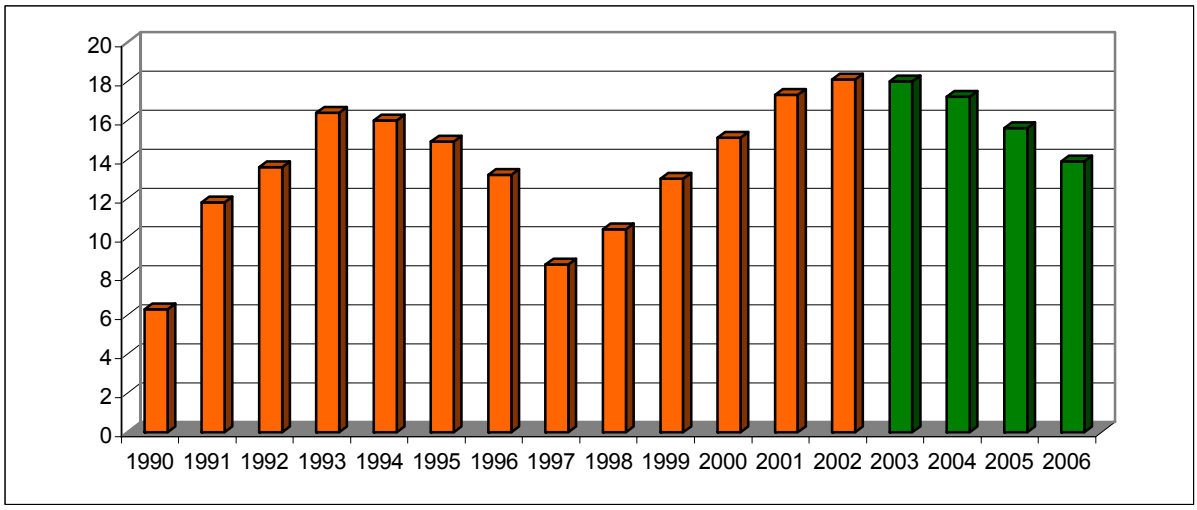
Source: EBRD (2002)

A.2. Labour market

A.2.1 Unemployment

During the whole transition period Poland has experienced relatively high rates of unemployment. The level of unemployment closely followed rates of economic growth: in mid 1990's, during the economic boom, the rate of unemployment declined to the lowest level (8.6% in 1997) in the whole transition period. Since then, however, in tandem with falling GDP growth rates and increasing labour supply as the 1980's baby boom generation was entering the labour force, the unemployment has been quickly increasing and reached 18.7% in January 2003 (almost 20% if calculated according to the International Labour Organization – ILO - methodology). Since then however, on the back of an accelerating economy, the unemployment rate has started to decline and reached 17.4% as of October 2003. The government projects that in line with faster economic growth, unemployment will decrease down to some 14% in 2006 (Graph A7). Other estimates by various local economic research centers project unemployment to decline below 15% by 2006 provided that economic growth indeed accelerates to 5% and more from 2004.

Graph A7. Rate of unemployment (% of labour force)

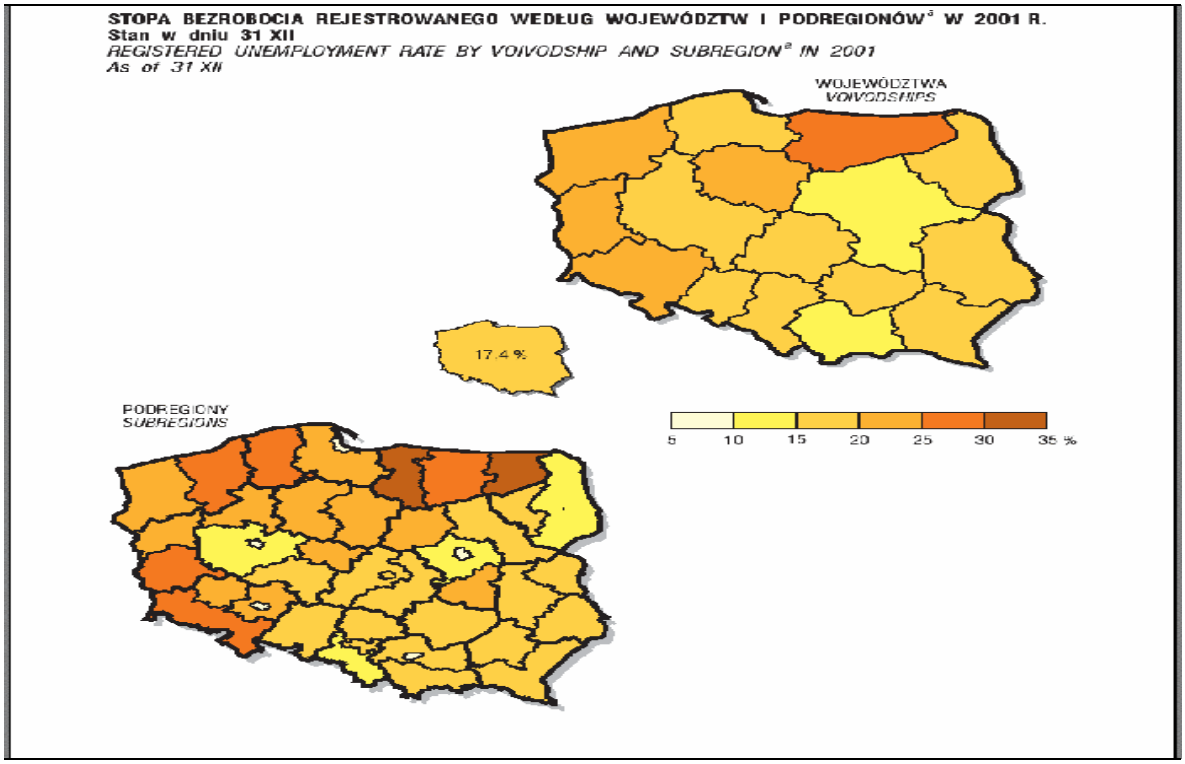


Source: Polish Statistical Office (2002) and government's projections for 2003-06

According to data from the Polish Statistical Office, more than 50% of the unemployed have failed to find a job for at least 12 months. Long-term unemployment has a negative impact on social cohesion and prospects for an all-inclusive development of the information society. It also represents and additional burden on public finances.

Graph A8 shows the regional distribution of unemployment in 2001. Warminsko-Mazurskie voivodship, whose economy is mostly based on agriculture, reported the highest rate of unemployment, which in 2001 exceeded 30%.

Graph A8. Regional distribution of unemployment in 2001

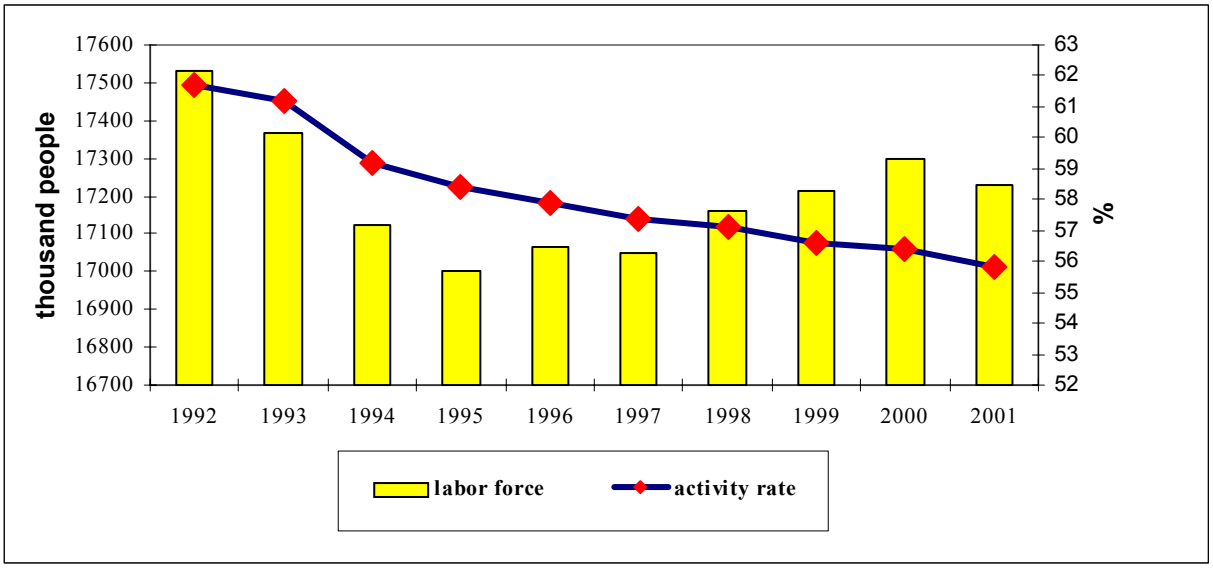


Source: Polish Statistical Office (2002)

A.2.2. Labour participation

Graph A9 shows that after 1992 the number of people willing to work has been steadily declining down to 55.5% and 53% of labour force in 2001 and 2002, respectively, one of the lowest ratios in the whole of the EU. The decline resulted from an adoption of social policies, which in order to prevent too large increases in unemployment and limit the social impact of job losses, allowed people to exit labour force early in their careers through various retirement schemes. This policy, while providing a social cushion during the transition period for the unemployed, had unfortunately put a large burden on the public finance system, which now has to carry over 6 million people in the PAYG (pay-as-you-go) pension system. In spite of a successful introduction in 1999 of privately-run pensions funds (the reform was modeled after the Chilean system - as of June 2003 private pension funds managed some PLN 40 billion or approx. EUR 9.5 billion in assets), the central budget still has to earmark some 7% of its total annual revenue to subsidize the existing PAYG system (some PLN 12 billion a year or EUR 2.8 billion). This clearly limits the resources available for public investments in education, infrastructure, etc., all spheres important for the development of IST. Overall low age retirements limits (65 for men and 60 for women) further aggravate the situation. There are however reasons for optimism: the 1999 pension reform contains various incentives for retiring as late as possible as the total value of a future pension depends on a number of years of contributing to the fund. By 2020 most of the current PAYG pensioners (aged 50 and over) will have given way to pensioners funded from their own private assets accumulated over the years. Hence, the burden of the pension system on public finances in Poland (as opposed to other countries in the EU, which still have not introduced pension reforms) will be slowly decreasing.

Graph A9. Size of the labour force (in thousand) and labour force participation rate (activity rate in percent)



Source: Polish Statistical Office – various years. Note: Participation rate (activity rate) – employed share of the total population.

A.2.3. Employment

Low labour participation is also due to high unemployment, which limits the number of available jobs, relatively high social security contributions paid by employers (48% of the wage bill) and relatively strict labour code regulations, which tend to dissuade employers from increasing employment. Relatively high social security tax burden also contributes to pushing some 5-10% of the labour force into the gray market.

Poland since 1989 has witnessed a gradual shift of employment from manufacturing to services. Between 1995 and 2001 employment in manufacturing as per cent of the labour force declined from 24.6% to 20.1%. At the same time, employment in trade and repair increased from 12,6% to 14,0%, real estate from 3.7% to 5.6% and in public administration from 2.5% to 3.5% (Table A1). Worryingly enough, employment in agriculture bucked the trend and increased from 27.3% to 28.3% of the total labour force (although admittedly a large part of those registered as working in agriculture in reality work in agriculture services. According to various analyses, the true percentage of those employed on farms hovers around 16%). This seems to be due to the low mobility of population, lack of opportunities for employment in the urban areas (often resulting from a mismatch of skills) and low availability of affordable housing.

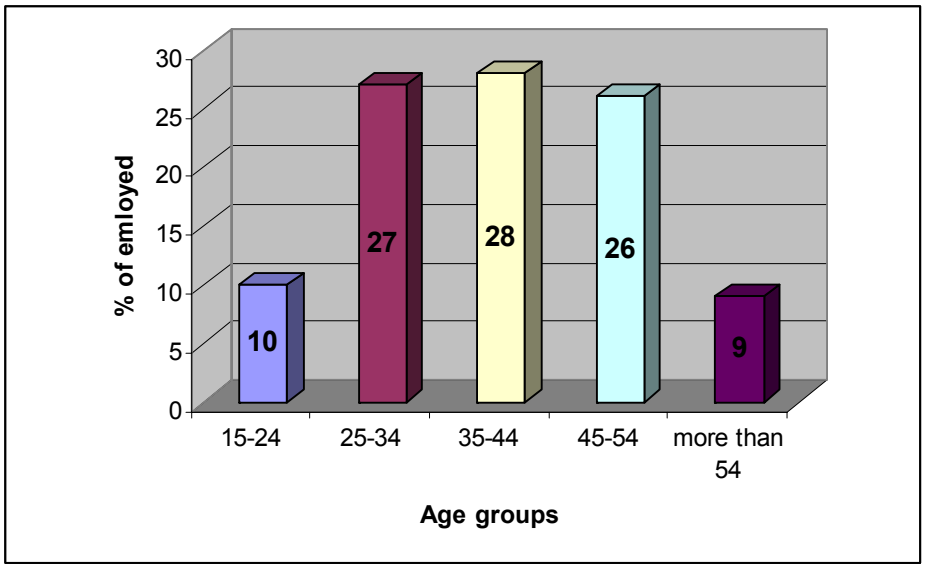
Table A1. Structure of employment in Poland in 1995 and 2001, by sectors

	1995		**2001**	
	In thousand	%	In thousand	%
Total employment	15 129.1		14 963.1	
Manufacturing	3 728.8	24.6%	3 008.1	20.1%
Agriculture	4 125.3	27.3%	4 238.2	28.3%
Construction	827.4	5.5%	772.0	5.2%
Trade and repair	1 903.1	12.6%	2 096.2	14.0%
Hotels and restaurants	185.9	1.2%	231.5	1.5%
Transport, storage and communication	838.1	5.5%	733.9	4.9%
Financial intermediation	268.2	1.8%	285.9	1.9%
Real estate	554.3	3.7%	841.3	5.6%
Public administration	381.3	2.5%	526.6	3.5%
Education	896.4	5.9%	915.6	6.1%
Health and social work	1 003.4	6.6%	865.0	5.8%

Source: Polish Statistical Office (2002)

As for the structure of employment as of 2001 by sex, men represented 55% of the total, while women the remaining 45% (GUS 2002). As for the age structure, as in Graph A10, shares of three age groups (25-34, 34-44, and 45-54) were almost the same.

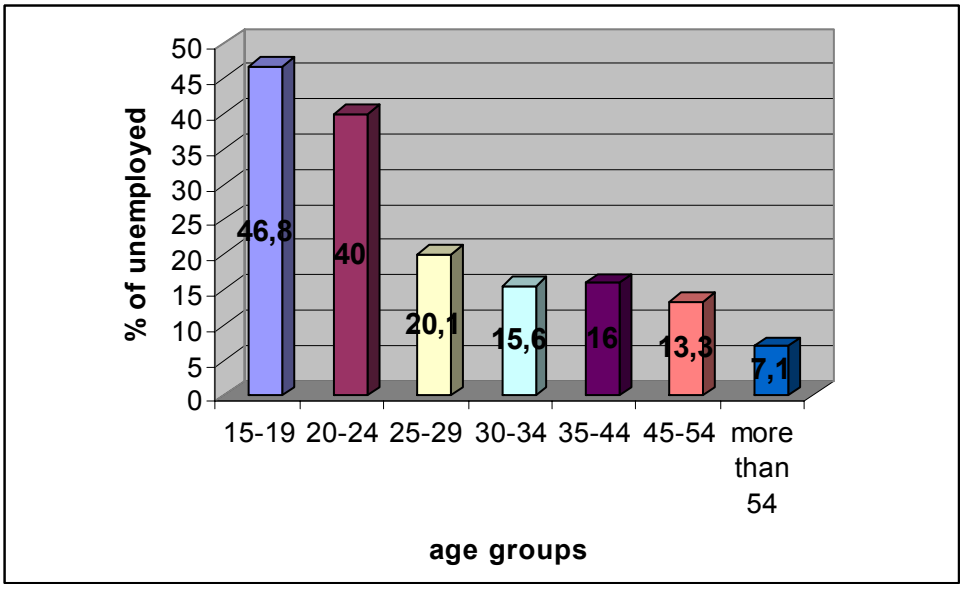
Graph A10. Age structure of employment as of 2001



Source: Polish Statistical Office (2002)

Young people aged 15-24 represented more than 85% of the unemployed as of the end of 2001 (Graph A11). This ratio is much higher than in the EU countries, where the same ratio does not exceed 50%. This unfortunate fact was due to lower demand for labour (particularly for the inexperienced adolescents) resulting from reductions in workforce in restructuring companies, low flexibility of the labour market and – quite importantly - a demographic peak resulting from a "baby boom" in early 1980's. In 2002 the government adopted a "First Job" program designed to help young people find their first employment. The government covers a part of social contributions of young employees to encourage their hiring. The "First Job" program also supports young people in starting their own businesses. It is too early to conclude if the "First Job" has delivered any tangible results. In 2001 men represented 47% and women the remaining 53% of the unemployed.

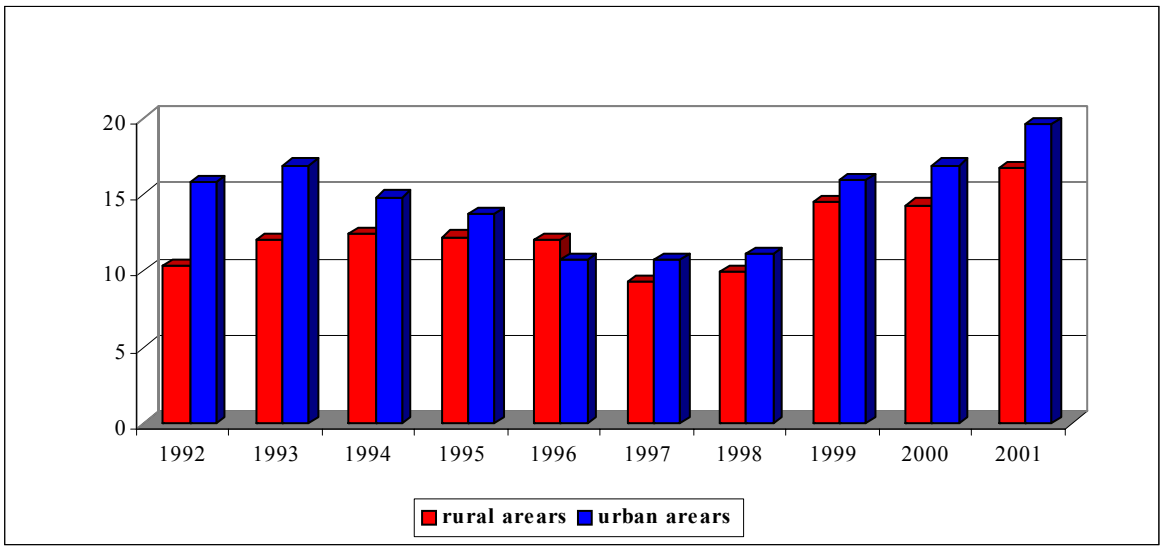
Graph A11. Age structure of the unemployed in 2001



Source: Polish Statistical Office (2002)

There is a large divergence between rates of unemployment in the rural and urban areas (Graph A12). It is rather surprising that rural areas report lower rates of unemployment than large cities. This is due to the fact that people, who can not find employment, decide to stay and work on their farms (approximately 16-18% of the labour force works in agriculture). The resulting high hidden unemployment in agriculture is estimated to amount to some one million people.

Graph A12. Unemployment rate in Poland in urban and rural areas, 1992-2001 (in %)



Source: Polish Statistical Office (2002)

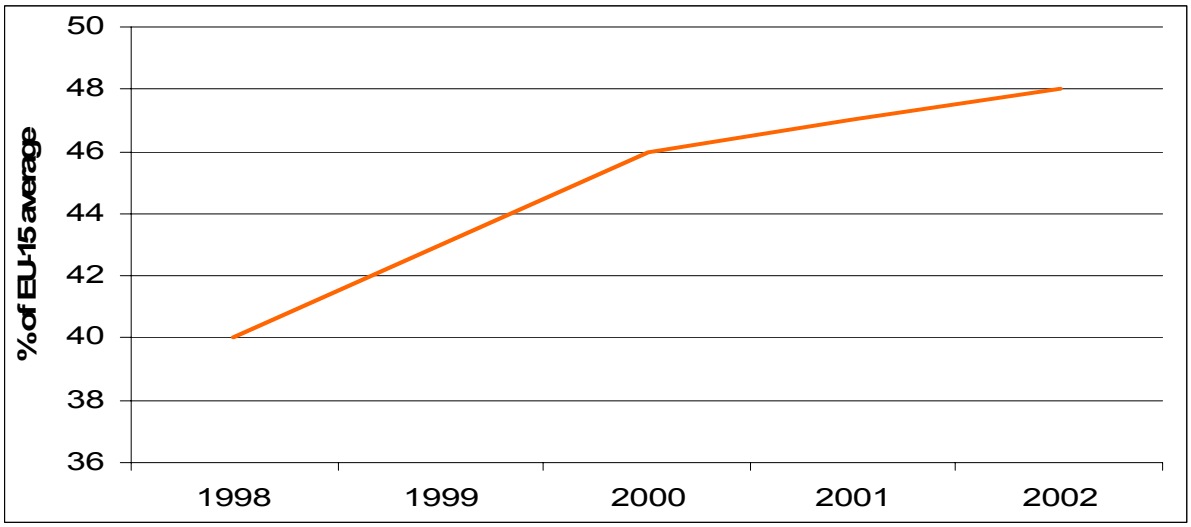
A.3. Labour productivity

Data on changes in labour productivity is available since only 1993. The decade of the 1990's saw an impressive increase in labour productivity in the industrial sector (Graph A13). In 2000 alone the labour productivity increased by almost 14%! High growth rates of labour productivity in the 1993-2001 period were due to labour shedding in restructuring companies (which in turn resulted in steadily increasing unemployment in spite of positive growth rates of the whole economy), structural changes in the economy (privatization and emergence of new, more productive manufacturing sectors) and higher productivity stemming from a higher quality of management and overall human capital. Nonetheless, despite fast growth rates, average labour productivity in Poland in 2002 hovered at around 48% of the EU-15 (Graph A14). It is projected that due to on-going real convergence of the Polish economy with the EU, the growth in productivity in Poland will keep on exceeding the average rate for the EU. Hence, the level of productivity vis a vis the EU average will be increasing. Based on the 1998-2002 trend, it can be projected that Poland's level of productivity will reach some 60% of the EU average by 2010.

Graph A12. Annual changes in labour productivity in Poland

Source: Polish Statistical Office (2002)

Graph A14: Level of labour productivity in Poland against the EU-15 average (GDP per person employed in PPS)

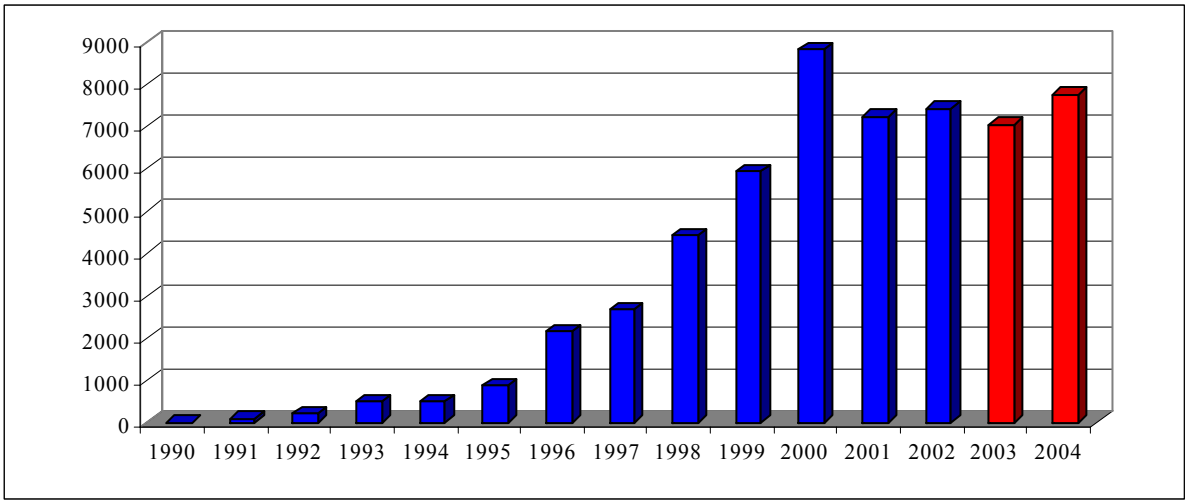


Source: European Commission (2003)

A.4. FDI inflows

Poland was relatively slow in absorbing FDI (Graph A15). Foreign investments in the early 1990's were almost negligible, particularly when compared to Hungary – the regional FDI champion of that time. Yet, the boom years of 1994-97 coincided with a significant increase in foreign investment, which – aside from quickly growing domestic demand – was enticed by the size of the local market (population of Poland is bigger than all of the other EU accession countries combined), attractive geopolitical position, stable economic and political situation, good quality of human capital and relatively low labour costs.

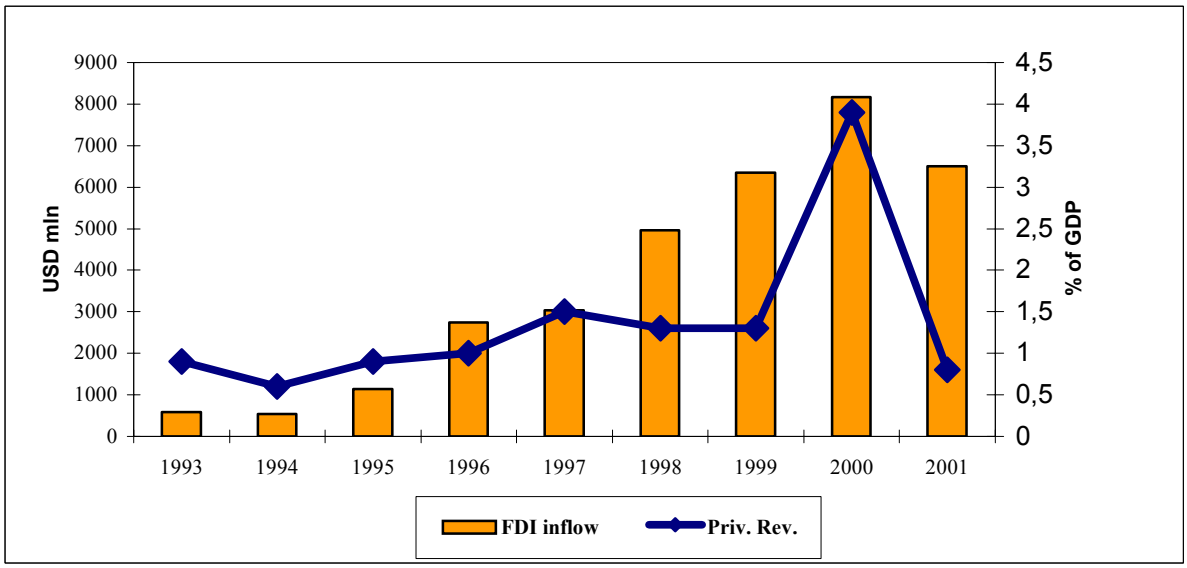
Graph A15. FDI inflows in Poland, 1990-2004 (in EUR million)



Source: EBRD (2002) and government projections for 2003-04

FDI inflows were growing along with improvements in macroeconomic stabilization. There seems to be a high correlation between FDI inflows and privatization revenues, as only a minor part of FDI could be considered pure "greenfield" investment (Graph A16).

Graph A16. FDI inflows (USD million) and privatization revenues (% of GDP)



Source: EBRD 2002 and 2001

Growing FDI substantially contributed to acceleration in economic restructuring. Banking system for example, where by 2002 FDI exceeded 13 billion, within a relatively short time achieved the quality and breadth of services comparable to developed countries. Apart from banking, most FDI inflows were concentrated in transport equipment manufacturing, food, drinks and tobacco, transport, storage and communications, and trade and repairs (Table A2)

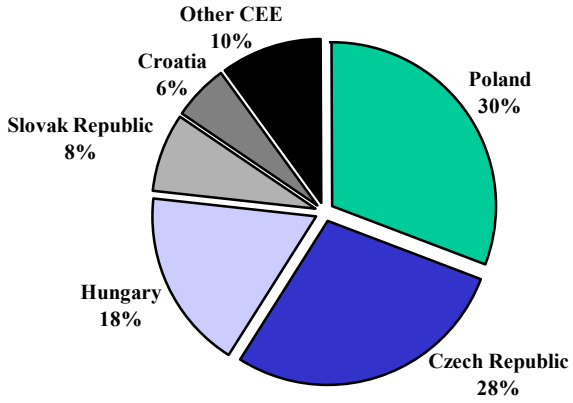
Table A2. FDI stock in Poland by sectors as of the end of 2002.

No	ECA (EKD)	Capital invested	Investment
1.	**I Manufacturing:**	**24 753.7**	**5,475.3**
2.	Transport equipment	6 219.4	927.3
3.	Food, drinks and tobacco products	5 984.0	417.5
4.	Other non-metal goods	3 383.4	950.2
5.	Chemicals and chemical products	1 925.0	796.4
6.	Pulp and paper, publishing and printing	1 728.1	287.4
7.	Electrical machinery and apparatus	1 678.1	279.9
8.	Wood and wooden products	1 339.6	203.2
9.	Rubber and plastics	647.9	408.8
10.	Metals and metal products	548.1	787.1
11.	Machinery and equipment	524.4	86.4
12.	Furniture and consumer goods	452.3	284.5
13.	Fabrics and textiles	308.8	46.1
14.	Leather and leather products	14.6	0.5
15.	**II Financial intermediation**	**13 393.2**	**197.4**
16.	**III Trade and repairs**	**7 586.3**	**908.5**
17.	**IV Transport, storage and communication**	**6 251.4**	**625.9**
18.	**V Construction**	**3 274.8**	**1 225.7**
19.	**VI Power, gas and water supply**	**2 272.2**	**1 306.1**
20.	**VII Community, social and personal services**	**1 825.7**	**535.9**
21.	**VIII Real estate and business activities**	**1 174.2**	**2 261.2**
22.	**IX Hotels and restaurants**	**652.6**	**301.2**
23.	**X Quarrying and mining**	**218.5**	**13.0**
24.	**XI Agriculture**	**44.8**	**16.3**
	Investments over USD 1 million	***61 447.4***	***12 866.4***
	Estimated investment below USD 1 million	***3 667.2***	
	TOTAL	**65 114.6**	

Source: Polish Information and Foreign Investment Agency (PAIIZ) web site (www.paiz.gov.pl)

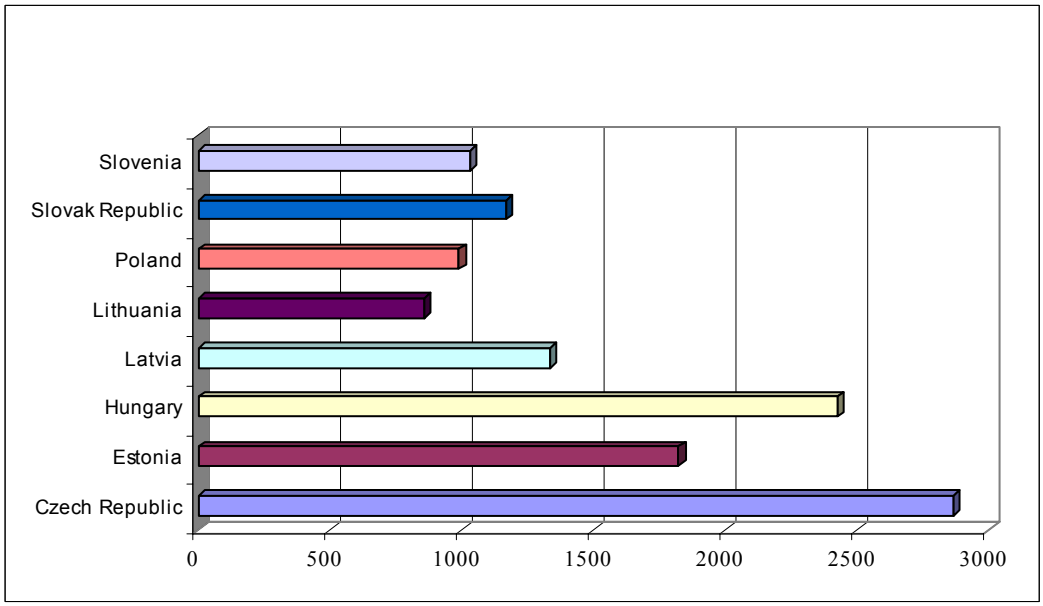
Towards the end of the 1990's, Poland has become the largest recipient of FDI in the region in nominal terms. In 2000 alone Poland attracted almost $10 billion USD of FDI. In the whole period of 1990-2002 Poland received more than $65 billion of foreign investments, which (in absolute terms) gave Poland the leading place among all transition countries with a 30% share in total investments in the region (Graph A17). However, when calculated as FDI per capita, Poland ranks behind Czech Republic, Hungary, Slovak Republic and Slovenia (Graph A18). The government projects that FDI inflows between 2003 and 2006 will amount to some USD 6-8 billion annually.

Graph A17. Cumulative FDI inflows in selected CEE countries 1989-2002 as a share of total FDI in the region.



Source: PAIIZ web site (www.paiz.gov.pl)

Graph A18. Cumulative FDI per capita in selected CEE countries 1989-2001 (in EUR million)



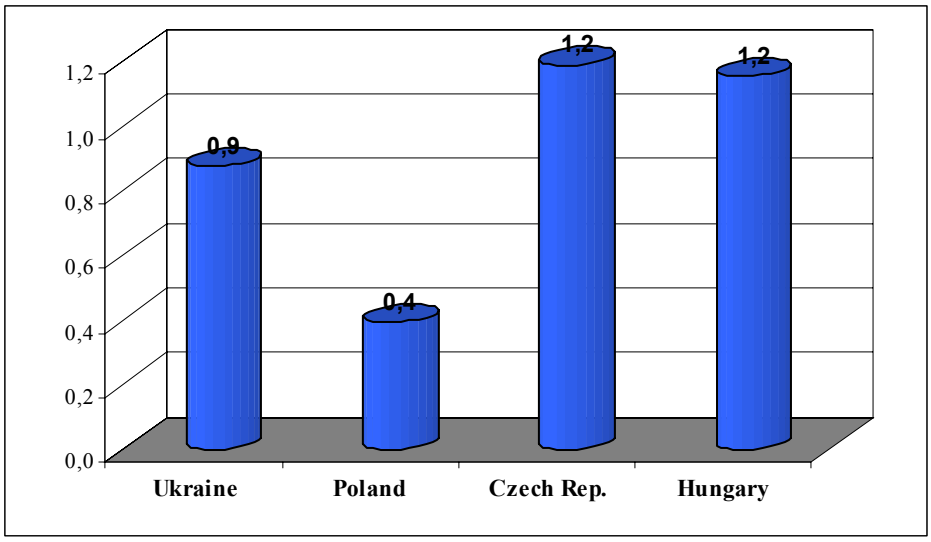
Source: International Monetary Fund (2002) and EBRD 2002

A.5. Trade flows

For its size in terms of population and GDP, the Polish economy is relatively open, with exports representing some 20% of GDP as of 2001 and 2002[1]. Smaller neighboring countries have recorded higher openness ratios (Graph A19). It however does not mean that Poland restricts its foreign trade: trade tariffs are very low and declining – in 2002 budget revenues form import tariffs amounted to only 1.7% of the total budget revenue (Ukraine's high proportion is due to low GDP and relatively large exports of natural resources).

[1] Larger countries in terms of population tend to record lower proportion of trade to GDP than smaller countries. For example, the ratio of exports to GDP in the US, which is undoubtedly one of the most open economies in the world, amounted to only 6% in 2002.

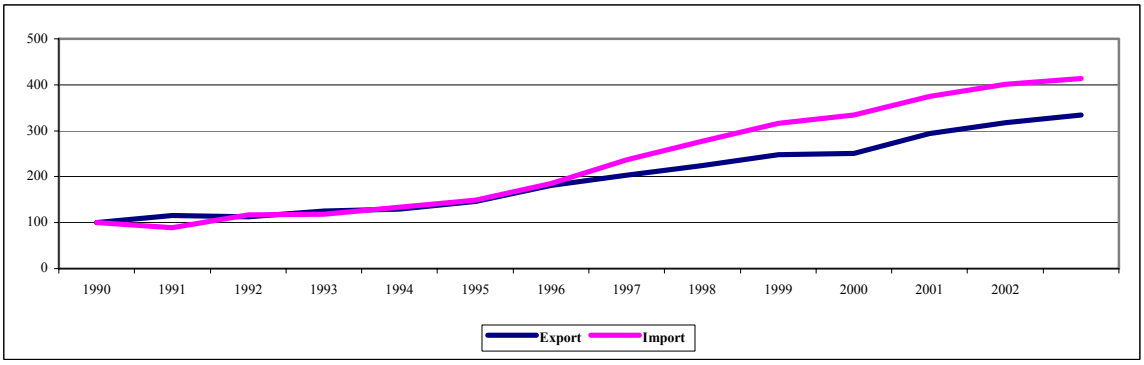
Graph A19. Trade openness of selected economies (share of exports and imports in GDP) in 2001



Source: author's calculations based on EBRD (2002) and Polish Statistical Office (2002)

Between 1990 and 2002, due to liberalization of the foreign trade, opening of the domestic market, and dynamic growth of the economy, rates of growth in exports and imports have been quite impressive (Graph A20). In 2002 total exports exceeded 33 billion USD, which was more than 330% of their 1990 value. At the same time, imports more than quadrupled and amounted to more than 43 billion USD in 2002.

Graph A20. Evolution of Poland's exports and imports (1989 = 100)

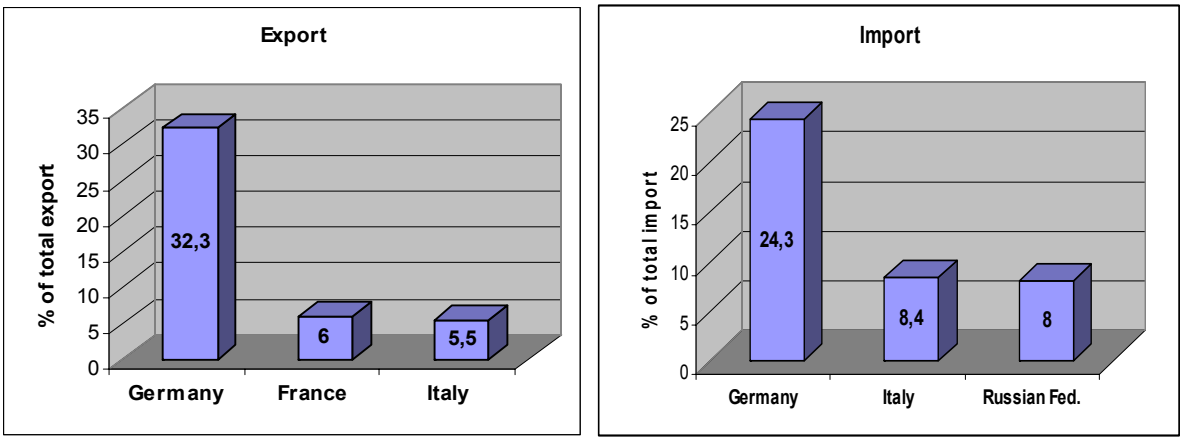


Source: author's calculations based on EBRD (2002) and Central Statistical Office (2002)

Owing to substantial depreciation of the Polish zloty to euro (30% in nominal terms in the last two years) and continuing increase in labour productivity, exports in 2003 in euro terms were growing at a double digit rate. In September and October 2003, for the first time in more than 5 years, Poland has recorded a surplus on its current account. It is projected that exports will increase by more than 10% in euro terms in 2003 and approx. 8% annually between 2004 and 2006.

Germany is by far the largest trading partner for Poland, as it represents more than 30% of the overall trade (Graph A21). It is followed by France and Italy and Russian Federation.

Graph A21. Major trading partners in 2002



Source: author's calculations based on EBRD (2002) and Central Statistical Office (2002)

Export to the EU represented some 70% of total Polish export in 2002. Import from the EU countries constituted some 60% of the Polish import. The structure of the Polish export during the last decade has been steadily improving: exports of heavy industries (steel, coal) have been superseded by higher-value added products: machinery, transport equipment and metals (Table A3).

Table A3. Structure of the Polish exports in 2001

	in PLN million	in EUR million	% of total
Agriculture products	12 454	3 395	8.6%
Mineral products	8 957	2 442	6.2%
Chemical industry	7 302	1 990	5.1%
Plastic and rubber	6 971	1 900	4.8%
Wood products	9 633	2 626	6.7%
Textiles and footwear	12 417	3 385	8.6%
Products of stone and glass	3 316	904	2.3%
Metals	17 356	4 731	12.0%
Machinery	31 056	8 465	21.5%
Transport equipment	22 932	6 251	15.9%
Other	11 843	3 228	8.2%
Total	144 234	39 317	100.0%

Source: Polish Statistical Office (2002)

Between 1998 and 2001 exports of machinery and transport equipment reported the highest dynamic, followed by chemicals and related products, and fuels and related products (Table A4). The increase in the exports of machinery and transport equipment has been predominantly driven by FDI from FIAT, GM, Volkswagen, Toyota, Isuzu, and car parts manufacturers, which expanded their local facilities and increased their exports.

Table A4. Dynamics of Polish exports 1998-2001 (y-o-y % change), by sectors

	1998	1999	2000	2001
Agriculture products	-6.4	-18.0	1.6	12.9
Crude materials	-0.9	4.4	6.6	2.4
Fuels & related products	-9.1	-11.9	18.2	26.6
Chemicals & related products	-5.6	-10.7	26.8	5.8
Intermediate manufacturing products	5.0	-1.9	12.5	9.6
Machinery & transport equipment	45.3	3.5	30.3	20.7
Misc. manufacturing articles	5.4	-2.0	1.1	9.5

Source: PlanEcon Report, June 2003

In 2002, motor vehicles and electronic manufacturers were among the largest exporters in Poland (Table A5).

Table A5. Thirty largest Polish exporters in 2002

Company	Industry	Exports (PLN million)	EUR million	% of total exports in 2002
Volkswagen Motor Polska	Motor vehicles	3 988	849	2.6%
Weglokoks	Trade	3 306	703	2.1%
KGHM	Mining	3 035	646	2.0%
Fiat Auto Poland	Motor vehicles	2 531	539	1.6%
Thomson Multimedia Polska	Electronics	2 459	523	1.6%
PLL LOT	Airlines	2 310	491	1.5%
Izusu Motors Polska	Motor vehicles	2 150	457	1.4%
Philips CEI Poland	Electronics	2 141	456	1.4%
Gdynia Shipyard	Shipyards	2 055	437	1.3%
PKP Cargo	Railways	2 031	432	1.3%
PHS	Steel	1 788	380	1.2%
Philips Lightning Polska	Lightning	1 158	246	0.7%
Polski Koks	Trade	1 072	228	0.7%
International Paper Kwidzyn	Pulp and paper	1 007	214	0.6%
TRW Polska	Motor vehicles	972	207	0.6%
Swewood Poland	Furniture	937	199	0.6%
PKN Orlen	Oil	931	198	0.6%
EuRoPol Gaz	Gas	928	197	0.6%
Frantschach Swiecie	Pulp and paper	882	188	0.6%
Delphi Automotive Systems Poland	Motor vehicles	828	176	0.5%
Kronospan	Wood	754	160	0.5%
Firma Oponiarska Debica	Tires	697	148	0.4%
TP S.A.	Telecom	666	142	0.4%
Avon Operations Polska	Cosmetics	614	131	0.4%
Kronopol	Wood	558	119	0.4%
ZCh Police	Chemistry	524	111	0.3%
Ciech	Chemistry	463	99	0.3%
Alstom Power	Automation	455	97	0.3%
ZA Pulawy	Chemistry	415	88	0.3%
Anwil	Chemistry	376	80	0.2%

Source: based on "Rzeczpospolita", "Lista 500", 2002

A.6. Regional data

Poland, after administrative reform implemented in 1999, is divided into 16 regions, called "voivodships" (formerly, there were 49 voivodships). The contribution of particular regions to national GDP is very unequal (Table A6). In 2001, Mazowieckie voivodship, which includes Warsaw, had a 21% share in total GDP, followed by Slaskie in southern Poland (14%) and Wielkopolskie (9%) in western Poland. Voivodships in central and eastern Poland report the lowest shares in total GDP: Podlaskie, and Warminsko-Mazurskie, but also Lubuskie (western Poland) and Opolskie (southern Poland).

Table A6. Regional contribution to national GDP in 2001 (in %)

Mazowieckie	21
Slaskie	14
Wielkopolskie	9
Dolnoslaskie	8
Malopolskie	7
Pomorskie	6
Lodzkie	6
Kujawsko-Pomorskie	5
Lubelskie	4
Podkarpackie	4
Zachodnio-Pomorskie	4
Swietokrzyskie	3
Warminsko-Mazurskie	3
Lubuskie	2
Podlaskie	2
Opolskie	2

Source: Polish Statistical Office (2002)

From the point of view of GDP per capita, there are big differences between regions (Table A7). Again, Mazowieckie leads the way, followed by Slaskie and Wielkopolskie. Voivodships from the Eastern Poland (Podlaskie, Podkarpackie, Lubelskie) report the lowest GDP per capita rates.

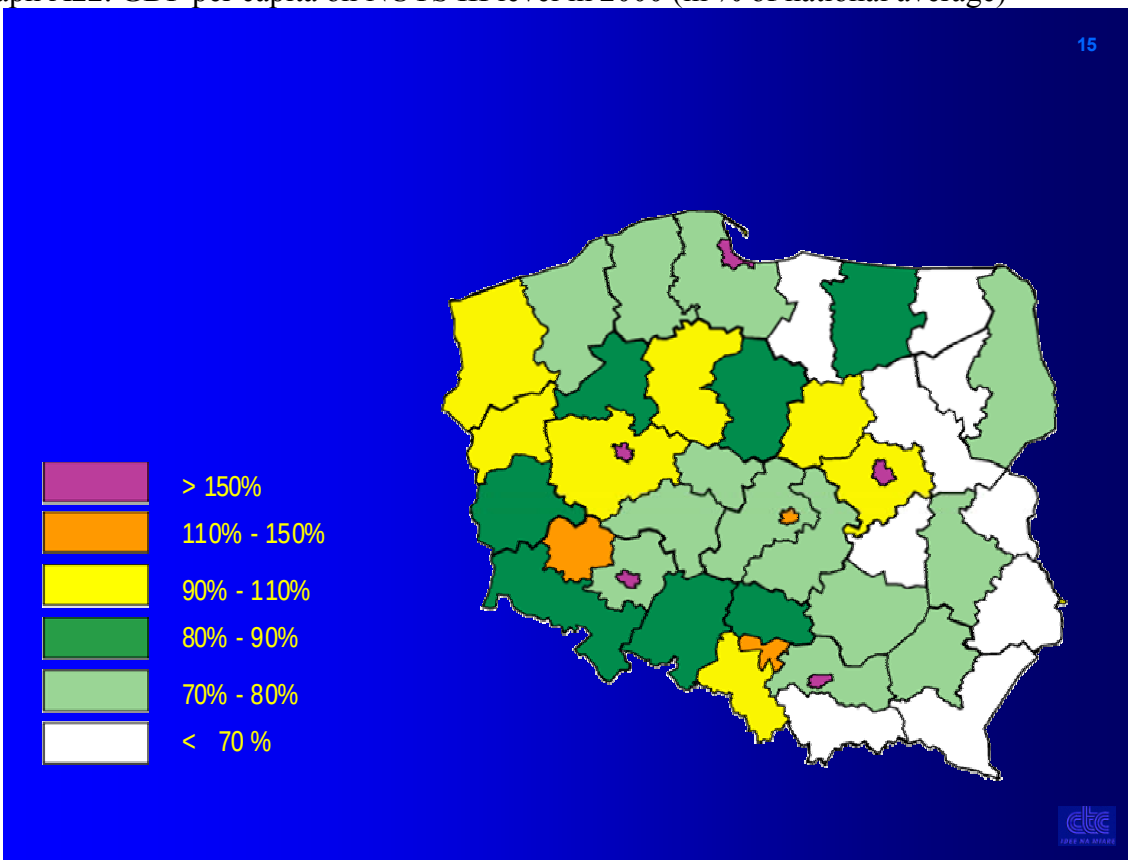
Table A7. GDP per capita in regions in 2001 (national average = 100)

Mazowieckie	164
Slaskie	119
Wielkopolskie	115
Dolnoslaskie	112
Zachodnio-Pomorskie	107
Pomorskie	109
Kujawsko-Pomorskie	97
Lubuskie	97
Malopolskie	97
Lodzkie	96
Opolskie	92
Swietokrzyskie	85
Warminsko-Mazurskie	81
Podlaskie	80
Podkarpackie	77
Lubelskie	74

Source: Polish Statistical Office (2002)

On a NUTS III level, which comprises 44 areas, eastern Poland is well behind the other parts of the country (Graph A22). Disparities between big cities and countryside are most conspicuous: Warsaw's GDP per capita amounts to almost 200% of the national average, while some parts of eastern Poland report GDP per capita at a level lower than 50% of the national average.

Graph A22. GDP per capita on NUTS III level in 2000 (in % of national average)



Source: Szlachta (2003)

The large regional differences in GDP per capita are due to historical legacies (eastern and southern Poland until 1918 was part of the Russian and Hungary-Austrian Empires, respectively) had always been less developed than the western part of the country (until 1918 part of Germany). The socialist 50 years have contributed to a relative lessening of the income divide (structural problems notwithstanding, as some parts of the country were left with large concentrations of uncompetitive industries - coal mines and steel industry in the Silesia region, shipyards on the Baltic coast, military industry in south-eastern Poland). This trend was however reversed during the decade of transition as better developed regions, and big cities in particular, were able to grow much faster than rural Poland (by virtue of much larger inflows of FDI, higher quality of human capital, better infrastructure etc.)

Regional development is one of the priorities of the "National Development Plan 2004-06", adopted by the government as part of preparations to the EU accession, aims to utilize the EU structural and cohesion funds to increase regional cohesion (Box A1).

Box A1. The "National Development Plan 2004-06" has the following selected objectives in terms of an increase in regional cohesion by 2006 ("Integrated Operational Program of Regional Development"):

Indices	Current value (year)	Projected value in 2006
Ratio of GDP per capita of the richest to the the poorest voivodship	1:2.2 (2000)	<1:2.2
Differences in unemployment ratio on NUTS III level	1:7.1	Less than 1:6
GDP per capita NUTS II level to national and EU average (in %)	69.8>NUTSII<149.3 27.2>NUTSII<58.1 (1999)	To be monitored
Unemployment rate (in %, NUTS II)	14.1<NUTSII<23.7 (2000)	To be monitored
Urbanization ratio (NUTS II)	41.0<NUTSII<79.3 (2000)	To be monitored
Educational achievement (NUTS II) - elementary - middle - university	14.8<NUTSII<26.2 63.5<NUTSII<76.9 8.3<NUTSII<14.9 (2000)	To be monitored
Employment structure by sectors - agriculture - industry - services	4.3<NUTSII<40.2 20.0<NUTSII<47.4 39.8<NUTSII<61.2 (2000)	To be monitored

Source: "National Development Plan 2004-06", p. 133.

According to a recent study by one of the largest domestic economic think-tanks - The Gdansk Institute for Market Economics (IBnGR) - Poland's entrance to the European Union will not bridge income gaps among particular regions within the country and EU-accession inflows will only speed up or slow down already existing factors. The study argues that the EU integration will not influence social and economic development in regions in a jarring way and that the regional differences will further grow (IBnGR 2003). IBnGR developed a model of regional development 2004-2012, which measures expected effects of accession. The model shows that the regional differences would grow regardless of EU-membership related matters. Integration is to positively influence both economic growth and employment growth in each of Poland's 16 regions, but this will not be able to offset negative implications of the actual situation within regions.

The IBnGR study shows that Poland as a whole will achieve average annual growth of value added of 5.5%. The result will vary for particular regions, ranging from 0.7% for the Kujawsko-Pomorskie region in north central Poland, to 9.4% for the Malopolskie region in southern Poland. According to the study, the accession effect will be quite evenly spread among regions, with benefits like 1.7% annually for the Lodzkie region [central Poland] and 2.4% for the Podlaskie region [eastern Poland]. In regards to employment, the situation is similar: Kujawsko-Pomorskie should record a 0.3% annual decline, while Mazowieckie region is likely to increase employment by 3.8% annually. Differences in growth forecasts stem from structural factors like infrastructure, human capital and location. IBnGR concludes that positive effects on regional development will be visible from the fourth year of accession onwards. The zenith should take place at the end of the analyzed period in 2009-2012.

The IBnGR study stands in contrast with the objectives of the National Development Plan 2004-06, which projects decreasing, rather than increasing regional differences. The final result will mostly depend on the administrative capacity of particular regions to take advantage of the available EU funds. While the poorest regions of Poland will have access to the largest amount of funds, their ability to utilize the funding is *ex ante* unknown. The most likely scenario is a short-term further increase in regional differences, as poorer regions – due to lower quality of human capital and skills and lack of complimentary assets (infrastructure, access to co-financing etc.) – will not be able to utilize available funds as effectively as better-endowed richer regions. Yet, in the longer-term, beyond 2006-07, this effect should start to dissipate as poorer regions - thanks to "learning-by-doing" effects in utilization of the EU money and increasing subsidies to agricultural population - should be likely to improve their competitive position vis a vis richer parts of the country.

A.7. Summary and conclusions

After almost 14 years of reforms, Poland has almost completed the transition to a free market economy and demonstrates to be one of the most successful transition economies.

Similarly to the EU countries, due to gradual shift away from agriculture and manufacturing, services now represent the predominant part of GDP. Polish economy has also achieved strong and sustained improvements in productivity driven by higher managerial skills, better quality of human capital, privatization, and labour shedding. Poland has received large amounts of FDI, thanks to which process of microeconomic restructuring has been accelerated. By 2002, economic stabilization has been achieved (low inflation, current account deficit on the safe level of approx. 3% of GDP). The GDP growth, which significantly slowed down in 2001-02, is likely to accelerate again and reach 5% in 2004 and beyond. But, despite substantial catch-up achieved within the last decade, Poland still shows a relative low level of economic development (GDP per capita PPP is about 40% of EU average). Also, high level of unemployment, particularly among the young, remains a substantial social problem.[2]

The success or failure of a currently debated reform of public finance system will decide on the size of funding necessary for IS development (including badly needed investments in general infrastructure – roads, airports, railways etc.). Should the reforms not be implemented, public spending on social transfers and on subsidies to ailing industries will continue to prevent growth of spending on IST[3]. It may also be the case that due to lack of reform, public spending on IST as a proportion of budget expenditure might even decrease, which would clearly undermine IS development prospects. The likelihood of this scenario is fortunately not high: it may be expected that in some part the reform will take place thus opening more room for the funding of IS.

Accelerating economic growth and accession to the EU should contribute to fast increase in private investment in IST as corporations are likely to increasingly resort to ICT, R&D and business process innovation in order to withstand increased competitive pressure. This

[2] For a brief analysis of the current economic situation in Poland, please also refer to the IMF's report on Poland as of June 19, 2003, available at http://www.imf.org/external/np/sec/pn/2003/pn0376.htm

[3] For instance, in 2003 subsidies to the coal mining industry will amount to some PLN 4 billion, while total annual public spending on computers in education does not exceed PLN 100 million! Polish Railways are subsidized (through direct subsidies and non-payment of due taxes and social security contributions) to the tune of PLN 2 billion zloty a year.

positive trend should be further strengthened by expected increase in FDI driven by the EU accession.

Large regional differences in GDP per capita, unemployment, urbanization, educational attainment remain a challenge for a cohesive and sustainable growth of the economy. Eastern and southern eastern Poland significantly lags behind other parts of the country in almost all categories. The differences are most pronounced when comparing big cities with rural communities. The decade of transition has contributed to an increase in this urban-rural divide. "National Development Plan 2004-06" aims to increase regional cohesion thanks to the use of EU funds. Administrative capacity of poorer regions to utilize available funding is however unknown. It is likely that in the short-term the accession to the EU will contribute to widening regional disparities as richer, better-endowed regions will be more successful in taking advantage of the accession. In the longer-term, however, thanks to positive effects of "learning-by-doing" poorer regions should overcome early handicaps and start to slowly catch-up with the rest of the country.

Strengths	**Weaknesses**
1. Macroeconomic stability 2. Accelerating economic growth 3. High growth of labour productivity 4. Size effect of the country	5. Precarious state of public finance 6. High unemployment 7. Old, non-competitive industries (coal mines, steel works, shipyards), which put a burden on more competitive sectors of the economy 8. Poor infrastructure (roads, railways, airports) 9. Regional disparities in economic development and social indicators 10. Large share of agricultural employment
Opportunities	**Threats**
11. EU funds, particularly for infrastructure investments 12. Additional macroeconomic stability driven by prospects of accession to euro zone by 2010 13. Further opening of the EU markets for Polish exports 14. Further rise in FDI flows 15. Effects of pension reform (but only fully by 2020)	16. Failure of the public finance reform and ensuing macroeconomic and political turbulence 17. Danger of social protests driven by unemployment 18. Problems with absorption of the UE funds.

Strengths
Poland has achieved macroeconomic stability characterized by a very low inflation and low level of current account deficit. Economic growth, after the 2001-02 slowdown, has started to accelerate. The government projects a 3.5% GDP growth in 2003 and more than 5% in 2004 and onwards. Poland is well placed for substantial increase in economic growth and productivity, which is set to have a positive effect on development of IS (since it is closely correlated with levels of GDP per capita). Large size of the local market is also likely to stimulate home-grown and domestically oriented ICT industry (software development in Polish language in particular).

Weaknesses
High unemployment exceeding 18% contributes to exclusion from the IS of a large part of the society. The exclusion is compounded by a regional distribution of unemployment, where some voivodships record unemployment rates exceeding 20%, with a share of young exceeding 50% of the total unemployment. These disparities may lead to a growing digital divide between higher (Mazowieckie, Western Poland) and lower developed regions (Central and Eastern Poland). The legacy of old, non-competitive industries weighs on the whole economy, including ICT industries, as resources are diverted from development to supporting ailing industries (coal-mining and Polish Railways in particular). Poland's poor general infrastructure (roads in particular) continues to stifle development. There are fewer kilometers of highways in Poland than in Slovenia, a country 20 times smaller than Poland population-wise. Regional disparities in economic and social development preclude some regions from active participation in the development of the IS, as available local resources are too small for spending beyond immediate needs. An almost 20% share of agriculture in total employment (which produces only 4% of GDP) limits the potential for fast IS development as agriculture is a sector with the least propensity to spend on ICT.

Opportunities
Accession to the EU is the clearest and biggest opportunity. Inflow of EU funds should contribute to higher economic growth. It is being estimated that accession to the EU will bring approx. 0,8% of additional GDP growth annually between 2004-06 (the largest impact in 2006). EU funds are likely to finance badly needed infrastructural investments, which remain one of the main bottlenecks of the Polish economy. The prospect of joining the euro zone by 2010 at the latest should bring additional stability to the economy. Almost complete opening of the EU market for Polish products should contribute to exports larger than otherwise. Opening of the markets will also lead to increased competition in products and services, which is likely to induce corporations to adopt business-related IS applications aimed at improving competitiveness.

Threats
Lack of a public finance reform might lead to a crisis-scenario as Poland exceeds the constitutional limit of public debt to GDP. This could undermine confidence of financial markets and lead to a significant increase in the cost of public debt, problems with an access to financing of both the public and private sector, large depreciation of the local currency and social disorder. Ascension to power of populist political forces in the next parliamentary and presidential elections scheduled for 2005, playing on social discontent, could thwart positive growth prospects. Absorption of the EU funds, which is not automatic, will pose a great challenge. It seems that just on the eve of the accession, due to low level of administrative efficiency, Poland may not be ready to fully take advantage of the available EU funds. Failure to utilize them would undermine positive economic trends. Entry to the EU will also bring

much fiercer competition from both the current and new member countries. Failure to compete successfully could lead to much lower growth rates and – as a result – dimmer prospects for the IS.

B. NATIONAL INFORMATION SOCIETY POLICIES

B.1. Institutional settings

All Poland's IS policies, particularly related to science and informatization, are co-ordinated by the newly established (April 1, 2003) Ministry of Scientific Research and Information Technology (MSRIT)[4]. The Ministry replaced administrative and decision-making functions of the State Committee for Scientific Research (KBN).

MSRIT's specific objectives focus on both science and information society and include the following:

- to coordinate all policies on science and informatization – support IT education, promote development of eGovernment and enable access to all public services through Internet (*Gateway to Poland*)
- to formulate strategies of state policies towards science, innovation and R&D, including the scale and structure of the state financing
- to coordinate informatization of public administration (eGovernment)
- to distribute funds among institutions and research teams and to control their spending,
- to opine and consult on a new legislative work related to science and informatization
- to submit to the government plans for budgetary expenditure in the area of research in science and technology,
- to sign international agreements on cooperation in the field of science and technology.

The establishment of MSRIT has created a single coordinating institution for all state policies on informatization. The Ministry is now authorized to coordinate all informatization projects of the public administration (eGovernment) – opining on informatization strategies of specific ministries and institutions, ensuring compatibility of public IT systems nation-wide and economic viability of new informatization projects.

On July 15, 2003 the government accepted a long awaited project of a bill on „Informatization of public administration" (the bill was originally scheduled to be adopted by the government already in December 2002), which will further strengthen the role of MSRIT as the coordinating center for IS policies. The bill, now in the Parliament, creates a legal framework for MSRIT to closely monitor and coordinate various informatization projects of the public administration. The bill specifically aims at the following[5]:

- to ensure compatibility of public IT systems and registries
- to establish legal framework for the development of eGovernment in Poland
- to attain budgetary savings thanks to better coordinated spending on IT projects and shift of a number of public services to electronic platforms
- to enhance efficiency of the public administration and increase the quality of its services

The bill empowers MSRIT to audit all public IT systems for their appropriateness and viability and to publish binding requirements as to the standards of exchange of documents and information between various public institutions. In addition, the bill opens a way for

[4] From: http://www.mnii.gov.pl/en/index.html
[5] From: http://www.informatyzacja.gov.pl/scripts/detail.asp?id=94

citizens to deliver various public documents electronically. It is expected the bill will come into effect sometime in the first quarter of 2004.

Since April 1, 2003, the State Committee for Scientific Research (KBN) has become a consulting institution to MSRIT. KBN is responsible for opining on the amount and structure of financing of state scientific institutions and specific research projects submitted for grant financing from the KBN.[6]

Prior to establishing MSRIT, the whole area of state policies towards science was coordinated by KBN. KBN's mandate, however, did not include informatization. Hence, until April 1, 2003 there was no formal coordination mechanism for Poland's IS policies**.** This fact had a clear negative impact on the scope and efficiency of creating and implementing IS policies.

The new Ministry was established in response to obvious shortcomings of the existing system with no coordinating institution, where various public administration institutions were developing their own IS policies often not compatible with each other. As a result, the effectiveness of public policies and financing for informatization was very low. This in turn resulted in relatively low level of informatization of public administration in comparison to the most successful EU accession countries in terms of the development of IS (Slovenia, Estonia).

The establishment of MSRIT is a single coordination institution within the public administration is poised to enhance effectiveness of state IS policies. As mentioned above, the new bill on informatization of the public administration likely to passed by the parliament in the fall of 2003 and enter into force in early 2004 should further enhance MSRIT legal authority.

Unfortunately, potential of MSRIT to become a powerful driver of IS policies is significantly constrained by low budgetary outlays on the Ministry and on IS policies. The 2003 budget earmarks some PLN 50 million (12 million EUR) for overall informatization of Poland (includes PLN 29.6 million of IS spending by the MSRIT), that is only 0.025% of total budget expenditure in that year![7] While additional financial resources for creation and implementation of IT projects are included in budgets of specific ministries and public institutions, meager budgetary outlays on IS policies coordination and infrastructure clearly represents a significant obstacle to fast and efficient IS development.

In such budgetary conditions, the new Ministry will not be able to effectively take advantage of its newly acquired authority. Within the Ministry, which employs roughly 180 people (equivalent to some 5% of the workforce of the Ministry of Finance) there are three departments out of overall fourteen, which directly deal with the IS policies (Information Society Department, Department of the Public Administration IT Systems and Department of the Science IT Systems). The Information Society Department employs only six people (sic!), who are to coordinate all policies aimed at IS development. Admittedly, this small group of people, in spite of their commendable commitment strongly supported by the Minister of Science and his deputies, will be hardly capable of coordinating and implementing all policies. Lack of sufficient budget and political and administrative support will also limit

[6] More on KBN is available at http://www.kbn.gov.pl/en/science/kbn.htm
[7] From: http://www.kbn.gov.pl/bip/index.html

MSRIT's power to define and decide on IS policies. Consequently, the efficiency of IS policies may be severely constrained.

B.2. Chronological description of the national IS policies

Public debate on the IS policies started in the early 1990's. Yet, it was only on July 14, 2000 that the Lower Chamber of the Parliament (Sejm) announced a "Proclamation on Information Society in Poland", which created a legal and political basis for the government to coordinate all policies related to the information society. Soon after, on 28 November, 2000, the government adopted a program document on the „Aims and Directions of the Information Society Development in Poland", which established the state strategy for development of IS in Poland compatible with the "e-Europe" objectives of the Lisbon summit.

On 23 January 2001 the Minister of Science and Chairman of KBN established a „Forum for Information Society", a multidisciplinary high-level consulting body to the Cabinet of Ministers, which was aimed at opining on strategies developed within the framework of „Aims and direction of development of information society in Poland" and executive acts to the „Act on Telecommunication Law". The Forum features representatives of public administration, local government, business organizations and NGOs dealing with information society issues.

On September 11, 2001 the government, in response to the adoption of the Lisbon Strategy, adopted "ePoland – Plan of Actions for Development of the Information Society in Poland 2001-06". December 2001 saw creation of a new branch of the public administration to handle all IS related policies. The Minister of Science was appointed to head the new administrative branch.

The program of the newly elected (2001) left-wing government on "Entrepreneurship-Jobs-Development" adopted in January 2002 underscored a need for facilitating the development of innovative enterprises and hence promotion of a knowledge-based economy. In a similar vein, the program on "Infrastructure – Key to Success" spelled out a need to continue with liberalization of telecommunication market and enhancing access to all communication networks (mainline, mobile, satellite, radio-based etc.). The Program set an aim of achieving telephone mainline penetration of 37 lines per 100 inhabitants by 2006 (compared to 29 as of the end of 2002) and penetration of mobile lines from 35% as of the beginning of 2003 to 50 by the end of 2006. The third program on "Entrepreneurship First of All", presented to the Parliament in April 2002, also focused on enhancing the competitiveness of enterprises through the use of innovative, IT-based technologies.

In January 2003 the Polish Agency for Foreign Investment published a "Strategy for Development of ICT Industry in Poland until 2010". In the same month, the upper house of the Parliament – the Senate – adopted a "Proclamation on the development of information society in Poland".

The "National Development Plan 2004-06", approved by the government on January 14, 2003, to guide Poland's policies after the EU accession, underlines the importance of IS policies arguing that "the future of Poland will be inextricably connected to development of

biotechnologies, IT, telecommunications and microelectronics".[8] The "Plan" assigns responsibility to MSRIT for coordinating IS policies.
The final strategic document on „Strategy for Informatization of Poland – ePoland" was announced on 10 March, 2003 by the KBN. The "Strategy" is a detailed and policy-oriented document clearly specifying the role of specific ministries and public administration in implementing public IS policies. It establishes clear performance benchmark for all public administration on the introduction of IS strategies (it does not however deal with private and household sector. These are discussed in "ePoland – Plan of Actions for Development of the Information Society in Poland 2001-06").

As mentioned in the first section, on 15 July, 2003, the government adopted a project of a bill on „Informatization of public administration", which aims to strengthen the coordinating role of the MSRIT over all public IS policies. Table B1 presents a chronological description of the main and recent IS policy initiatives along with their major objectives.

[8] From: http://www.um.szczecin.pl/fundusze/prawo/NPR%20-%20ostateczny.pdf

Table B1. Chronological description of the main state IS policy initiatives and their main objectives

Date	Development	Objectives
13 January, 2004	The Council of Ministers adopted the "Strategy for Informatization of Poland – ePoland 2004-06"	- To specify a role of specific ministries and public administration in implementing state IS policies.
19 December, 2003	The Council of Ministers adopted the "National Strategy of Development of Broadband 2004-06"	- To develop broadband penetration in Poland
15 July, 2003	„Bill on informatization of public administration" - – draft project accepted by the government. Sent to the parliament. Expected to enter into force: January 2004	- To ensure compatibility of public IT systems and registries - To create legal framework for the development of eGovernment in Poland - To attain budgetary savings thanks to better coordinated spending on IT projects and shift of a number of public services to electronic platforms - To enhance efficacy of the public administration and increase the quality of its services
1 April, 2003	Creation of "Ministry for Science and Information Technology"	To create single coordinating institution for all IS policies.
10 March, 2003	„Strategy for Informatization of Poland – ePoland" announced by the State Committee for Scientific Research	To specify a role of specific ministries and public administration in implementing state IS policies.
January 2003	"Proclamation on the development of information society in Poland" adopted by the Senate	- To underscore the importance of the IS for the development of Poland
January 2003	"Strategy for Development of the ICT Industry in Poland until 2010" published by the Polish Agency for Foreign Invest	- To promote development of ICT industry in Poland
September 11, 2001	"ePoland – Plan of Actions for Development of the Information Society in Poland 2001-06" adopted by the government	- To create a strategy for development of IS in Poland
January 23, 2001	„Forum for Information Society" appointed by the Minister of Science	- To opine on strategies developed within the framework of „Aims and direction of development of information society in Poland" and executive acts to the Act on Telecommunication Law
November 28, 2000	„Aims and Directions of the Information Society Development in Poland" - adopted by the government.	To establish state strategy for development of information society in Poland compatible with the "e-Europe 2000" objectives of the Lisbon summit.
Date	**Development**	**Objectives**
July 14, 2000	"Proclamation on Information Society in Poland" - Sejm, lower chamber of the Parliament.	To create legal and political basis for the government to coordinate all policies related to the information society.

Source: author's based on various sources

Poland has also made a large progress in adoption of the EU directives on electronic markets and electronic services:

- On 18 September, 2001, Poland adopted a Bill on e-Signature, which entered into force on 16 August, 2002.
- 18 July, 2002 – adoption of a Bill on Electronic Services, which entered into force on 10 March, 2003

- 30 August, 2002 – adoption of a Bill on Electronic Payment Instruments (to enter into force on 30 August, 2003)
- In 2002 a change to the Civil Code was introduced, which provided for validity of contracts signed by electronic signatures.

Although legislation on the electronic signature was adopted already in August of 2002, it is only now, a year later, that enterprises are slowly starting to use e-signatures. Lack of so-called "qualified certificates", which allow for the use of e-signatures, has been mainly responsible for the delay. Still, even with the whole infrastructure in place, the growth in use of eSignature is very slow as enterprises are unable to electronically communicate with public administration (a few enterprises have however already used the signature in inter and intra-company dealings). A pilot project in Krakow, where enterprises have been able to electronically file corporate taxes, has proved to be very successful. Alas, eTax filing for the whole country is not likely to be available at least until mid-2004.

In order to remedy this situation, the recently adopted draft of a bill on informatization of public administration sets a deadline for all public administration entities to be able to accept e-signed documents by August 2006, four years after the original bill on e-signature. E-signatures can be purchased from four licensed enterprises. The total cost of e-signature for enterprises varies with every contract, but the average price for the whole e-signing set (qualified certificate, a chip, and a chip reader) hovers around PLN 400 or EUR 95. This relatively high price limits the use of e-signature by individuals.

B.3. Driving motivation of IS policies

All IS policies, as spelled out in official documents, are aimed at developing information society in Poland, based on universal access of citizens to information, public services, education, health, and knowledge, in order to increase the level of well being and standards of living of the Polish society. The IS policies are also being implemented with a view to accelerating economic growth and catching-up with developed countries of the world.

The implementation of IS policies should result in a number of financial and non-financial benefits. Among the former, IS should lead to a decrease in costs of economic activity, increase potential for offering new products and services, and result in savings for the state and business due to better control and enhanced effectiveness of various activities and processes. Non-pecuniary benefits of tapping IS include enhanced customer convenience, satisfaction, choice, potential of acquiring new information and knowledge and direct contact and access to political, social and economic life.

IS policies are also being implemented with a view to satisfying requirements of the EU accession. It can be strongly argued that without the "EU carrot" the progress in IS would be considerably slower. EU-related legislation has also met with much less opposition from various political parties as they implicitly admitted that "what concerns the EU accession has to be adopted fast so that we get to the EU". Hence, a large body of the IS related legislation has had a relatively smooth ride in the parliament under a guise of the "EU legislation that needs to be adopted". Going forward, it would be then commendable for the EU authorities to keep on driving IS related policies (for instance, through non-negotiable EU directives), thus helping national governments in their efforts to adopt IS legislation.

B.4. IS strategies and objectives

The MSRIT is responsible for implementation of the state strategy within the „eEurope+ 2005" initiative based on a general program document on the „Aims and directions of the information society development in Poland"[9] and subsequent "ePoland – Plan of Actions for Development of the Information Society in Poland 2001-06". The former one specifies the following detailed aims of the public policy:

- to ensure general public access to telecommunications services for citizens
- to prepare the Polish society for technological, social and economic changes related to the creation of the information society
- to prepare the Polish society for new conditions on the labour market and for new methods in the workplace; to take advantage of the opportunities afforded by the changes taking place in the country in order to reduce unemployment resulting from the restructuring of industry and agriculture.
- to adjust legal provisions to the requirements of the rapid technological progress and the information society era; to apply ICT in developing new legislation.
- to adjust the national economy to the requirements of the global electronic commerce by introducing regulations concerning the electronic commerce.
- to enhance the system of public procurement in order to make the implementation of ICT systems to the public sector more efficient; to make the system of public procurement more efficient by using ICT networks.
- to establish, with the aid of ICT instruments transparent and citizen-friendly structures of public administration which are fit for the era of the open information society; to ensure greater efficiency of administration through a broader application of ICT
- to provide conditions for a lasting and sustainable regional development, accounting for modern ICT and to monitor such development
- to develop modern branches of industry and enhance its innovation in order to improve the competitiveness of the Polish economy towards the global electronic economy
- to ensure support of the science sector for the electronic economy and the information society, in order to take maximum advantage of the opportunities and to minimize dangers; to develop the infrastructure for science.
- to enhance the position of Polish culture in the world by means of ICT tools; to preserve cultural property and national cultural heritage.

The document on "ePoland – The Action Plan for the Information Society Development in Poland for the years 2001-06"[10] provides more specific and time-bound objectives of the IS policies, which – apart from the public sector – also concern the private and household sector:

- development of telecommunications infrastructure
- universal, cheaper, faster and safe access to the Internet
- investment in people and skills so as to as ensure universal ability to use ICT
- stimulation of better utilization of internet capabilities
- promotion and development of Internet content and services, particularly in Polish language

[9] From: http://www.kbn.gov.pl/en/cele_en.html
[10] From: http://www.kbn.gov.pl/cele/epolska/epoland.doc

- diffusion of information and communication technologies in rural areas
- development of digital radio and television

Yet another document adopted by the government and coordinated by MSRIT is the „Strategy for Informatization of Poland 2001-06"[11]. This document, which clearly spells out objectives, analyses current situation, and assigns responsibility together with deadlines to specific ministries, institutions and policy makers. The „Strategy", which focuses on the progress in informatization of the public administration, sets up an on-going mechanism of monitoring of progress in implementation of the strategies, which focus on the implementation of the following objectives:

- broadband Internet for schools
- telecommunication infrastructure and access to the Internet
- infrastructure for science and research – see below more within the PIONIER project
- on-line security
- creation of databases of public administration
- internet access to public services and public administration
- distance learning (eLearning)
- distance health services
- eCommerce
- digital divide

The sub-program „PIONIER: Polish Optical Internet –Advanced Applications, Services and Technologies for Information Society[12], developed by the KBN, aims to develop information sciences infrastructure in Poland for conducting research in contemporary science, technology, services and applications. It also envisages producing applications for information society and developing new software applications.

Within the „eEurope 2005" strategy, the MSRIT is also implementing a project of „Gateway to Poland', which aims at enabling access of citizens to all public services through the Internet, 24 hours a day, 7 days a week. The main objectives of the project are the following:

- to enhance flow of information to citizens
- to create electronic channels of interaction between citizens, firms and the public administration
- to exchange information between the entities of public administration
- to enable electronic applications for identity cards, passports, driving licenses, car registration, medical registration, insurance etc.
- to introduce tax e-filing for citizens and companies

Other public institutions also contribute to the debate of relevant strategies for development of IS in Poland. The Polish Agency for Foreign Investment (PAIZ) developed a "Program of Pro-Investment Activities for the ICT Sector in Poland"[13], which seeks to promote and

[11] From: www.informatyzacja.gov.pl
[12] From: http://www.kbn.gov.pl/en/pionier/index.html
[13] From: www.paiz.gov.pl

facilitate foreign and domestic investment in ICT production so as to become a regional center of production of high-value added ICT products.

The Ministry of Education and Sports has been promoting and implementing its program nicknamed Interkl@sa for ensuring Internet access to all public educational establishment, particularly elementary and high schools.

There is a number of other initiatives of specific public actors, which promote IS. For instance, the Ministry of Finance has developed and run a pilot project for eTax filing for both individuals and companies in Krakow. A complete system of e-filing is scheduled to be developed for the whole of Poland by the end of 2004. All Polish ministries maintain web sites with information on the activity of a particular ministry (see later in the text an assessment of the quality of information available as surveyed by the NGO "Citizens Internet").

As per the guidelines of the document on the "Aims and Direction of development of Information Society in Poland" adopted in 2003, the MSRIT is required to publish quarterly assessments of the status of creation, adoption and implementation of various IS policies. Reports are being published on MSRIT's affiliated web site at www.informatyzacja.gov.pl[14]

Regional IS policies have so far been driven by local grass-root initiatives as well as guidelines of the nationwide program "Gateway to Poland" coordinated by MSRIT. An NGO - "Association of Cities in the Internet" (www.miastawinternecie.pl) - has been created to share information about various local IS initiatives. Within the "Gateway to Poland" program, Malopolskie voivodship has gone ahead with a pilot project of development of local eGovernment (more on it in later sections). Private sector has also joined in development of regional IS policies: for example, a CEO of an IT company based in Katowice in southern Poland developed back in 2001 a program called "IT Highway", which calls for promotion of an IT industry cluster in the region of Krakow-Katowice-Wroclaw, which is linked by an A-4 highway. So far, however, the program has not been implemented.[15]

National and regional IS policies are likely to be significantly strengthened thanks to financing from the EU structural funds. "National Development Plan 2004-06" projects that within the "Sectoral Operational Program to Increase Competitiveness of Entreprises" EUR 100 million of the EU funds in the period 2004-06 will be earmarked for informatization of national public administration. Another EUR 80 million is projected to be available for co-financing construction of local Internet access points, particularly in small cities and in the countryside. As of the end of November 2003, Poland has already prepared a number of projects aimed of informatization of the public administration of a total value of roughly EUR 244 million (including local portion of financing) (Table B2). The projects will soon be submitted to the EU for funding. According to experts from Cisco Poland, IT projects in the private sector may benefit from some EUR 800 million of the EU funding between 2004-06 out of the total of EUR 11.3 billion available to the whole economy.

[14] Most recent report on the first quarter of 2003 ("Raport o stanie realizacji zadan w zakresie rozwoju spoleczenstwa informacyjnego w Polsce w I kwartale 2003") is available at: http://www.informatyzacja.gov.pl/_d/files/raporty/raport_si_1kw2003.pdf

[15] More info available at http://www.2si.com.pl/aktualnosci/autostrada/

Table B2. Selected projects of informatization of public administration to be submitted for funding to the EU

No.	Project	Final beneficiary	Description
1	eTaxes	Ministry of Finance	Services as VAT, PIT and CIT for enterprises and private persons which are operating business
2	Modernization and development of interior tele-transmission network for eGovernment	Ministry of Internal Affairs and Administration	Electronic interchange of data between administration, public registries and enterprises
3	PESEL 2	Ministry of Internal Affairs and Administration	Project for enterprises. Integration of important registries as KRS, ZUS, KRUS, RUM, NIP, ZSK, CEPIK with PESEL register
4	On-line availability of data from judical registries	Ministry of Justice	On-line databases from judical registries (Pledge Register, National Judical Register - KRS, Perpetual Books)
5	e-NORM Portal	Polish Committee for Standarisation	Norms (Polish, European and international) will be available on-line for all enterprises
6	Electronic platform for personal data protection	The Inspector General for the Protection of Personal Data	Comprehensive electronic services for enterprises (registration of databases with personal data, electronic forms)
7	GEONET	Central Office for Geodesy and Cartography	Interactive, multi-functional positioning system based on ground control station and Global Positioning System (GPS)
8	GEOBASE	Central Office for Geodesy and Cartography	On-line geographic information for enterprises
9	SDI POLAND	Central Office for Geodesy and Cartography	Infrastructure of spatial data for electronic services.
10	Real estate tax on-line	Central Office for Geodesy and Cartography	Information on estates and data from enterprises related to real estate tax. Project will be integrated with other projects and registries (KRS, REGON, perpetual books)

Source: MSRiT (2003)

B.5. The institutional settings behind the policies

All the government's program documents on IS assign clear responsibility to all actors in the public administration, among which the Ministry of the Economy, Labour and Social Affairs, Ministry of Finance, Ministry of Infrastructure and Ministry of Internal Affairs and Administration are the most pertinent to the IS. The MSRIT coordinates implementation of all initiatives. It is incumbent on the Ministry to report to the Cabinet of Ministers on timely implementation of the official IS policies. Accession to the EU will not change the current institutional setting.

Polish Chamber of Information Technology and Telecommunications is the leading private institution dealing with the development of IS policies. It comprises of members representing the ICT industry in Poland (computer, software, and telecommunications industry). It actively takes part in public debates on IS. Yet, its lobbying and persuading power is limited as evidenced by relatively slow progress in implementation of existing IS policies.

B.6. Commitment of private and public actors, main actors and their tasks

The establishment of MSRIT together with a recent flurry of IS-related public initiatives (see chronological table B1) attests to the stronger commitment of the government to IS. The IS strategies and policies are being developed in consultation with a number of stakeholders, including business, academia, and NGOs. The most recent example of a cooperation between the MSRIT and stakeholders is the World Bank's project on the „Knowledge Based Economy in Poland", which – next to the World Bank and MSRIT – involves representatives of other ministries, venture capital funds, entrepreneurs and academia. While there is no formal format of consultation, progress is being made on seeking consensus among all stakeholders on promoting IS.

A number of the members of Sejm, the lower chamber of the parliament, created in 2002 a „Parliamentary Group on the Information Society". While this is a very commendable initiative, the group has so far not proved to be influential enough to sufficiently promote the idea of the IS.

Aside from the public administration, IS policies are largely influenced by private companies, NGOs and various other national and regional institutions. Domestic and international IT companies are very active in promoting IS in line with their commercial, but also general interests. The lobbying effort is galvanized by the Polish Chamber of Information Technology and Telecommunications (PIIT) (http://www.piit.org.pl/index.xml), which is the largest organization representing IT and telecom companies in Poland. The Chamber has actively taken part in creating legislation on e-signatures. It is now involved in enhancing legislation on public e-procurement. Every four years PIIT, together with other private institutions, organizes a "Congress of Polish Informatics". On 2-4 June, 2003 the third Congress was held. The Congress concluded with an adoption of a report on "Polish Informatics in the EU". The report features inter alia twelve recommendations of the private IT sector as to the development of the IS in Poland.[16] Alas, as even admitted by the authors of the report, the recommendations of the two previous congresses went largely unheeded.

[16] The full text of the report is available here: http://www.kongres.org.pl/3KIP_raport.pdf

Consequently, public administration remains the main actor impacting IS development in Poland. The main public institutions are the following:

a) Ministry of Scientific Research and Information Technology – coordinator of all state-driven IS policies and strategies
b) Ministry of Infrastructure – responsible for development of IST infrastructure
c) Office of Telecommunications and Post Regulation (URTiP) – a newly created watchdog (2000) for telecommunications market. Responsible for monitoring and execution of liberalization of a local telecom market.
d) Ministry of Finance – developing eTax filing
e) Ministry of Education and Sports – responsible for eLearning, access to education, development of ICT skills.

Largest IST companies, both international (Microsoft, Oracle, SAP, IBM) and domestic (Prokom Software, Computerland, Softbank) are the most active business actors supporting IS development. They actively contribute to the debate on ICT policies in Poland through business lobbying, conferences, training programs etc.

The NGO community related to IST has been expanding rapidly since 1989. A variety of institutions from academia and grass-root organizations have been established. The largest are the following:

- Internet Society Poland - http://www.isoc.org.pl/home/index.pl.html
- "Internet Obywatelski" (Citizens Internet) - http://www.egov.pl/
- TIGER economic think-tank – www.tiger.edu.pl
- CASE economic think-tank – www.case.com.pl
- NASK – Research and Academic Computer Network - http://www.nask.pl/nask_en/
- Polish Software Market Alliance - http://www.pro.org.pl/
- Scientific Association for Economic Information Technology - http://bsd.ae.wroc.pl/ntie/
- Polish Association for Information Technology - http://www.pti.org.pl/
- Association „Cities in the Internet" - http://www.miastawinternecie.pl/
- "Information Society" - http://www.spoleczenstwoinformacyjne.pl/

The impact of NGOs, although growing, is still not strong enough to tangibly influence overall pace of adoption and implementation of IS policies. This is due to relative weakness of NGOs in terms of manpower, budgets and lobbying impact. A lack of an established framework for discussion of the IS development between the public and private sector further limits the strength of the private sector. A coordinated effort of both the MSRIT and the private sector to stimulate political support for the IS policies would be very much welcome.

B.7. Assessment of the national IS policies and the implementation

The results of all strategies developed by the public sector in Poland are mixed. First of all, they were adopted quite late, only in 2000. Before that the political elite did not seem to recognize the importance of IS for socio-economic development. The development of the IS in Poland has been also hamstrung by a lack of coordination of public policies and bureaucratic inertia: it took almost a year to implement the prescriptions of the "ePoland" program document, adopted in September 2001, that is to create a single coordinating institution for IS policies. The Minister of Science and KBN were assigned the coordinating

role only in July of 2002. In the same vein, of two new acts of informatization and a new version of the "ePoland" strategy, which were scheduled to be presented to the Cabinet of the Ministers in December 2002, only a draft of a bill on informatization has been adopted by the government (15 July, 2003). Due to insufficient support from the prime minister and relatively weak intra-government lobbying power of the Minister of Science, more delays in adoption and implementation of IS policies can be expected.

The declaration promoting the information society proclaimed by the Lower Chamber of the Parliament in 2000 gave a strong impetus for development of IS strategies and policies. Nonetheless, IS still does not seem to be the main political, economic or social priority. It is evidenced by a low level of financing for implementation of IS policies (although mostly constrained by difficult budgetary situation), lack of clear political support (for instance, the role of MSRIT would be significantly strengthened if – similarly to the Office of the European Integration UKIE – it would directly report to the Prime Minister) and low public support for the necessary IS changes. It seems that the IS community (MSRIT and the private sector) has not yet reached the "critical mass" needed to tangibly impact national policies.

Box B1.

The apparent lack of interest in IS on the part of the members of the parliament (MPs) and their lack of IS skills has been recently amply evidenced by a survey conducted by "Internet Obywatelski" (Citizens Internet), a local NGO (April 2003). The aim of the survey was to check how many MPs would respond to emails sent to their official email addresses (e-mails asked about working hours of the MPs offices). It transpired that only 34,1% of all MPs ever responded, although emails were sent at least twice to each of them. Nonetheless, this has been improvement: in a similar survey done a year earlier, only 13,3% of MPs responded

In a similar survey, in December 2002 the same NGO sent emails to a selected number of presidents and mayors of towns and cities. 48% of those contacted responded before the deadline. The highest ratio of responses came from cities in Opolskie voivodship in southern Poland. Yet, none (sic!) of the cities in Zachodniopomorskie voivodship in the north-eastern part of Poland responded to the survey. From: http://www.egov.pl/io/index.php

Pressing, short-term and sensitive social needs (for instance, restructuring ailing industries – agriculture, coal mines, steel works, shipyards) seem to predominate a list of priorities on the Polish political agenda. It is directly connected to the political process, which responds to pressures exerted by organized interest groups (miners, farmers, blue collar workers in ailing industries) rather than the interest of the society at large, which is distant and amorphous. Although significant progress has been recently made, clearly "bread" issues predominate over "broadband".

The creation of the Ministry for Scientific Research and Information Technology shows progress in a change of attitude towards IS. The new Ministry, in spite of it extremely small budget, is poised to be much more effective in implementing IS policies (since heretofore there was no single coordinating institution). The recent adoption of the "Strategy for Informatization of Poland", with its clear timetable, deadline, and clear responsibility for specific ministries for implementation of assigned tasks, bears another proof to maturing of domestic IS policies. The "Strategy" is a creative effort aimed at promoting IS by using local competitive advantages in human capital. As with any plan, the follow up will be the critical issue: how many of the bright ideas will be implemented on time. So far, a large number of

efforts, not only concerning IS, have foundered due to lack of proper execution, follow-up and monitoring.

The pending accession to the UE has also been an important factor driving adoption of IS policies. The peer pressure, requirements of *acquis communataire* and tight deadline substantially contributed to acceleration in development and implementation of IS strategies. Upon accession on 1 May, 2004, Poland will stand a chance of further accelerating catching up in IS thanks to increased investment in IS infrastructure supported by the EU funds, better coordination of IS policies, complete adoption of the EU IS regulations, and finally, much easier access to technologies, knowledge, ideas and innovations developed in the EU.

Future of the IS in Poland will then be mostly dependent on successful adoption of the EU regulations, absorption of EU funds and diffusion of ideas and knowledge locally. Much will depend on the ability to absorb the EU funds. This is still uncertain, yet realistically speaking Poland is quite likely to be a net beneficiary of the accession already in 2004 (IBnGR economic research center argues that Poland needs to utilize only 48% of the available EU funds between 2004-06 to "break even", that is, to receive from the EU at least as much as it will pay to the EU budget[17]).

On a highly speculative note, it seems that given the geopolitical position, size, economic and political potential, high quality of human capital, and accelerating economic growth, Poland should be able to follow more into the Spanish rather than Greek footsteps. Nonetheless, irrelevant of the path Poland will tread, it will continue to make - slower or faster - economic, political and social progress, which will all combine to improving the state and prospects of IS in Poland. Development of IST may not only be a consequence of overall development – it may also be the driver of progress. IST may contribute to faster economic growth, more pronounced increases in productivity, and faster and more sustainable social progress. A virtuous cycle may develop, whereby IST contributes to overall growth, which in turn contributes to the development of IS, which then positively impacts growth and so on.

B.8. Summary and conclusions

In the last three years Poland has made a substantial progress in development and implementation of the IS policies. Yet, bureaucratic inertia, insufficient funding and coordination, lack of required human resources, skills and competences, poor monitoring and follow up, and low political support have rendered the process of IS development much slower than it could have been otherwise. Unless there are major political breakthroughs, which would give new momentum for supporting IS polices, Poland is likely to continue the current modest pace of progress in informatization of public administration and implementation of IS policies. The progress may be somehow quickened thanks to large potential outlays on IT projects funded by the EU structural funds. Yet, as with all other projects, sufficient administrative capacity to handle EU projects will be the key to effective utilization of the funding (up to EUR 1 billion overall for the public and private sector between 2004 and 2006). There is also some hope related to likely promulgation in the first quarter of 2004 of a bill on information of public administration, which would significantly strengthen MSRIT's role in coordination of public IT projects. Yet, the new law by itself will

[17] IBnGR (2003), "Finansowe skutki przystąpienia Polski do Unii Europejskiej" available at http://www.ibngr.edu.pl/m3.htm

not work: MSRIT will need to considerably increase its staff dealing with IT coordination (from current fewer than 20 people) to be able to effectively use its prerogatives conferred on it by the new law. Increase in funding depends on budgetary allocations is hinging on political support, which – as mentioned above – has been so far lacking.

Strengths	**Weaknesses**
1. Adoption of the IS program documents and most of the EU legislation on the e-economy. 2. Creation of a single coordinating institution for IS policies 3. Growing commitment of non-governmental actors: IT corporations, IT business alliances, NGOs.	1. Low efficiency of the public administration in implementing IS policies 2. Insufficient coordination of IS policies 3. Insufficient political support 4. Lack of financial resources for investment in IS 5. Multiple priorities on the political agenda 6. No clear role for stakeholders in IS policies definition and implementation – a "public owned" area
Opportunities	**Threats**
1. Complete adoption of the EU legislation on the IS upon the accession 2. EU financial support for IS development 3. Higher political interest in IS driven by EU peer reviews and local NGOs 4. Regional cohesion policies and IS plans 5. New political momentum	1. Further focus on politically sensitive issues rather than on IS policies 2. Continuous lack of financial resources for investment in IS 3. Delays in implementation of IS due to opposition from various interest groups and low quality of public administration

Strengths

Most of the EU legislation on IS has already been adopted. Creation on April 1, 2003 of the Ministry for Scientific Research and Information Technology (MSRIT) is poised to substantially improve effectiveness of state policies on IS development. Poland has also witnessed a fast growth in non-governmental actors dealing with the IS: IT corporations, IT business alliances, NGOs. Their pressure on the development and implementation of IS policies, although still not tangible enough, is however constantly growing.

Weaknesses

Bureaucratic inertia driven by low level of skills, lack of motivation of public officials, insufficient funding and low efficiency of the public administration in implementing IS policies represent one of the main impediments to IS development. Insufficient coordination of IS policies at the level of the central government, in spite of the recent establishment of the responsible Ministry, has also clearly compromised the speed and quality of public IS policies. Implementation of IS policies has also proved to be slow due to low political support for the IS as most of the attention is being diverted towards more politically and socially sensitive issues. It seems that most of the policy makers (MPs, ministers, high level officials) do not have enough of an understanding of the opportunities related to the IS. Low level of financing for both coordination of IS policies and IT investments in public administration equally contribute to slow progress. Finally, there is no established framework for public-private sector dialogue aimed at enhancing IS development. Public administration, in spite of

its shortcomings, dominates the IS development. Private sector and NGOs have a long way to go before they will be able to exert tangible influence on IS policies.

Opportunities

Faster development of IS in Poland is mostly an "EU story". Upon the accession to the EU on May 1, 2004, Poland will have to introduce the remaining pieces of EU legislation on the IS. This fact should clearly stimulate local IS development. Since effective implementation of IS policies requires sizeable financial support, access to the EU funds may prove to be the only way for financing needed investments in infrastructure, administration, training, and regional development. Accession to the EU will also drive political interest and awareness of IS policies driven by peer pressure and EU sponsored initiatives. Similarly, growing importance of local NGOs, strengthened by alliances with the EU organizations, is very likely to positively impact the speed of IS development. IS programs may also be increasingly utilized in action plans aimed at enhancing regional cohesion (access to information, development of new services industries etc.). Finally, parliamentary elections in 2005 may be a chance to institute a government with political and economic priorities much closer focused on IS development.

Threats

Focus of the political elite on sensitive social issues (unemployment, restructuring of ailing industries, abortion etc.) not related to the IS remains a significant threat. Difficult budgetary situation, which does not allow for sufficient funding of IS initiatives, has been and is likely to stifle implementation of IS policies requiring state funding (infrastructure, education, IT projects in public administration). Strong opposition from various interest groups (coal miners, nurses, steel workers, railways' employees), which are likely to lose state subsidies and various privileges due to on-going liberalization and deregulation of the product markets, may negatively affect the resolve of the policy makers to introduce needed policies. Even if they would be adopted often very low quality of public administration may cause substantial delays in implementation and efficient execution of the IS policies.

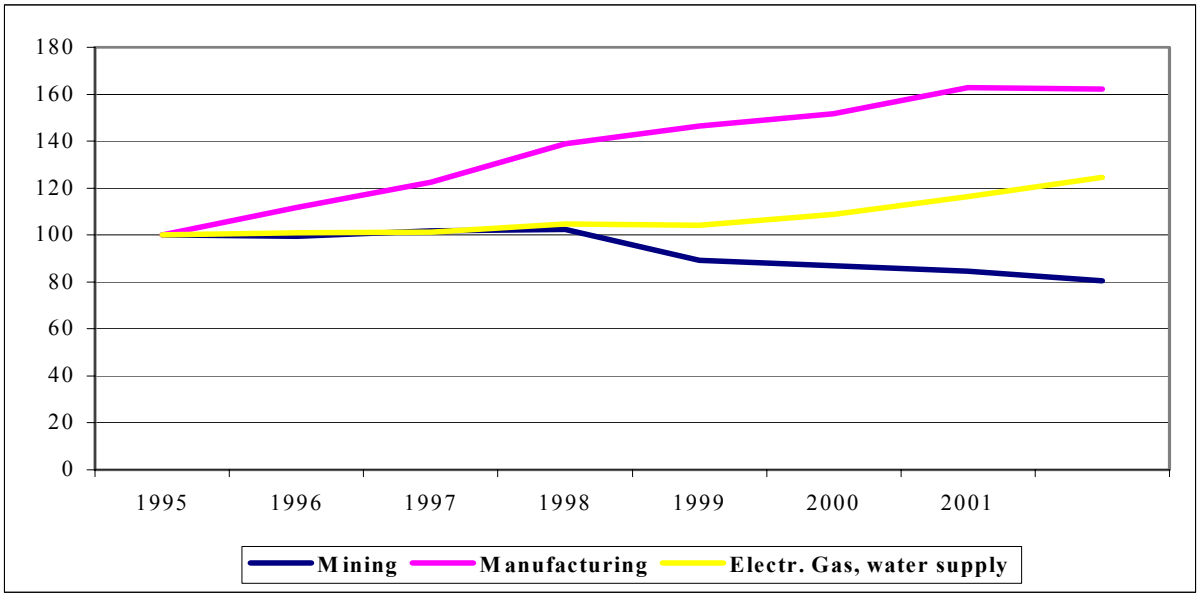
C. INDUSTRIAL DEVELOPMENT AND COMPETITIVENESS, AND ITS GEOGRAPHY, 1990-2001

C.1. Developments in the structure of the economy

During the last decade the Polish economy experienced a gradual shift from traditional, smokestack industries of steel, mining, chemicals and shipyards to services and higher-value added manufacturing.

Between 1995 and 2001 production of mining sector, an embodiment of an old, ailing industry, was quickly decreasing (Graph C1), particularly relative to other manufacturing sectors. The share of mining in total industrial production went down to 5% in 2001 from 8% in 1995, while the share of manufacturing and utilities increased to 84% and 11%, respectively.

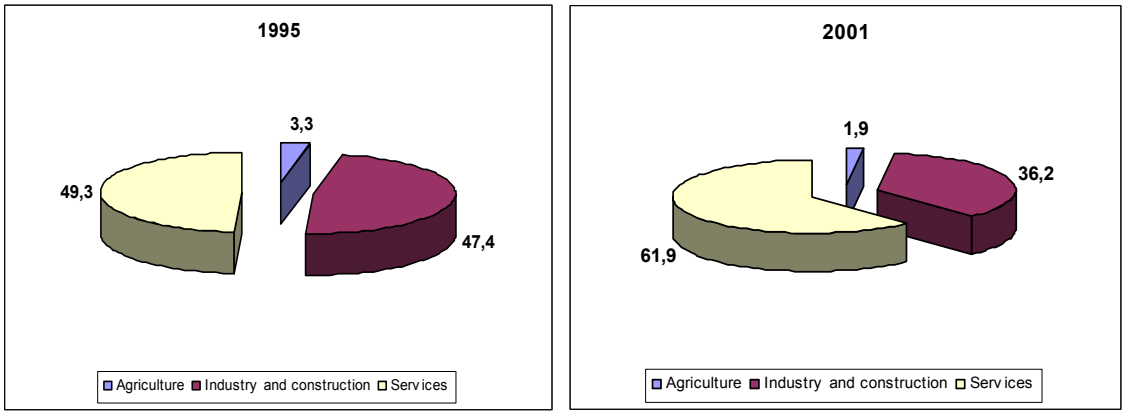
Graph C1. Dynamics of production sectors in Poland (year 1994=100) and changes in composition of investments



Source: Polish Statistical Office (2002)

At the same time, the share of the service sector in the total investments in the economy increased from 49.3% in 1995 to 61.9% in 2001 (Graph C2). The increase went in line with a growing share of the service sector in GDP. In 2001, investments in the service sector as a share in total were almost exactly on par with the share of services in GDP. Large investments in the service sector seem to have reflected a fact that due to relative scarcity of services (a legacy of years of underinvestment under socialism), investments in the sector were offering much higher rates of return than alternative investments in manufacturing. This particularly applies to banking, financial sector and telecommunications.

Graph C2. Composition of investments by GDP sectors



Source: Polish Statistical Office (2002)

C.1.1. Manufacturing

Within manufacturing, in continuation of trends from the early 1990's, between 1995 and 2001 the share in total industrial production of more technologically advanced manufacturing sectors was increasing (Table C1). In 2001 manufacturing of food products and beverages represented the largest share in total industrial production (20.1%), followed by chemicals and chemical products (5.6%), manufacturing of motor vehicles (5.4%) and metal products (5%). The share of mining and quarrying decreased from 5.9% in 1995 to 3.7% in 2001.

Table C1. Structure of industrial production by sections and divisions in selected years, in % of total industry production

	1995	2000	2001
Mining and quarrying	5.9	3.8	3.7
Food products and beverages	19.1	18.2	20.1
Wood and wood products	2.8	3.2	3.1
Publishing and printing	2.7	3.4	3.3
Coke and petroleum products	4.1	5.3	4.9
Chemicals and chemical products	6.8	5.7	5.6
Rubber and plastic products	3.2	3.8	4.0
Non-metallic mineral products	3.7	4.6	4.6
Basic metals	6.6	4.8	4.0
Metal products	3.8	4.8	5.0
Machinery and equipment	5.6	4.6	4.3
Office machinery and computers	0.2	0.3	0.3
Radio, TV, and communication equip.	1.4	1.9	1.9
Motor vehicles	3.6	6.3	5.4
Furniture	3.1	3.7	3.7
Electricity, gas, water supply	10	10.1	11.3
Other	17.4	15.5	14.8
Total	100.0	100.0	100.0

Source: Polish Statistical Office (2002)

Poland's industrial production is quite diversified. Aside from from the food products and beverage industry, shares of almost all other branches of manufacturing hover around 3-5% of total industrial output. The motor vehicle industry and metal products industry, which mostly include production of automotive spare parts, almost doubled its share in total production between 1995 and 2001. It is mostly due to an expansion of local production facilities of international automobile manufacturers: FIAT, GM, Daewoo (up until its recent bankruptcy) and Volkswagen. The motor vehicle production has also contributed to growth in the spare parts (Delphi, Magnetti Marelli and others) and engine (Isuzu, Toyota) manufacturing.

In the same period, the value of production of office machinery & computers and radio, TV and communication equipment increased to 342,9 and 222,9, respectively, of the production level in 1995 (Table C2). Nonetheless, their share in total industrial production is still very small and in 2001 amounted to 0.3% and 1.9% of total production, respectively ("other" in Table C1).

Table C2. Rising and declining industrial sectors (previous year =100)

Sector	1999	2000	2001	2001 (1995=100)
Basic metals	93.4	109.4	82.2	88.2
Mining of coal and lignite	95.5	95.5	97.2	78.2
Textiles and clothing	92.7	104.8	91.2	103.5
Medical and precision instruments	111.1	98.9	109.9	172.3
Radio, TV and communication equipment	100.9	111.4	105.9	222.9
Office machinery and computers	140.5	93.1	116.7	342.9

Source: Polish Statistical Office (2002)

Similarly to motor vehicle and metal products industry, FDI has played a very large role in growth of most manufacturing branches of the economy, including the fastest growing industries. Thomson, LG, Philips have developed large production capacity of various electronic equipment including TV sets, computer monitors, DVD players, lightning etc. The value of Philips' exports alone amounted to some EUR 1 billion in 2002. Office machinery and computers are produced by Compaq, Optimus (a Polish company) and a number of other local and international manufacturers. It can be safely argued that almost all of the high-tech industry in Poland has been built based on foreign capital. As foreign owned companies are much more likely to use advanced ICT technologies (ERP, eCommerce, digital supply chain management etc. – see Clarke 2003), almost all industrial sectors with high FDI involvement (again, this applies to virtually all high-value added industries) have proved to absorb more ICT than local companies. For data on ICT investment, please refer to Chapter E.

Alas, FDI did not have an equally beneficial effect on the value of R&D spending – most foreign companies have chosen not to establish their R&D facilities in Poland. Some argue that this is due to the fact that when Polish state-owned companies were privatized, it was not incumbent on foreign investors to maintain R&D capabilities (as it was the case in Hungary, for instance). Nonetheless, recent examples suggest (Philips and Siemens software center in Wroclaw, Motorola technology center in Krakow) that foreign corporate R&D spending may be on the rise.

C.1.2. Services

In the service sector as of 2001, trade and repair represented 33% of the total value of the services output, followed by real estate and renting (21%), transport, storage and communication (14%) and public administration and defense (8%) (Table C3).

Table C3. Structure of services in 2001, in % of total services

Trade and repair	33,0
Hotels and restaurants	2,3
Transport, storage and communication	13,9
Real estate, renting and business act.	20,8
Public administration and defence	7,7
Education	5,4
Health and social work	5,2
Financial intermediation	6,8
Other	4,8

Source: Polish Statistical Office (2002)

In the recent seven years, financial intermediation, hotels and restaurants, transport, storage and communication have significantly increased their output, which can be interpreted as a positive structural change (Table C4). It is not by coincidence that the above services have increased their production by the largest factor – the same services have also been the most intensive users of ICT (refer to Chapter E for data on ICT investment). This particularly applies to financial intermediation (banks, insurance companies, investment funds), transport, communication and retail and wholesale trade. As shown in Chapter D, there seems to be a close correlation between the amount of ICT investment in the Polish banking industry and its productivity (Piatkowski 2003). Van Ark (2003) shows that ICT-using industries in Poland have recorded much higher productivity growth rates than non-ICT using industries. While correlation is not an evidence of a causal relationship (it is either that ICT increases productivity or that the most productive industries invest in ICT), it can be safely argued that ICT investment is very likely to contribute to an increase in industry-level and – consequently – macrolevel productivity.

Similarly to the manufacturing sector, service sectors that most intensively use ICT are predominantly foreign owned. This is particularly true for Polish banking sector, which is in 80% owned by foreign investors (Citibank, ING, ABN Amro, Commerzbank, Credito Italiano, SEB, Nordea, HSBC, Credit Agricole etc.). There has also been large FDI inflows into retail trade (Tesco, Auchan, Leclerc, Real, Praktiker, Hypernova, Geant etc.), transport (Vos Logistics, Equus, Raben) and communications (France Telecom, Denmark Telecom, Vodafone, Deutsche Telecom).

Alas, and again similarly to the manufacturing sector, FDI has not resulted in an increase in R&D spending. To the contrary – entrance of foreign investors has in most cases led to a decrease in R&D spending as foreign investors replaced local R&D capacities with import of ready-made solutions from abroad. R&D spending in the whole service sector is unfortunately very low. It seems that none of the sectors has so far focused on innovation as a key to long-term competitiveness (more on R&D in Chapter D).

Table C4. Output dynamics of the service sector, by sectors (year 1995 = 100) – data for year 2001

Trade and repair	137.0
Hotels and restaurants	1780.
Transport, storage and communication	138.0
Real estate, renting and business act.	109.6
Public administration and defence	137.0
Education	109.2
Health and social work	86.6
Financial intermediation	187.0
Other	104.4

Source: Polish Statistical Office (2002)

C.1.3. Regional structure of production

There are large regional disparities in the value of industrial production. Mazowieckie voivodship, which includes Warsaw, represented in 2001 approximately 20% of the total industrial production of Poland. Slaskie (southern Poland) followed with 17% and Wielkopolskie (western Poland) with another 10%. Podlaskie voivodship in eastern Poland, mostly based on agriculture, contributed meager 2% of the total industrial production (Table C5).

Table C5. Regional structure of total industrial production in Poland in 2001 (in %)

Mazowieckie	20
Slaskie	17
Wielkopolskie	10
Dolnoslaskie	7
Malopolskie	7
Pomorskie	6
Lodzkie	6
Kujawsko-Pomorskie	5
Lubelskie	3
Podkarpackie	4
Zachodnio-Pomorskie	3
Opolskie	3
Warminsko-Mazurskie	3
Lubuskie	2
Podlaskie	2
Swietokrzyskie	2

Source: Polish Statistical Office (2002)

Central and eastern Poland (Podlaskie, Podkarpackie, Lubelskie, Warminsko-Mazurskie) in almost all economic and social aspects substantially lags behind the more developed, urbanized and industrialized regions of western/southern Poland and Mazowieckie voivodship (Warsaw). Agricultural employment is highest in central and eastern Poland. The same regional disparities apply to the unemployment rate, which is highest in Warminsko-Mazurskie (north-east) (Table C5).

Table C6. Regional and per sector distribution of labour force and unemployment rate

	Agriculture	Industry	Trade and repair	Financial intermediation	Unemployment rate
Dolnoslaskie	3.8	7.8	7.5	7.7	22.2
Kujawsko-Pomorskie	4.6	4.8	5.2	4.5	22.3
Lubelskie	11.8	3.9	4.3	4.4	15.3
Lubuskie	1.3	2.1	2.4	2.4	25.7
Lodzkie	8.0	5.1	6.6	5.8	18.3
Malopolskie	11.1	8.8	7.9	6.6	13.7
Mazowieckie	13.9	17.0	17.9	27.2	13.8
Opolskie	2.5	2.6	2.1	2.0	18.8
Podkarpackie	10.4	4.5	4.4	4.5	16.2
Podlaskie	5.4	2.1	2.6	2.6	14.5
Pomorskie	2.6	6.0	5.6	5.7	21.2
Slaskie	3.5	15.5	13.7	10.9	16.6
Swietokrzyskie	6.8	3.1	2.8	2.1	17.9
Warminsko-Mazurskie	2.8	2.8	2.9	2.7	27.9
Wielkopolskie	8.1	9.5	9.7	8.1	15.9
Zachodnio-Pomorskie	1.9	4.4	4.4	3.8	25.9

Source: Polish Statistical Office (2002)

In spite of quite substantial differences in contribution of various sectors to overall GDP and sectoral structure of employment, the composition of GDP on a regional basis is relatively homogenous – in all regions the share of services in regional GDP is close to 60% (Table C7).

Table C7. GDP composition in selected regions

Region	Agriculture	Industry	Services
Mazowieckie	3.2	27.4	69.4
Lubelskie	6.0	28.6	65.4
Lodzkie	4.0	32.8	63.2
Dolnoslaskie	3.8	33.7	62.5
Slaskie	1.7	40.9	57.4

Source: Polish Statistical Office (2002)

C.2. The role of ICT industry

C.2.1. Main characteristics: growth and structure

There is not enough data to fully assess the size, structure and growth patterns of the ICT industry in Poland. The only data available is from the OECD "Measuring Information Economy 2002" publication and a number of private sources. Polish Statistical Office plans to publish first official data on ICT sector in early 2005 as part of the Eurostat-sponsored project.

According to the OECD, between 1995 and 2000 (Table C4) the value of ICT manufacturing in Poland almost tripled from PLN 4.036 million in 1995 to PLN 11.408 million in 2000 (approx. EUR 2.450 million). Accordingly, the value added increased from 1.314 million to 2.770 million in the same period, which in 2000 represented some 0.4% of GDP.

At the same time, the number of employed in ICT manufacturing decreased from 49 300 in 1995 to 37 800 in 2000. The decrease in employment combined with significant increase in value added evidences a high rate of productivity growth in the ICT manufacturing sector. Contrary to developments in the ICT manufacturing and in line with trends in most EU countries, employment in computer and related activities doubled from 17 600 in 1995 to 35.100 in 2000.

Wages and salaries in both ICT manufacturing and computer and related activities were quickly increasing. In spite of lower employment in ICT manufacturing, the overall amount spent on wages and salaries almost tripled in the period. Increases in wages reflected concomitant increases in productivity.

Between 1995 and 2000 the number of ICT manufacturing enterprises increased only slightly from 202 to 232. Growth in numbers of enterprises in telecommunications and computer and related activities were much more pronounced: the number of registered enterprises of the former almost doubled, while the group of computer and related activities increased by some 45% between 1995 and 2000. The high growth rates illustrate the economy-wide trend of a shift from a manufacturing to a service sector.

Investments in ICT sector as denoted by GFCF (gross fixed capital formation) were quite small between 1995 and 2000: in 2000 they overall amounted to some PLN 800 million or an equivalent of approx. EUR 180 million. Investments in ICT sector represented only 0.5% of the value of all investments in the Polish economy.

Table C8. Production, value added, employment, wages, number of business and investments in ICT sector in Poland 1995-2000

Production (output)	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**
millions PLN						
ICT manufacturing[1]	4 036	5 162	6 847	9 042	10 426	11 408
of which office, accounting and computing machinery	574	799	922	1 192	1 632	1 538
Value added *(at basic prices)*						
ICT manufacturing[1]	1 314	1 604	2 040	2 483	3 299	2 770
of which office, accounting and computing machinery	188	251	252	349	578	550
Employment						
employees						
ICT manufacturing[1]	49 300	46 300	45 000	42 800	39 700	37 800
of which office, accounting and computing machinery	4 200	4 100	4 500	4 700	5 000	5 000
Computer and related activities	17 600	19 300	25 800	28 100	31 100	35 100
Wages and salaries, employees	1995	1996	1997	1998	1999	2000
millions PLN						
ICT manufacturing[1]	437	529	662	758	1 038	1 134
of which office, accounting and computing machinery	38	49	77	94	172	178
Computer and related activities	207	305	472	686	1 200	1 635
Number of businesses	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**
enterprises						
ICT manufacturing[1]	202	208	234	223	221	232
of which office, accounting and computing machinery	13	14	15	15	19	21
Telecommunications	..	..	834	1 005	1 137	1 446
Computer and related activities	..	..	21 485	25 084	27 660	31 427
of which software consultancy and supply	..	..	10 779	12 041	12 911	14 168
Other ICT services[2]	..	..	66	76	108	120
Total ICT sector[2]	..	..	22 619	26 388	29 126	33 225
GFCF						
ICT manufacturing[1]	168	344	356	530	574	393
of which office, accounting and computing machinery	16	17	24	31	20	19
Telecommunications	..	..	..	..	..	..
Computer and related activities	73	115	165	222	318	415

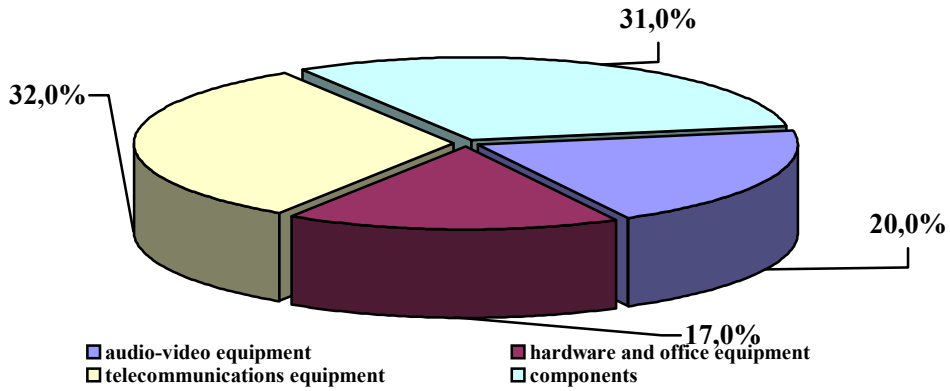
1. Excluding ISIC 3130 (Manufacture of insulated wire and cable), ISIC 3312 (Manufacture of instruments and appliances for measuring, checking, testing, navigating and other purposes, except industrial process control equipment) and ISIC 3313 (Manufacture of industrial process control equipment).
2. Excluding ICT wholesaling activities.

Source: OECD, Measuring the Information Economy 2002, based on Polish Central Statistical Office.

In 2002 the value of production of the electronic industry exceeded USD 3 billion and sustained large dynamic of growth[18]. For instance, in 2001 alone the value of production of office machinery and computer equipment (total value of USD 240 million) increased by 25% relative to 2000. Production of telecommunications equipment and electronic components (total value of USD 2.4 billion) increased by 13%. Nonetheless, despite high growth rates, the share of electronic industry in GDP in 2001 amounted to less than 1%.

The production structure of the electronic industry (Polish Statistical Office uses a broader definition of ICT) in Poland is heavily biased towards telecommunications equipment and electronic components, which altogether represent 63.0% of the total production. IT hardware and office equipment together with audio-video equipment take up the remaining part of the production (Graph C3).

Graph C3. Structure of production of the electronic industry in Poland in 2001
(enterprises with more than 49 employees)

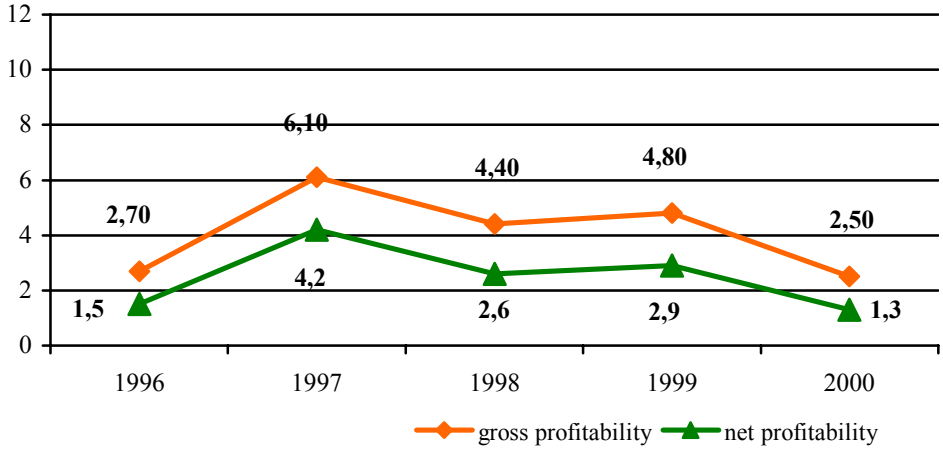


Source: Polish Statistical Office (2002), www.stat.gov.pl

Between 1996 and 2000 a net profitability of the electronic industry has widely oscillated between 1.3% and 4.2%, mostly in line with the business cycle. Due to economic slowdown in 2000, the profitability reached only 1.3% - the lowest level in the period. It is safe to assume that given further deterioration in the pace of GDP growth (2000-4.0%, 2001-1.2%, 2002-1.3), the net profitability has decreased even further (Graph C4).

[18] The definition of ICT according to the OCDE applies to only certain electronic equipment. Hence, the OECD data is not directly comparable.

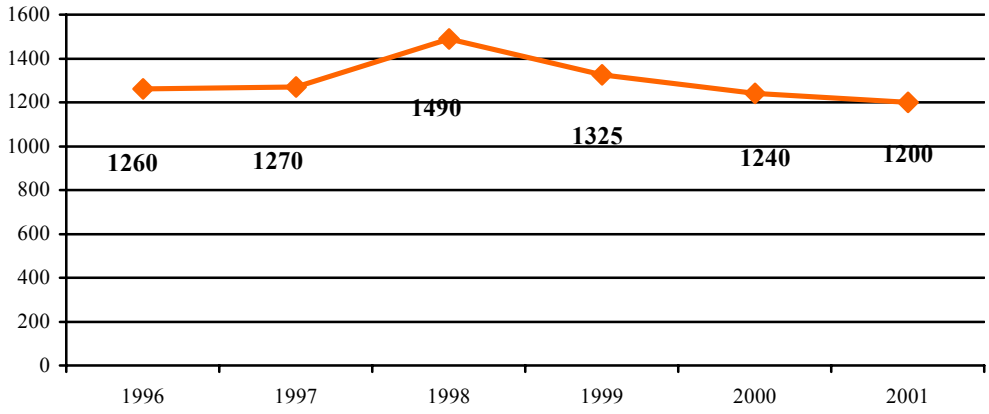
Graph C4. Gross and net profitability of electronic industry in Poland, 1996-2000 (in %)



Source: Polish Statistical Office (2002)

Anecdotal market evidence suggests that electronic industry has been recently under an enormous financial pressure due to a slowdown in market demand driven by lower GDP growth rates. The value of the computer and office equipment market in Poland in 2001 went down to USD 1 200 million from USD 1 490 million in 1998 (Graph C5).

Graph C5. Computer and office equipment market in Poland in 1996-2001 (in USD million)



Source: Institute of the Electronic Markets, www.ire.com.pl

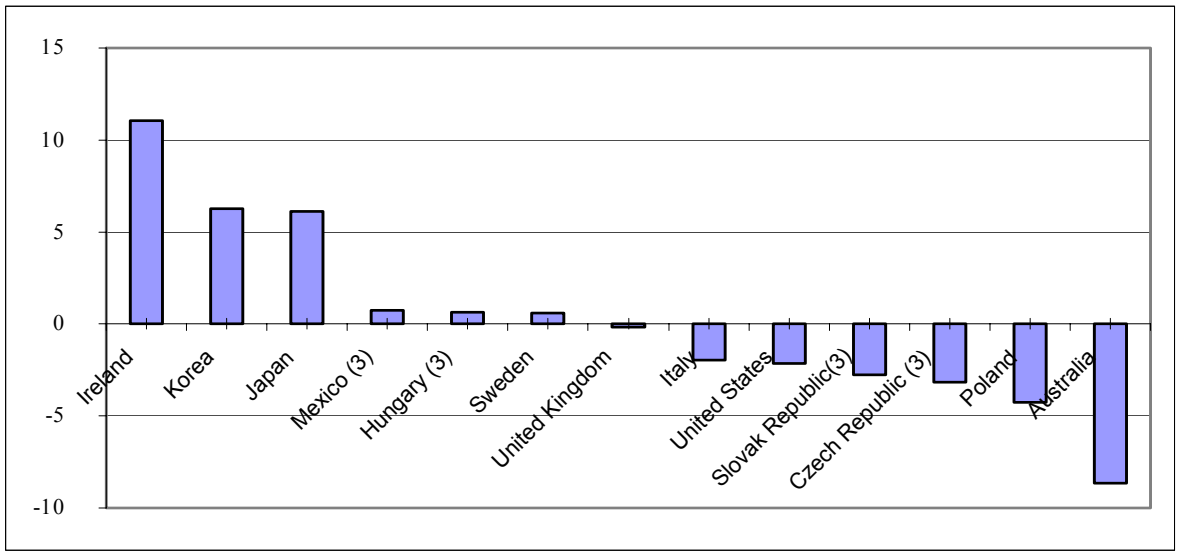
In 2001 the value of exports of Polish electronic industry amounted to some USD 1.5 billion.[19] There are some 250 foreign companies in the electronic production sector, which represent approx. 15% of all companies in the sector.

[19] All data from Gadomski (2003).

C.2.2. Trade balance of the ICT sector

Poland has always been a net importer of ICT products, even before 1989. In 2001 Poland ran a deficit of some 4% of the total value of the ICT trade (Graph C6).

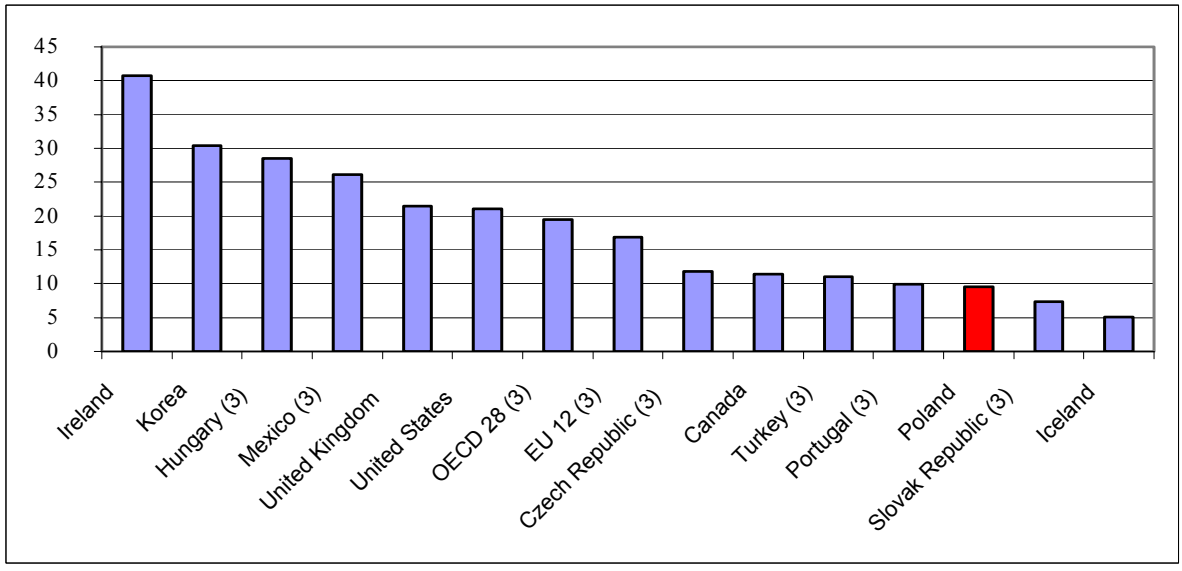
Graph C6. ICT sector trade balance, 2001 (in percent)



Source: OECD, International Trade in Commodity Statistics (ITCS) and Structural Analysis (STAN) databases, August 2002. Taken from: OECD (2002)

The deficit in the ICT trade is mostly due to a low value of ICT exports, which is evidenced by a low share of ICT manufacturing trade in the total manufacturing trade. In 2001 the shares amounted to only 10% of the total, below 12% for the Czech Republic and 29% for Hungary (Graph C7).

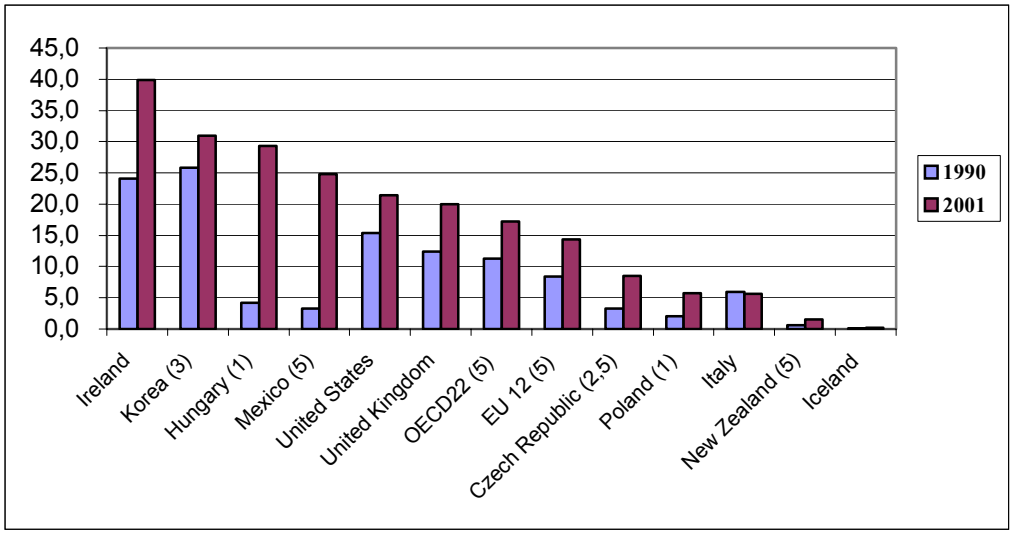
Graph C7. ICT manufacturing trade as a share in total manufacturing trade*, 2001 or latest year available



*Average of imports and exports; (3) 2000 data
Source: OECD, International Trade in Commodity Statistics (ITCS) and Structural Analysis (STAN) databases, August 2002.

Although the share of ICT exports in total exports has been recently growing from 2.1% in 1992 to 5.8% in 2001, Poland still lags behind most OECD countries, including Czech Republic and Hungary (Graph C8).

Graph C8. Share of ICT sector exports in total merchandise exports, 1990-2000 (in %)



1. 1992 data; 2. 1993 data; 3. 1994 data; 4. 1995; 5. 2000 data

Source: OECD, International Trade in Commodity Statistics (ITCS) and Structural Analysis (STAN) databases, August 2002.

Structure of ICT exports shows strong bias toward radio, TV and communication equipment, which represented 71% of total ICT exports in 2000. In comparison to the Slovak and Czech Republic, the share of office computing and machinery in total ICT exports in Poland is very low at 6% of the total compared to 23% and 21% for the other two countries, respectively (Table C8).

Table C8. The composition of ICT sector exports in selected countries, 2000

	ISIC 32 - Radio, TV & communication equipment	ISIC 30 - Office & computing machinery	ISIC 313 - Insulated wire and cable	ISIC 3312+3313 - ICT scientific instruments
Poland	**71**	**6**	**18**	**5**
Turkey	66	4	27	3
Czech Republic	58	21	14	7
Slovak Republic	56	23	12	9
Hungary	44	47	6	2

Source: OECD, International Trade in Commodity Statistics (ITCS) and Structural Analysis (STAN) databases, August 2002.

Poland is clearly not a large exporter of IT hardware, which however does not necessarily need to be assessed as negative for IST development. A large body of literature asserts that the use of ICT rather than production is the key to reaping the benefits of the IS. As for software exports, according to a report on "Polish Informatics in the EU" published by the "III Congress of Polish Informatics"[20], in 2002 the value of the Polish software exports

[20] Available at http://www.kongres.org.pl/3KIP_raport.pdf

amounted to some PLN 400 million or EUR 86 million. Ten largest software exporters represented some 54.5% of total software exports (Table C9).

Table C9. Ten largest software exporters in Poland in 2002

Company	Revenue in PLN thousand	In EUR thousand	Share in total software exports
Intel Technology Poland	50 456	10 851	12.6%
NTT System	48 300	10 387	12.1%
IMG IM Polska	27 060	5 819	6.8%
Bull Polska	16 952	3 646	4.2%
Altkom Akademia	15 490	3 331	3.9%
Optimus	15 293	3 289	3.8%
Logotec Engineering Group	12 000	2 581	3.0%
ARAM	11 445	2 461	2.9%
Softsystem	10 954	2 356	2.7%
Young Digital Poland	9 873	2 123	2.5%
Total exports	400 000	86 022	100.0%

Source: Computerworld TOP 200 List (2003), www.computerworld.pl

The anecdotal evidence suggests that the software exports have been recently growing (no specific data available, though). They are also likely to grow in the future on the back of ongoing internationalization of local software companies (see Box C1 for example), which increasingly look to foreign markets, and inter-company exports of software developed in local companies owned by foreign investors (for instance, Philips and Siemens employ almost 50 IT programmers each in their Wroclaw software center. Their products are likely to be exported to other companies within the holding).

Box C1.
Comarch, a local IT company based in Krakow, has just signed - through its captive company Comarch Software AG based in Germany – a contract for sale of IT billing systems to Ukrainian Mobile Communications, a leading mobile telephony operator in Ukraine. The contract is worth some EUR 4.8 million. This is yet another foreign contract signed by Comarch this year. The company estimates that in 2003 the company's exports will amount to some 20% of the total annual revenue of roughly EUR 40 million.
From: www.comarch.pl

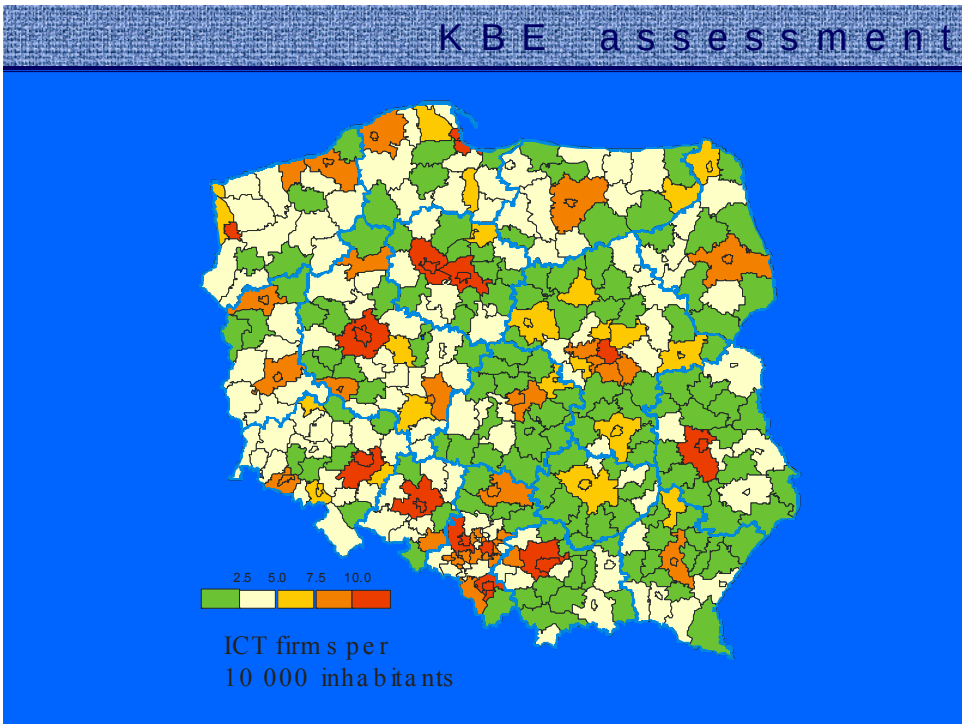
C.2.3. Regional distribution of ICT sector

ICT sector is concentrated in and around large cities in Poland (Warsaw with the majority of ICT companies, Poznan, Rzeszow) and along the so-called "highway cluster" between Krakow, Katowice and Wroclaw and adjacent areas (Bielsko-Biala, Nowy Sacz), cities in southern Poland linked with A4 motorway.[21] Such distribution echoes the large disparities, presented elsewhere, in penetration of IST in Poland (Graph C9). The eastern and central southern parts of Poland substantially lag behind the other parts of the country. This pattern seems to be closely correlated with disparities in access to education (see section G), low

[21] Comarch and Veracomp based in Krakow, Techmex based in Bielsko-Biala, Optimus based in Nowy Sacz, Pronox Technology from Katowice, Action Wroclaw, Winuel from Wroclaw and others. For a complete list, please refer to Computerworld TOP 200 List (2003), www.computerworld.pl

quality of infrastructure (communications and roads) and low GDP per capita in the specified regions, which limits demand for ICT products and services.

Graph C9. ICT firms per 10,000 inhabitants (NUTS 4) as of 2002



Source: Guzik (2003)

C.2.4. Size of the ICT market

Poland is by far the largest IT and ICT market in CEE countries (Table C10). This fact mostly reflects Poland's size: Poland's GDP of roughly EUR 175 billion as of the end of 2003 represents some 35%-40% of the total GDP of all CEE countries.

Table C10. IT spending in CEE countries in 2001, in EUR million

	IT spending	Share in total spending in %	IT/GDP in %	Per capita IT spending in EUR
Bulgaria	244	2.8	1.0	29
Czech Republic	1 894	21.9	3.8	183
Estonia	182	2.1	3.7	122
Hungary	1 441	16.7	3.0	141
Latvia	166	1.9	2.8	69
Lithuania	182	2.1	1.8	50
Poland	**3 188**	**36.9**	**2.1**	**83**
Romania	423	4.9	1.3	19
Slovakia	536	6.2	2.9	100
Slovenia	377	4.4	2.0	190
Total CEE	8 632	100.0	2.3	83
Total Western Europe	324 439	100.0	3.8	835

Source: EITO (2002)

Similarly to GDP, the total ICT expenditure in Poland of EUR 12 billion in 2001 accounted for almost 40% of total ICT spending in the CEE region (Table C11). For other data on ICT spending, please refer to Chapter D.

Table C11. ICT spending as a share of total ICT spending in CEE countries in 2001, EUR million

	ICT spending	Share in %
Bulgaria	1 300	4.3
Czech Republic	4 964	16.3
Estonia	644	2.1
Hungary	4 541	14.9
Latvia	679	2.2
Lithuania	806	2.6
Poland	**12 044**	**39.5**
Romania	2 626	8.6
Slovakia	1 640	5.4
Slovenia	1 266	4.1
Total	30 510	100.0

Source: EITO (2002)

C.2.5. Major actors in the ICT market

Out of the fifteen largest IT companies in Poland in 2002, eight were Polish. The revenue of Hewlett Packard Poland, the largest IT company operating locally, amounted to EUR 414 million in 2002 (Table C12).

Table C12. Fifteen largest IT companies in Poland in 2002

	Total revenue (in PLN thousand)		2002/2001 change	Revenue in EUR thousand	Employment	
	2001	2002		2002	2001	2002
HP Polska	1 555 772	1 780 269	14.4%	414 016	393	550
Action	884 496	998 796	12.9%	232 278	189	238
ABC Data	85 831	942 919	998.6%	219 283	137	137
Prokom Software	841 077	891 930	6.0%	207 426	1475	1514
Tech Data Polska	802 200	788 880	-1.7%	183 460	120	112
IBM Polska	717 700	750 000	4.5%	174 419	460	700
Microsoft	550 000	620 000	12.7%	144 186	120	150
Incom Group	506 000	587 300	16.1%	136 581	97	100
LG Electronics Polska	347 170	518 723	49.4%	120 633	63	72
Techmex	565 188	518 518	-8.3%	120 586	166	246
ComputerLand	524 550	502 334	-4.2%	116 822	1035	1146
AB	461 497	485 528	5.2%	112 913	214	160
NTT System	291 565	345 000	18.3%	80 233		170
JTT Computer	403 178	432 874	7.4%	100 668	254	179
Intel Poland	282 555	324 938	15.0%	75 567		

Source: Computerworld TOP 200 List (2003), www.computerworld.pl

C.2.5.1. ICT manufacturing - computers:

In 2002 almost 1,1 million PCs were sold in the Polish market (11% increase over 2001). Domestic producers increased their market share to more than 80% from 75.5% in 2001.[22] The local PC market is very fragmented. Five largest computer manufacturers – NTT System, HP, Optimus, Dell Computer and Action – controlled only some 27.2% of the market after three quarters of 2003 (Table C12). Small, "garage-like", PC assembly companies control more than 60% of the market. Sales of laptops increase at a very fast rate of 30% annually driven by rapid decrease in prices and growing realization of companies of the benefits of mobile computing. In the 3Q of 2003 alone 35 thousand laptops were sold. Sales of PCs in the 3Q 2003 increased by 8% relative to the same quarter of 2002. According to IDC Poland, the PC market is poised to increase by 15% in 2003 (30% increase for laptops, 11% for servers) (Rzeczpospolita, 1 December, 2003). It can be safely assumed that in 2004 and onwards the growth rate in sales of computers will exceed 10% annually.

Table C13. Sales of computers (PCs, laptops, servers) and market shares after 3Q of 2003

	Sales (in thousand pieces)	**Market share**
NTT System	54.0	7.6%
HP	52.5	7.4%
Optimus	31.4	4.4%
Dell Computer	30.6	4.3%
Action	24.6	3.5%
ITT Computer	23.9	3.4%
Toshiba	20.0	2.8%
IBM	16.6	2.3%
Fujitsu	14.4	2.0%
Vobis	13.7	1.9%
Other	428.3	60.3%
Total	710.0	100.0%

Source: Rzeczpospolita, 1 December, 2003.

Optimus, the third largest PC manufacturer, was founded back in 1987. In early 1990's it started to quickly develop on the back of a huge pent-up market demand for computers. Starting from simple computer assembly from imported components, Optimus quickly traded up, established its brand and engaged in production of higher-end computers. Despite some financial problems in 2001-02, Optimus is likely to resume its growth in the coming years, although undoubtedly the growth rates in production will be nowhere close to those experienced in the beginning of the transition decade.

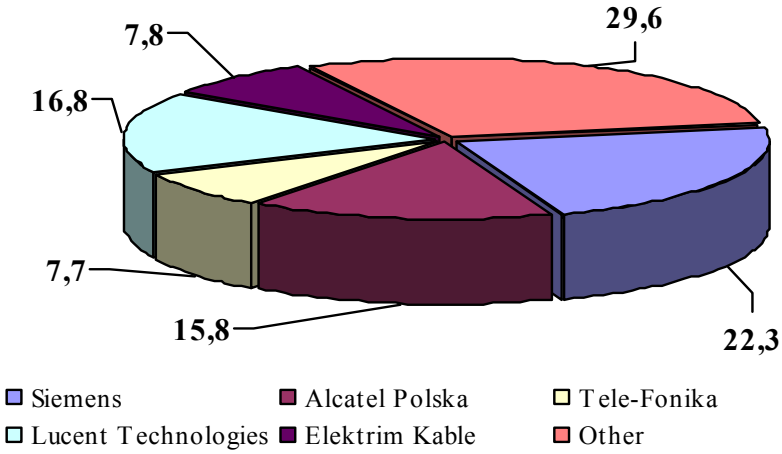
C.2.5.2. Telecommunication equipment:

Global telecommunications equipment manufacturers – Siemens, Alcatel and Lucent – dominate the local market (Graph C10). Yet, most of the equipment sold locally is also produced locally in factories bought by the three companies in mid -1990's from the government in exchange for equipment delivery contracts with the incumbent telecom operator TPSA. This *quid pro quo* worked well. In spite of the expiry of delivery contracts, all three companies continued to expand their local operations. Faced with a slowdown in

[22] "Teleinfo" magazine, 10/2003, March 3, 2003

demand in the local market, they have recently taken measures to increase exports of Poland-made equipment to other countries within the corporate network.

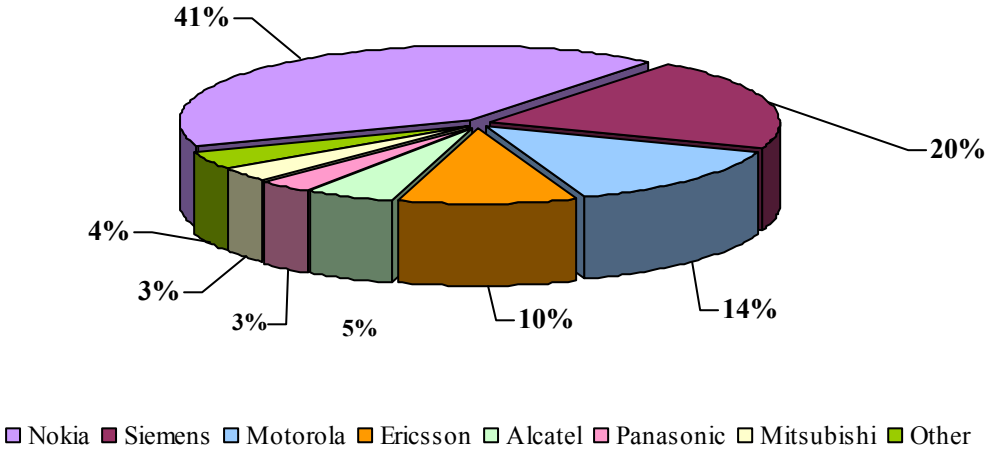
Graph C10. Structure of the telecommunications equipment market in Poland in 2000, (in % of market share)



Source: Teleinfo, www.teleinfo.com.pl

Mobile phones are not manufactured in Poland. All of the mobile equipment is being imported. Nokia has a 41% share in the local market (Graph C11).

Graph C11. Structure of the equipment market for mobile phones in Poland in 2000 (in % of market share)



Source: Institute of the Electronic Markets, www.ire.com.pl

C.2.5.3. Software market

According to WITSA (2002), software spending in Poland between 1993 and 2001 increased from USD 87 million in 1993 to 511 USD million in 2001. As concerns sale of own software, Microsoft, Oracle Polska and ComputerLand were the largest software companies in Poland in 2002 (Table C14). While data on the total value of the software market in Poland in 2002 is not available, based on WITSA data it can be assumed that the value of the whole market in 2002 amounted to some EUR 500 million, of which sale of own, pre-packaged software represented some EUR 400 million (the other EUR 100 million was sale of custom-made

software) Based on this assumption, Microsoft had by far the largest share of the market, with 33.3% of the overall value.

Table C14. Ten largest companies selling their own software, 2002

	Revenue in PLN thousand	In EUR thousand	market share
Microsoft	620 000	133 333	33.3%
Oracle Polska	229 500	49 355	12.3%
ComputerLand	111 477	23 974	6.0%
IBM Polska	90 000	19 355	4.8%
Prokom Software	69 090	14 858	3.7%
SAP Polska	58 000	12 473	3.1%
Novell Polska	52 000	11 183	2.8%
SAS Institute	30 664	6 594	1.6%
Wasko	29 771	6 402	1.6%
Softlab trade	27 710	5 959	1.5%
Total market	1 860 000	400 000	100.0%

Source: Computerworld TOP 200 List (2003), www.computerworld.pl

Quite interestingly, Polish companies dominate the market for custom-made software. ComputerLand, Prokom Software, PKP Informatyka, Sofbank, Bazy i Systemy Bankowe and Winuel represent almost 50% of the total market (Table C15).

Table C15. Ten largest companies selling custom-made software, 2002

	Revenue in PLN thousand	In EUR thousand	Market share
ComputerLand	71 000	15 269	15.3%
Prokom Software	69 090	14 858	14.9%
Altkom Akademia	31 328	6 737	6.7%
PKP Informatyka	30 465	6 552	6.6%
Intel Technology Poland	22 957	4 937	4.9%
DRQ	19 346	4 160	4.2%
Softbank	18 513	3 981	4.0%
Bazy i Systemy Bankowe	13 549	2 914	2.9%
Bull Polska	13 432	2 889	2.9%
Winuel	12 730	2 738	2.7%
Total market	465 000	100 000	100.0%

Source: Computerworld TOP 200 List (2003), www.computerworld.pl

C.2.5.4. Software piracy

The software piracy remains a significant issue, in spite of a substantial progress in fighting it. According to International Intellectual Property Alliance (IIPA), 50% of all business software applications in 2002 were pirated. Still, there has been a substantial improvement since 1998 when the share of pirated software amounted to 61% (there were even cases of the use of

pirated software in public administration!).[23] Large scale anti-piracy campaigns led by Business Software Alliance, a NGO representing producers of software, and better legal enforcement contributed to a gradual decrease in piracy. As of 2003, most of the pirated software is used in households and small enterprises. Most medium and large size companies have by now replaced pirated software with the official versions.

C.3. Conclusions and implications

In the 1990's the structure of Poland's economy has been quickly converging with the structure of economies in the developed countries, where services rather than manufacturing play a leading role. Within manufacturing alone, in the last decade the importance of traditional, smokestack industries of steel, coal, and shipyards was decreasing in favor or higher-value and more competitive manufacturing of machinery and equipment, including ICT.

During the transition, Poland also witnessed a very rapid increase in ICT penetration on the back of massive ICT investments driven by rapidly falling prices of ICT and formidable pent-up demand for ICT products and services, which were not freely available before 1989.

Due to the small size of the local ICT-producing sector, the predominant part of the growing market demand has been met by ICT imports. Nonetheless, the ICT-producing sector has grown quite substantially in the last decade, although its share in GDP is still not significant. Polish ICT production could most likely have been larger had it not been for the unavailability of financing, particularly in the form of seed-capital for start-up ICT firms. Venture capital funds in Poland have proved to be very reticent in funding ICT production, citing high technological risks, unstable markets, and lack of market experience.

Poland experiences large disparities in regional distribution of ICT production. It seems to be due to poor access to education and infrastructure in the eastern and southern parts of Poland and ensuing lack of sufficient regional demand for ICT products and services. In the 1990's a number of ICT clusters have developed, largely in and around large cities (Warsaw, Poznan) and in the "motorway corridor" between Krakow, Katowice and Wroclaw.

Poland's ICT market is by far the largest in the CEE region since it represents 40% of the total regional ICT spending. Although recent economic slowdown has contributed to slower growth rates in ICT expenditure, the growth rates are still positive, which evidences the unsaturated market demand for ICT products. This phenomenon bodes well for the further development of IS in Poland.

[23] Full report available at http://www.iipa.com/rbc/2003/2003SPEC301POLAND.pdf

Strengths	Weaknesses
1. 1. Positive changes in the product structure of manufacturing **2.** 2. Large investments in ICT infrastructure **3.** 3. Fast growth of the ICT sector	**1.** 1. Large negative imbalance in trade in ICT products **2.** Large regional disparities in distribution of ICT production **3.** Legacy of old, non-competitive and ailing "old economy" sectors of the economy. **4.** Insufficient venture capital financing for ICT start-up companies
Opportunities	**Threats**
1. 1. Accelerating economic growth will increase demand for ICT products **2.** 2. Opening of the EU market upon accession will create new opportunities for exports **3.** 3. Production of IT applications for global market niches	**1.** 1. Increased competition from the EU countries **2.** 2. Growing regional disparities in ICT production may lead to further technological retardation of specific regions of the country **3.** 3. Continued poor access to start-up financing

Strengths

Since 1990's the structure of the economy has been shifting towards more technologically advanced sectors and away from heavy industries (steel, mining, chemicals). The fast growth of the ICT sector, producing both hardware and software, exemplifies this positive trend. Expansion of the ICT sector has been driven by substantial pent-up demand for ICT infrastructure (its poor state being a legacy of technological backwardness and low investments under socialism before 1989).

Weaknesses

Poland has always been a net importer of ICT products. This situation is not likely to change in the near future. Negative trade balance does not have to be viewed negatively: imports allow for modernization and technological catching-up of the local industry through use of technologically advanced equipment. What is however more disturbing is the low value of ICT exports, which may evidence the relative low competitiveness of the local economy. Sizeable disparities in distribution of ICT production, although in itself can be considered quite natural (ICT clusters), are epitomizing technological backwards in both production and use of ICT in eastern and central regions of Poland. Unresolved problems of restructuring of the loss-making sectors of the economy (steel, mining) result in a shift of resources and attention away from technologically advanced sectors. Finally, insufficient availability of venture capital financing significantly limits growth of the local start-up ICT sector.

Opportunities
Clearly, projected faster economic growth will increase demand for ICT products. Complete opening of the EU market for industrial products upon accession will create new opportunities for exports of ICT and other competitive industries. This is particularly so for IT applications in the niche markets. A number of IT experts point to the fact that while Polish ICT producers do not have any chances for conquering the global markets with mass ICT production, there are however opportunities for successful marketing of specialized ICT applications. There is a number of case studies of Polish ICT companies successfully selling their software in the overseas market.

Threats
Accession to the EU and elimination of all trade and price barriers will increase the competitive pressure on the local economy. As a result, some less competitive sectors of the economy, including ICT, may suffer. Increasing regional disparities in ICT production may lead to further technological retardation of the lagging regions. Lack of venture capital financing for ICT start-up companies may compromise opportunities for grass-root development of the local ICT industry.

D. PRESENCE OF MOST RELEVANT ECONOMIC ACTIVITIES FOR IST APPLICATIONS

D.1. Most relevant potential spill-over effects of IST

According to preliminary results by van Ark (2003), labour productivity growth in Poland's ICT-using industries between 1992 and 2001 was much higher than in sectors not using ICT (Table D1, for definition of ICT-using industries and services, refer to Box D1.[24])

Table D1. Labour productivity growth and employment in ICT-producing, ICT-using, and non-ICT industries in Poland and selected countries in the CEE region, 1992-2001 (in %)

	Labour Productivity (GDP per person employed)				Total Persons Employed			
	Czech 1990-2001	Hungary 1992-2000	Poland 1992-2001	Slovak 1993-2001	Czech 1990-2001	Hungary 1992-2000	Poland 1992-2001	Slovak 1993-2001
Total Economy	2.1	3.2	4.2	2.1	-0.7	-0.7	0.2	-0.1
ICT Producing Industries	19.8	12.3	10.8	8.9	0.0	2.9	-0.2	0.8
ICT Producing Manufacturing[1]	23.5	22.4	20.4	8.8	0.1	4.9	-1.5	0.5
ICT Producing Services	10.9	8.1	4.3	8.8	-0.1	1.3	0.9	0.9
ICT Using Industries	2.6	0.8	4.9	2.0	0.3	0.8	1.2	1.4
ICT Using Manufacturing	5.1	6.9	11.9	2.3	-1.8	0.3	-2.2	-0.5
ICT Using Services	1.2	-1.0	2.5	0.9	1.7	1.0	2.6	2.8
Non-ICT Industries	1.0	3.0	3.3	1.7	-1.1	-1.4	-0.1	-0.6
Non-ICT Manufacturing	2.7	5.7	8.2	1.8	-1.7	-3.2	-1.5	-0.3
Non-ICT Services	0.4	1.8	1.4	3.2	2.0	0.4	1.2	1.0
Non-ICT Other	2.0	3.5	1.7	-1.7	-5.3	-3.7	-0.5	-4.0
Pro memoria								
Total Economy (national data)	2.0	3.4	4.1	1.9				

Source: van Ark (2003)

Higher growth rates in ICT-using sectors are very likely to mean that ICT investments bring higher-than-normal returns on investment (the so-called spillover effects) and allow companies to substantially increase their productivity (although, again, the purported correlation between ICT investment and productivity does not prove a causal relationship between the two– it may be that either ICT drives productivity or that highly productive sectors invest in ICT).

[24] For exact definition of industries, please refer to van Ark and McGuckin (2002), available at http://www.conference-board.org/pdf_free/workingPapers/EPWP0201.pdf, p. 6. For the lack of detailed data on ICT investment on industry level, for the CEE countries van Ark (2003) assumed that composition of sectors in terms of their use of ICT is the same as in the US.

Box D1. Definitions of ICT-using industries and services

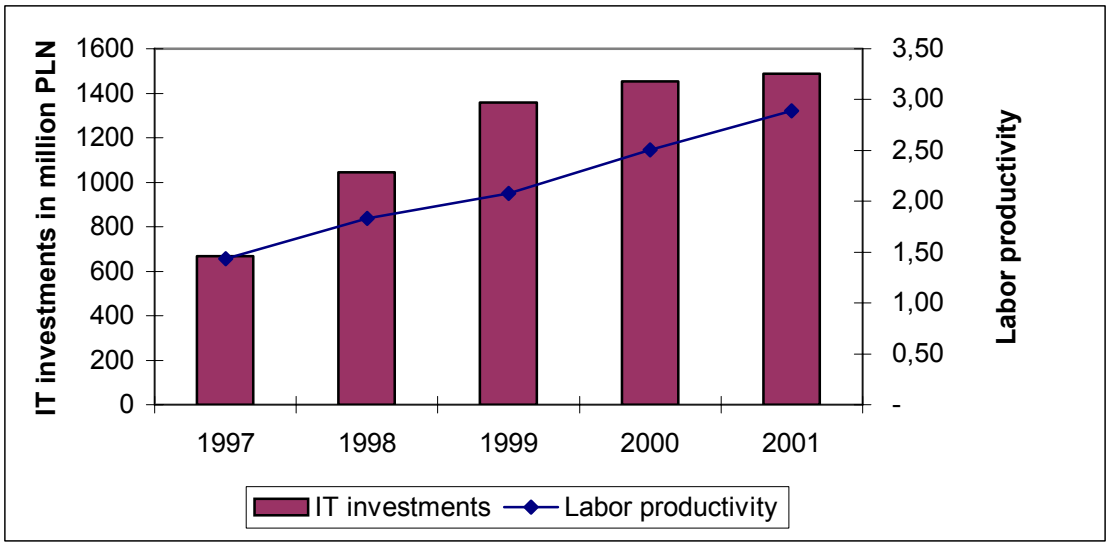
ICT-using manufacturing		ICT-using services	
	ISIC Rev. 3		ISIC Rev. 3
Clothing	18	Wholesale trade and commission trade, except of motor vehicles and motorcycles	51
Printing & publishing	22	Retail trade, except of motor vehicles and motorcycles; repair of personal and household goods	52
Mechanical engineering	29	Financial intermediation, except insurance and pension funding	65
Electrical machinery and apparatus	31 (excl. 313)	Insurance and pension funding, except compulsory social security	66
Precision and optical instruments	33 (excl. 331)	Activities auxiliary to financial intermediation	67
Building and repairing of ships and boats	*351*	Real estate activities	70
Aircraft and spacecraft	*353*	Renting of machinery and equipment	71
Railroad equipment and transport equipment nec	*352+359*	Research and development	73
Furniture, miscellaneous manufacturing; recycling	36-37	*Legal, technical and advertising*	*741-3*

Source: van Ark and McGuckin (2002)

Since there is no data on ICT and non-ICT investment at an industry-level, it is not possible to measure direct contribution to productivity growth in each industry. Hence, it is not possible to prove causality between ICT investment and productivity. Nonetheless, based on the data on ICT investment in the Polish banking industry, which is one of the most intensive user sectors of ICT, there exists a strong correlation between investments in IT and labour productivity (Graph D1)[25]. Between 1997 and 2001 the labour productivity more than doubled. Without a doubt, ICT investments have played a large part in the productivity increase as automatization of back-office processes and better overall management contributed to a decrease in employment.

[25] Correlation coefficient – 0.92: at a significance level 0.05 the observations are correlated, but at a significance level of 0.01 it can not be ruled out that they are not. As a note of caution, an existence of correlation does not explain the direction of causality. It may either be that IT investments increase efficiency or that efficient banks invest in IT. Most likely both processes are at play at the same time.

Graph D1: IT investments and labour productivity in the Polish banking sector 1997-2001



Note: Labour productivity measured as assets in PLN million per employee.
Source: author's calculations based on DiS (2002) for IT investments and NBP (2002) for other data.

There is no data on ICT investments for other sectors, which intensively use ICT (financial sector, wholesale and retail trade, transport, mass media). However, according to one of the recent studies on the transport industry in Poland (Brdulak 2002), the market share of transport companies in Poland using sophisticated software increased from 45 per cent in 2000 to 60 per cent in 2001, thus evidencing benefits and potential spillover effects of IT use.

There is no data on spillover effects of ICT production. However, given that the estimated contribution of ICT industry to GDP in Poland hovers around only 1%-2%, any spill-over effects stemming from the ICT production in Poland are not likely to be significant.

D.2. Level of IT investment

Aggregate investments
There is no official data on ICT investment in Poland from Central Statistical Office. International Data Corporation (IDC), a private research company, however provides data on ICT spending in 51 countries in the period 1993-2001, including Poland. The results are published in WITSA (2002). ICT spending as a share of GDP in Poland and seven other transition countries based on WITSA (2002) between 1993 and 2001 is displayed in Table D2.

Table D2. ICT spending in eight transition countries 1993-2001, as % of GDP

Country	1993	1994	1995	1996	1997	1998	1999	2000	2001	Avg.
Bulgaria	2.2	2.9	2.3	2.7	3.0	3.1	3.6	4.1	4.2	3.1
Czech Republic	5.5	5.3	5.9	5.8	6.4	6.6	7.8	9.1	8.7	6.8
Hungary	4.2	4.3	3.9	4.2	4.5	7.5	8.2	8.9	10.0	6.2
Poland	**2.1**	**2.1**	**2.2**	**2.3**	**2.6**	**4.6**	**5.4**	**6.1**	**5.9**	**3.7**
Romania	1.1	1.1	0.9	1.0	1.3	1.4	2.1	2.3	2.4	1.5
Russia	4.0	3.2	1.8	1.7	2.0	2.7	4.1	3.5	3.2	2.9
Slovak Republic	4.2	4.2	4.0	4.0	3.9	5.5	6.8	8.1	8.8	5.5
Slovenia	3.0	3.0	2.9	3.1	3.4	3.7	4.4	5.3	4.7	3.7
Average*	4,4	4,4	4,5	4,7	5,0	5,6	6,2	6,8	7,3	5,4

Source: WITSA (2002)

WITSA (2002) also provides a detailed breakdown of ICT spending in the same period (Table D3). Within IT spending, hardware represents the largest share, followed by IT services and internal ICT spending. Telecommunications spending in 2002 represented 61,6% of the total ICT market. According to Teleinfo 500 (2003), in 2002 hardware represented 47,5% of the total IT market, while services and software accounted for the remaining 31,7% and 20,8%, respectively.

Table D3: ICT spending in Poland 1993-2001, in USD million

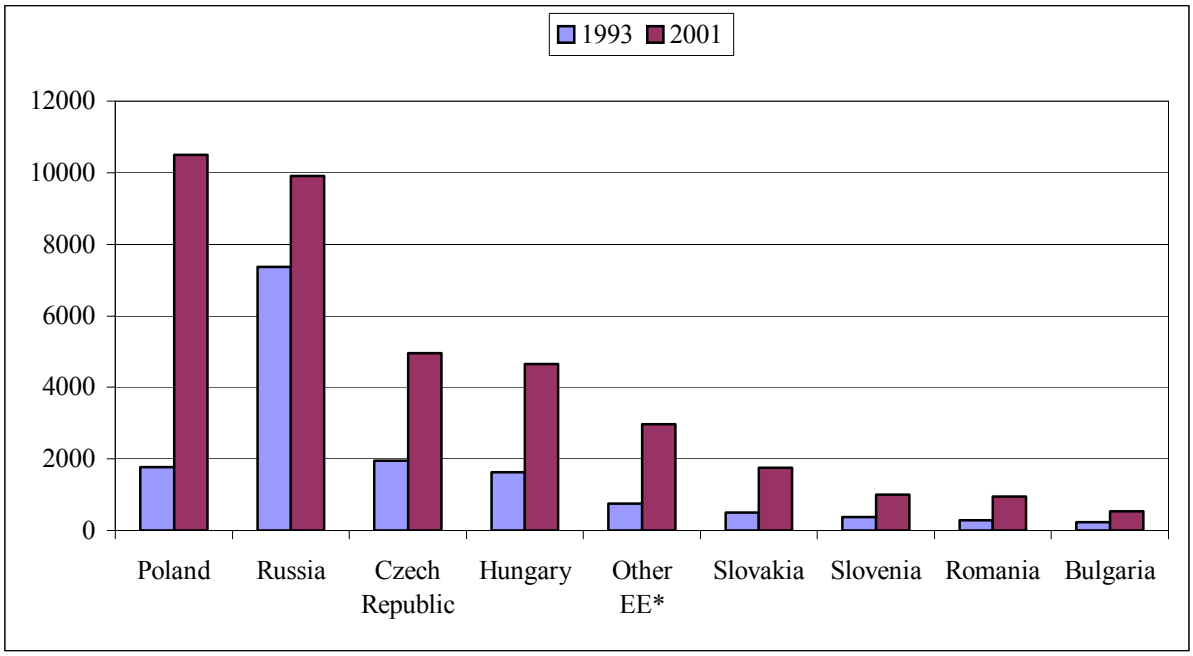
	1993	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**In total in 2001**
IT Hardware	545	643	822	984	1 127	1 339	1 438	1 549	1 661	15.8%
Software	87	106	115	180	229	268	309	447	511	4.9%
IT Services	152	178	213	341	428	486	515	756	877	8.4%
Internal	334	402	458	502	528	702	705	778	867	8.3%
Other Office Equipment	67	52	59	70	77	92	98	106	114	1.1%
Total IT	**1 184**	**1 381**	**1 667**	**2 076**	**2 389**	**2 886**	**3 066**	**3 636**	**4 031**	**38.4%**
Telecommunications	587	667	1 079	1 201	1 317	4 384	5 364	5 935	6 458	61.6%
Total ICT	**1 772**	**2 048**	**2 745**	**3 277**	**3 706**	**7 270**	**8 430**	**9 570**	**10 489**	**100.0%**

Source: WITSA (2002)

ICT spending in Poland as a ratio of GDP has been steadily increasing since 1993 from 2,06% to 5,95% in 2001. Despite the increase, ICT spending in the Czech Republic, Hungary and Slovakia in relative terms in 2001 was higher than in Poland. In the whole WITSA sample of 51 countries, which is biased towards developed countries, Poland's average spending on ICT in the period was almost two percentage points lower than the overall average. Nonetheless, the gap has been on a decrease throughout the period: in 2001 the difference in spending narrowed to 1.3 of a percentage point.

In nominal terms, Poland experienced a six-fold increase in annual ICT spending from USD 1.772 million in 1993 to USD 10.489 million in 2001. This result puts Poland in the forefront of ICT spending among the transition economies (Graph D2).

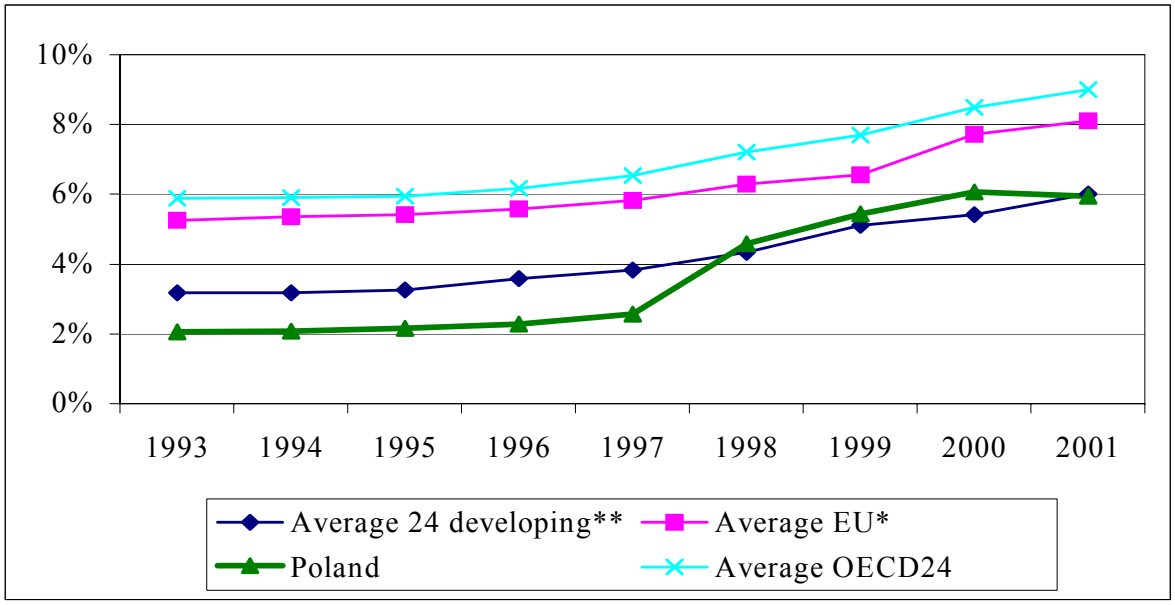
Graph D2. Total ICT spending in transition economies in 1993 and 2001 (USD million)



* Other EE – other Eastern European countries: Albania, Belarus, Bosnia and Herzegovina, Croatia, Estonia, Latvia, Lithuania, Macedonia, Moldova, Ukraine, Serbia and Montenegro.
Source: WITSA (2002)

Trends in ICT spending in Poland should also be displayed against the background of the EU, OECD, and developing countries (Graph D3). Poland recorded a large jump in spending in 1998 on the back of high economic growth (7% in 1997 and 6.8% in 1998).

Graph D3: ICT spending in the EU, OECD, developing countries and Poland (as % of GDP)



* Excludes Luxembourg; ** Argentina, Brazil, Chile, China, Colombia, Egypt, Hong Kong, India, Indonesia, Malaysia, Mexico, Philippines, Saudi Arabia, South Africa, Taiwan, Thailand, Turkey, Venezuela, Vietnam.
Note: non-weighted arithmetic averages.
Source: own calculations based on WITSA (2002)

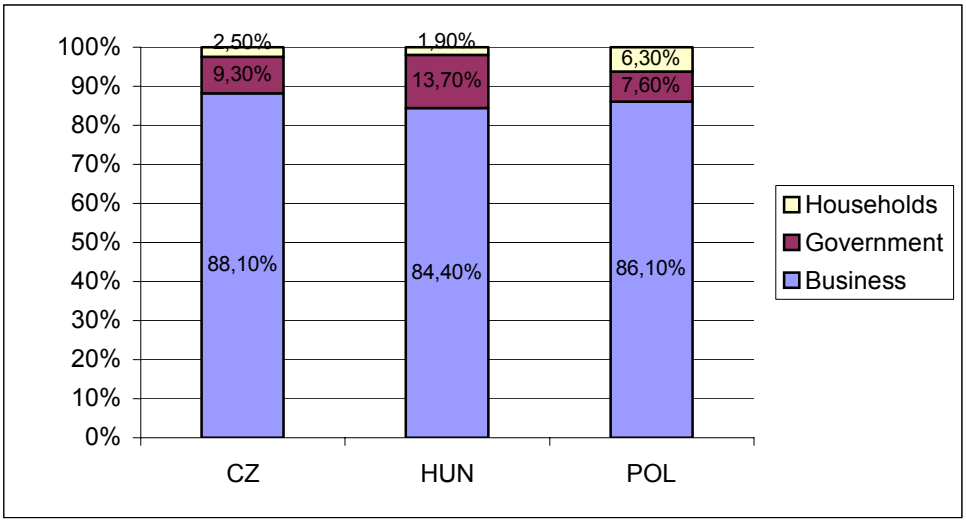
Between 1993 and 2001 Poland's relative position in ICT spending has been improving compared to all groups of countries. In 1998 the share of ICT spending in GDP caught up

with the average ICT spending in the group of 24 middle and lower income developing countries. The possible explanation for this fast catch-up is the substantial pent-up demand for ICT products and services resulting from substantial underinvestment in ICT infrastructure before 1989[26]. This, together with high rates of economic growth in the 1990's, created opportunities for higher-than-normal returns on ICT investment, which induced firms to spend on ICT.

Dataset from WITSA (2002) on ICT spending does not delineate the expenditure shares of enterprises, government and households. Neither does it divide the spending between investment and services. Since spending by households and spending on services should not be regarded as ICT investment, their share in total spending has to be estimated and deducted from the total.

To arrive at ICT investment data for Poland, after Piatkowski (2003) it is assumed that the share of telecommunication investment in total telecommunication spending amounted to 30% in the 1992-2001 period. The share of investment in IT hardware in total IT hardware spending in the 1992-2001 period, based on actual data from IDC for Poland for 2001 (Graph D) was set to amount to 93.8%. Under an assumption - based on estimates of the local IDC office - that the data on software spending does not take into account internally developed, custom made software, what BEA calls 'own account software', the value of software investment in Poland was projected to amount to 120% of the software spending reported by WITSA (2002). The data on 'other office equipment' is aggregated with IT hardware under the assumption that the former fits into the definition of ICT. Graph D4 shows the structure of IT spending in selected EU accession countries and Poland in 2001.

Graph D4. Structure of IT spending in Czech Republic, Hungary and Poland in 2001



Source: IDC (2002), unpublished document.

Based on the above assumption, the real value of investment in ICT in Poland is much lower than ICT spending reported by WITSA (2002) (see Table D2)

[26] For example, Poland's fixed line telephone penetration increased from 12 lines per 100 inhabitants in 1990 to roughly 30 in 2002. Likewise, mobile phone penetration increased from zero in 1990 to approx. 33 as of the end of 2002.

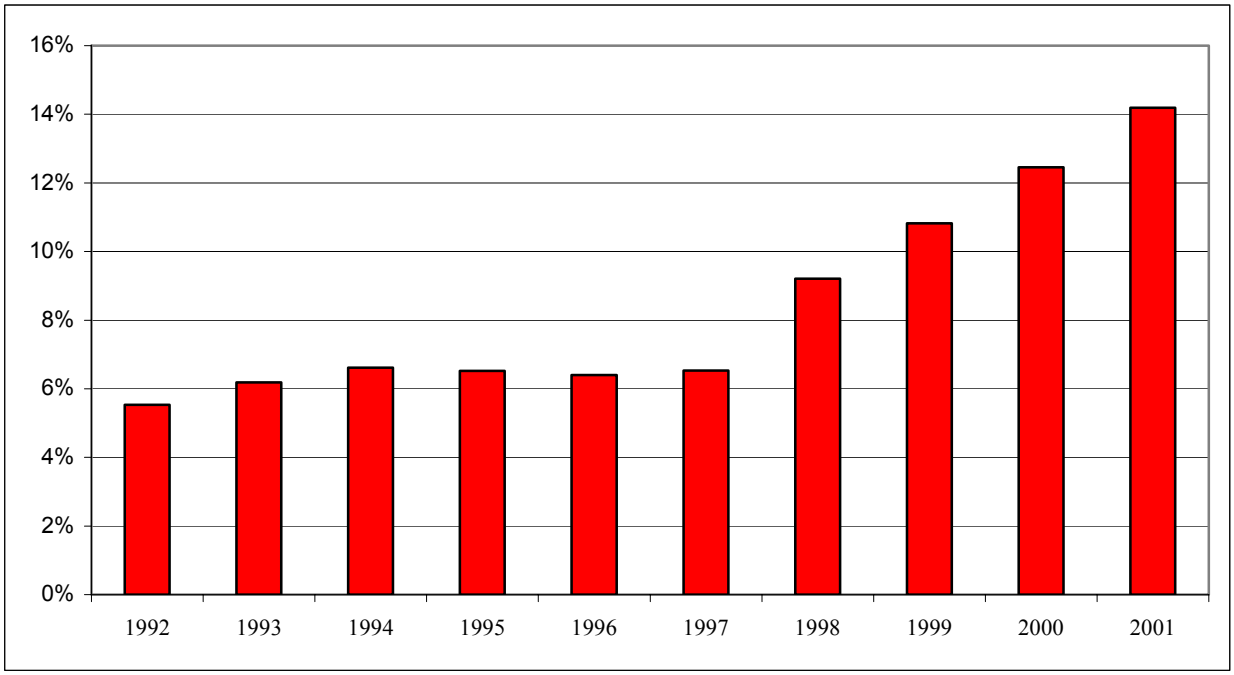
Table D2. Investments in ICT in Poland, 1992-2001 (current prices, USD million)

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
IT hardware	545.0	569.2	646.4	819.3	980.2	1119.7	1330.8	1428.5	1539.2	1650.8
Software	96.0	104.4	127.2	138.0	216.0	274.8	321.6	370.8	536.4	613.2
Telecom. equipment	155.1	176.1	200.1	323.7	360.3	395.1	1315.2	1609.2	1780.5	1937.4
Total ICT	796.1	849.7	973.7	1281.0	1556.5	1789.6	2967.6	3408.5	3856.1	4201.4
Share of ICT in total GFCF (in %)	5.5	6.2	6.6	6.5	6.4	6.5	9.2	10.8	12.4	14.2

Source: own estimates based on WITSA (2000, 2002)

Share of ICT investments in total Gross Fixed Capital Formation (GFCF) between 1992-96 has been quite stable at roughly 5.5% and 6.6%. After 1996, the ICT share has started to quickly increase and reached 12.4% in 2000 and 14.2% in 2001 (Table D2 and Graph D5). In spite of the significant increase, the ICT share in total GFCF in Poland in 2000 was still substantially lower than in the EU and the US, where it amounted to 17.1% and 29.6%, respectively (van Ark *et al*. 2002).

Graph D5. Percentage share of ICT investment in total GFCF in Poland, in current prices, 1992-2001



Source: Piatkowski (2003) based on WITSA (2000, 2002)

According to an alternative source of data from a local research company DiS, the total IT investment in Poland in 2001 and 2002 amounted to USD 3.26 billion and 3,25 billion, respectively. These are comparable results with those obtained from WITSA (DiS however covers only IT rather than ICT). [27] It is worth noting that according to DiS the total value of IT investments in 2002 fell in comparison with 2001. Economic slowdown was the main reason for lower investments as companies were cutting down on costs and investment outlays.

[27] DiS (2003), „Rynek oprogramowania i usług". From: http://www.dis.waw.pl/raporty/rou02/rou02ip.htm

Real investments in ICT (deflated by constant-quality price indices) in Poland between 1995 and 2000 have been growing at an average annual rate of 50.9% (Table D3), which was a much faster rate than in the EU and the US. Investments in communication equipment were particularly robust in comparison to the EU and the US as they were increasing in the period by 65.7% annually. This is likely to be due to substantial pent-up demand for communication services and fast catching up in communication infrastructure from low levels of telephone penetration.

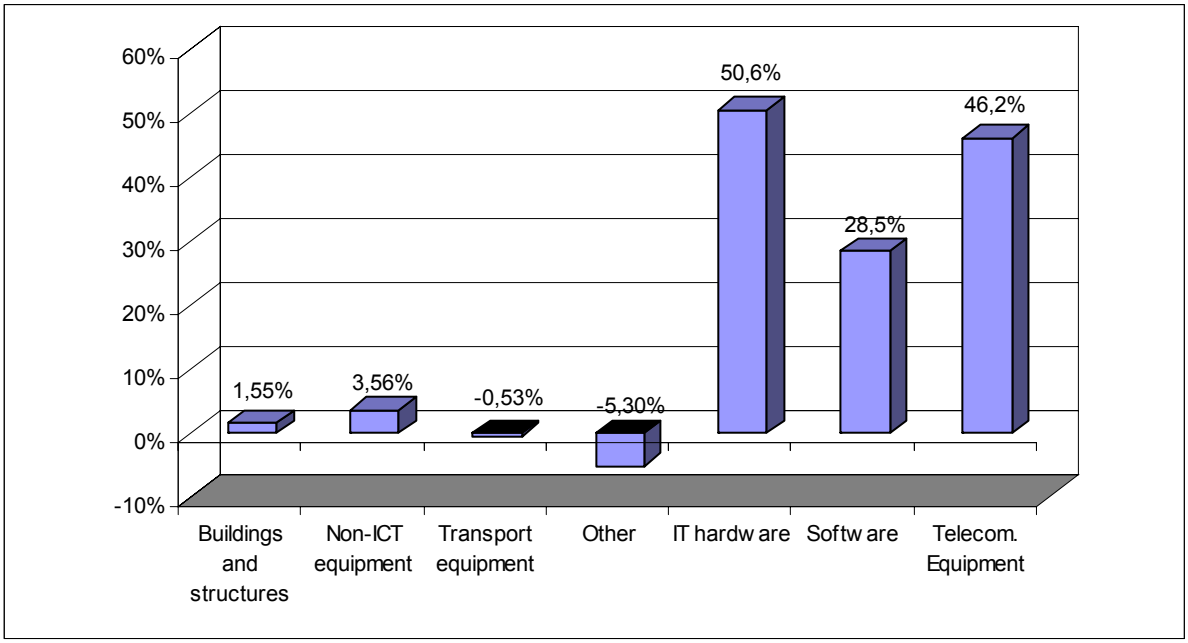
Table D3. Growth rates in real ICT investment in Poland and selected countries, arithmetic average for 1995-2000

	Poland	EU	USA
IT hardware	52.7%	31.6%	27.0%
Software	32.7%	12.3%	16.0%
Communication equipment	65.7%	11.9%	15.7%
Total ICT	50.9%	18.5%	19.3%

Source: Van Ark et al. (2002) for the EU and the US, and Piatkowski (2003) for Poland

Between 1995 and 2000 on the back of large ICT investments the real stock for three types of ICT assets have been quickly growing, particularly in comparison to other, non-ICT capital (Graph D6).

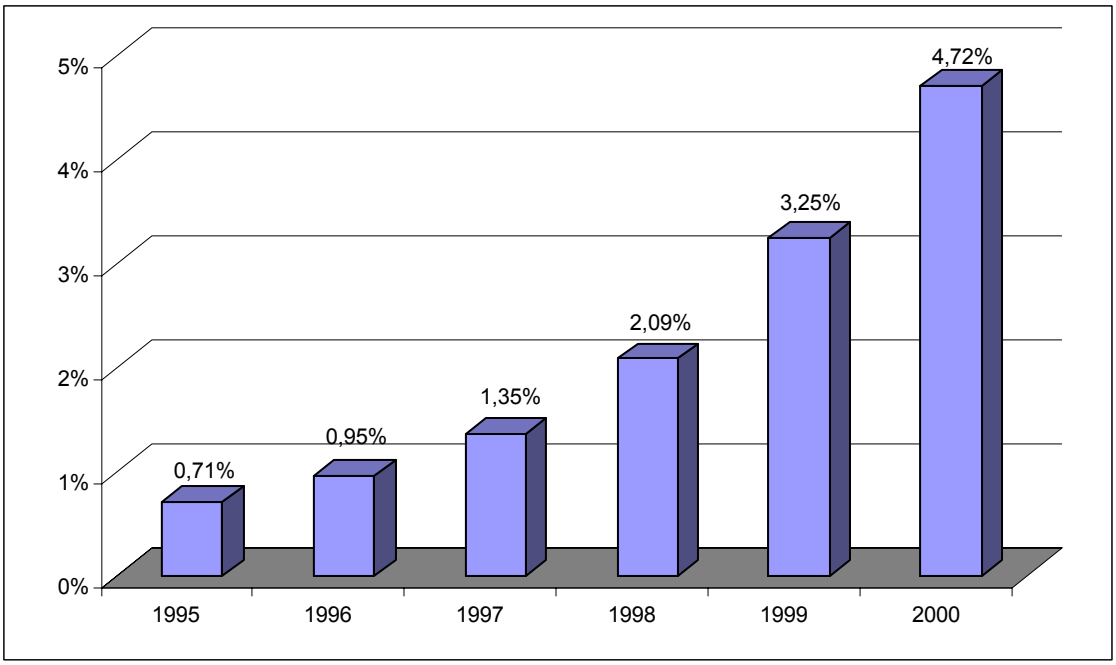
Graph D6. Average annual growth rates in real mid-year ICT and non-ICT capital stock, 1995-2000 (in fixed prices 1995)



Source: Piatkowski (2003)

As a consequence of the rapid growth in real ICT stock, its share in gross total capital stock substantially increased from 0.71% in 1995 to 4.72% in 2000 (Graph D7).

Graph D7. ICT real mid-year capital stock as a percentage of a total gross mid-year capital stock in Poland, 1995-2000 (in fixed prices 1995)

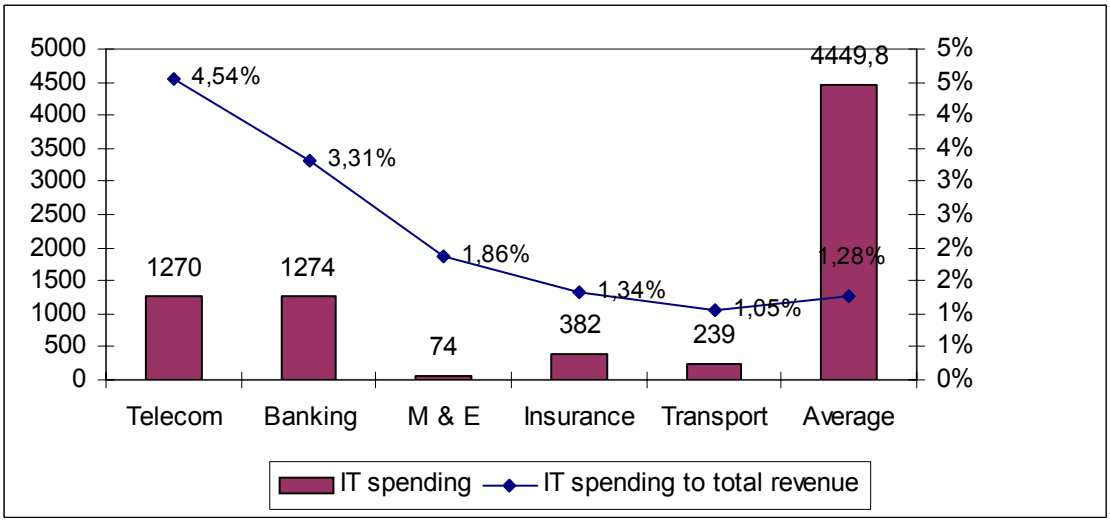


Source: Piatkowski (2003)

ICT investments in the business sector

According to DiS (2003a), IT investments of the 100 largest Polish enterprises (in terms of revenue in 2002) represented one third of the total IT investments in the economy (USD 1.080 million out of the total of roughly USD 3.250 million). Telecom companies spent 4.54% of their revenue on IT, followed by 3.31% in banks, 1.86% in media and entertainment, 1.34% in insurance companies and 1.05% in transport and press distribution. Mining, pharmaceutical and service companies recorded the lowest IT investments as share in total revenue (Graph D8).

Graph D8. IT investments in selected industries in Poland in 2002, in PLN million and % of total revenue



Source: DiS (2003). Note: data refers only to the 100 largest enterprises in Poland. "Average" – total IT investments and average share in total revenue.

Banking sector investments in IT have been steadily growing (see section 1 of this chapter). In 2001 banks invested PLN 1.740 million in ICT and PLN 891 million in system maintenance. It represented a 75% increase over the results for 2000. In 2000 IT investments in banking represented 10.7% of total IT investments. In 2001 the share however significantly increased to 19.7% (DiS 2002).

According to DiS (2002) the telecommunication sector in 2001 spent PLN 1498.6 million, 15.8% of total IT investments in Poland. According to the same source, power sector in Poland invested USD 211 million in 2002 or 6.5% of the total IT market (DiS 2003b). Insurance sector spent some USD 128.27 million on IT in 1998 and USD 188.56 million in 1999.[28] It is estimated that in 2002 the value of IT investments in this sector exceeded USD 200 million.

Public sector employed some 2,5 million people in 2001 (one million in health care and 900 thousand in education) and utilized 600 thousand computers. The pace of investments in IT has slowly increased in the recent years. Currently there are a number of big IT projects, which are to be completed by 2005, partly due to the requirements of the EU accession (like the IACS IT system for direct subsidies to agriculture worth some USD 150 million). It is estimated that the public administration will be spending some EUR 250 million a year going forward (CEPIK system for auto registration, TETRA system for emergency communication, RUM for health care sector patient registration etc.).

D.3. Effects of IT investment

There are no reliable estimates of the impact of ICT investments on the firm and industry-level. However, already mentioned, preliminary results by van Ark (2003) suggest that enterprises and industries, which intensively use IT display higher growth rates. Further anecdotal evidence shows that ICT-intensive industries are more competitive and provide a higher quality and variety of products and services (banking sector, transport, retail trade, telecom sector). Management increasingly views ICT as an indispensable part of a competitive game: who does not invest in IT, can not survive.

As for the aggregate level, Piatkowski (2003) made a first attempt at estimating the contribution of ICT investment to aggregate economic growth and labour productivity in Poland 1995-2000. Piatkowski (2003) found that the average contribution of ICT capital to economic growth in Poland between 1995-2000 amounted to 0.47 percentage points or 8.9% of average output growth of 5.31% in that period (Table D4).

[28] From: http://www.dis.waw.pl/raporty/iwu00/iwu00ip.htm

Table D4. Contributions of ICT capital to real output growth in Poland 1995-2000 (in percentage points and in %)

		In percentage points	In %
ICT capital	**IT hardware**	0.33	6.23
	Software	0.04	0.74
	Telecommunication equipment	0.10	1.94
Total ICT capital		**0.47**	**8.90**
Non-ICT capital		0.66	12.40
Labour (employment)		0.26	4.82
TFP		3.67	69.09
Total output growth		5.31	100.00

Source: Piatkowski (2003)

The above results can be compared with estimates for the contribution of ICT capital to growth in the OECD countries in the same period obtained by van Ark *et al.* (2002), the study largely based on actual data from national statistics, and Daveri (2002), who used the WITSA dataset for ICT spending, the same as in this study (Table D5).

Table D5. Percentage point contribution of ICT capital to real output growth in the EU countries and Poland, 1995-2000

	Van Ark *et al.* 2002	Rank	Daveri 2002*	Rank
USA	0.86	1	1.45	1
Ireland	0.80	2	0.96	3
UK	0.69	3	1.17	2
Netherlands	0.68	4	0.72	6
Denmark	0.61	5	0.65	7
Sweden	0.53	6	0.85	4
Poland	**0.47**	**7**	**0.47**	**8**
Italy	0.41	8	0.35	13
Finland	0.37	9	0.74	5
Germany	0.37	10	0.45	10
Austria	0.36	11	0.43	12
France	0.35	12	0.44	11
Portugal	0.34	13	0.49	8
Spain	0.27	14	0.34	14

* 1996-99 only.

Source: van Ark et al. (2002), Daveri (2002) and Piatkowski (2003) for Poland

Poland ranks almost exactly in the middle of the sampled countries: 7th in van Ark's study and 8th in Daveri's study, *ex aequo* with Portugal. Poland's high position relative to its GDP per capita, which for 2000 hovered around 40% of the EU average, owes much to extraordinary rates of growth in real ICT investment (50% annually between 1995 and 2000) as firms in response to rapidly falling prices of ICT have favored ICT investments over non-ICT capital (computers and enterprise software investments substituted spending on real estate, motor vehicles, and other equipment). The additional incentive for large ICT investments seems to have been the opportunity to reap extraordinary rates of return on investments in ICT due to

substantial pent-up demand for ICT products and services resulting from low level of penetration of IT and telecommunications infrastructure, a legacy of underinvestment and technological retardation under the communist system.

Relative contribution (in per cent) of ICT capital to output growth in Poland between 1995 and 2000 amounted to 8.9%. It compared with the EU and the US average of 17% and 20%, respectively (van Ark *et al*. 2002). The low relative contribution of ICT to GDP in Poland results mostly from high GDP growth in that period, which averaged 5.31% annually.

Labour productivity growth in Poland in the second part of the 1990's amounted to a very high average of 5.07% annually. This fast growth was mostly due to substantial increase in TFP (78% of total growth), which have reflected structural changes in the economy, accelerated microeconomic restructuring, changing composition of labour force, and rising quality of human capital. Capital deepening contributed the remaining 22% of the growth (Table D6).

ICT capital had a larger impact on growth in labour productivity (12.7%) than its contribution to economic growth in the period (8.9%). Contribution of ICT capital was also higher than that of the non-ICT equipment.

Table D6. Sources of labour productivity growth in Poland, 1995-2000

	Labour productivity growth	**Capital deepening**						**TFP**
		Total capital	Total non-ICT	Total ICT	IT hardware	Software	Telecom. equipment	
1995	6.07	0.63	0.35	0.28	0.22	0.02	0.05	5.40
1996	1.11	-1.45	-0.76	0.31	0.24	0.02	0.05	2.54
1997	7.19	0.94	0.43	0.51	0.38	0.06	0.07	6.22
1998	2.68	0.52	-0.22	0.74	0.44	0.06	0.25	2.13
1999	7.00	3.26	2.20	1.06	0.52	0.07	0.47	3.78
2000	6.37	2.88	1.91	0.97	0.46	0.09	0.42	3.56
Average 1995-2000	**5.07**	**1.13**	**0.48**	**0.65**	**0.38**	**0.05**	**0.22**	**3.94**
In % of LP growth		22.29	9.55	12.74	7.42	1.05	4.27	77.71

Source: Piatkowski (2003)

According to van Ark *et al*. (2002) study, ICT capital was responsible for 34% and 28% of labour productivity growth in the USA and the EU in the same period, respectively (LP measured per person hour worked rather than per employed person as in this study). ICT contribution to LP in Poland was substantially smaller owing to much lower ICT income share in total income.

D.4. Trends in innovation and R&D

Innovation and R&D are indispensable ingredients of a competitive economy as well as of a development of the information society. R&D creates new technologies but also allows for adoption of technologies developed abroad (facilitates knowledge spillovers).

Three separate kinds of institutions represent the foundation of R&D in Poland[29]:

a) universities and various establishments of higher education – some 8 thousand various departments, institutes etc, mostly coordinated by the Ministry of Education – 45.8% of the total state annual budget for innovation and R&D (36.8% in 1994)
b) more than 240 industry-specific R&D institutes, with majority of them coordinated by the Ministry of the Economy, Labour and Social Policy – 31.8% share in the total budget for R&D (43.6% in 1994)
c) 82 institutes of the Polish Academy of Sciences (PAN), which mostly focus on basic, fundamental research – 22.4% (19.6% in 1994)

Aside from the above, there is a number of institutions and organizations, which facilitate spread of knowledge between R&D establishments and industry (technology transfer centers – 20 as of 2001, technology incubators – 44 as of 2001, and four industrial parks etc.). Their number and form is constantly changing, yet the current prevailing trend is regional centralization of various R&D capabilities in integrated center of technology transfer.

Development of R&D in Poland is determined by an interaction between:

(i) academic institutions coordinated by the Ministry of Education (category A above), which are not inclined to commercialize their innovation projects due to lack of financial incentives,
(ii) specialized R&D centers coordinated by specific ministries (defence, medicine, food technologies, agriculture) (category B above), and
(iii) business sector.

The above academic and affiliated institutions still dominate R&D in Poland, which given their weak links with business, significantly limits the commercial potential of their activity. The collaboration of the Polish Academy of Science's Institutes, which mostly focus on fundamental research, with business is relatively less important for commercial R&D development, since it mostly focuses on ready-to-use applications.

Poland has been able to retain some part of its R&D capabilities during the transition period. Between 1990 and 2001 employment in R&D institutes declined from 72 thousand to 26 thousand. At the same time, employment in tertiary education increased from 65 thousand to 80 thousand, and employment in various establishments of the Polish Academy of Sciences decreased from 10 thousand to 8 thousand.

Alas, the survival of a few R&D institutions in majority of cases did not result from a deep reform of their activity and increase in quality and effectiveness. In a number of cases, R&D institutions financed by the state have become a source of social welfare (on a minimum level, though) to employed researchers. Most of the R&D establishments have not evolved into

[29] This section is mostly based, including most of the data, on „Biala Ksiega, Czesc II: Gospodarka oparta na wiedzy" (2003), Forum Strategii Lizbonskiej. From: www.strategializbonska.pl

commercially oriented institutions. In 2002 only 14% of total research results of all research institutions were applicable commercially. Some of these dormant R&D institutions have been in decay for a long time and some of them are now being liquidated. The verification process is however very slow.

In terms of regional distribution of R&D capabilities, about a half of all research institutions is based in Warsaw. Dolnoslaskie, Malopolskie, Slaskie, Lodzkie and Wielkopolskie voivodships come next. Eastern and central Poland (Podlaskie, Swietokrzyskie, Warminsko-Mazurskie) has the lowest density of R&D potential.

Nonetheless, some progress has been made. Growing competition in access to public funds (grants from the State Committee for Scientific Research, for instance) has led to an improvement in quality and scope of research projects. Polish R&D institutes have increasingly taken part in EU and global research cooperation, which resulted in „learning-by-doing" spread of knowledge, management skills and research capabilities. Although still low by international standards, the share of commercially viable R&D has been slowly increasing in total outlays on R&D. Finally, as said above, there is a growing number of various institutions intermediating in transfer of innovation between science and business.

In 2002 total spending on R&D amounted to some 0.66% of GDP. The share of state financed R&D expenditure amounted to only 0.43% of GDP, that is some PLN 3.3 billion (approx. EUR 760 million). Due to cuts in the state budget, in 2002 the share declined to 0.36% of GDP, that is some PLN 2,6 billion (EUR 600 million). In 2003 the share further declined to 0.35% of GDP. Owing to poor state of public finances, additionally challenged by the costs of the EU accession (central budget will need to pay some EUR 2.5 billion annually as a EU membership fee, on top on all other existing expenditure). Most of the EU money will however not come back to the central budget, but will be distributed at a level of local government, enterprises and farmers), one should not expect any increase in state R&D funding in the next three years 2004-06 beyond that driven by the growth of GDP. With growing GDP (3.5% in 2003, 5% in 2004 and onwards), sustaining the 0.35% ratio to GDP would translate into proportionally larger spending on R&D. Fast GDP growth, next to an increase in funding from business and the EU, is key to larger investments in R&D for the next years in Poland.

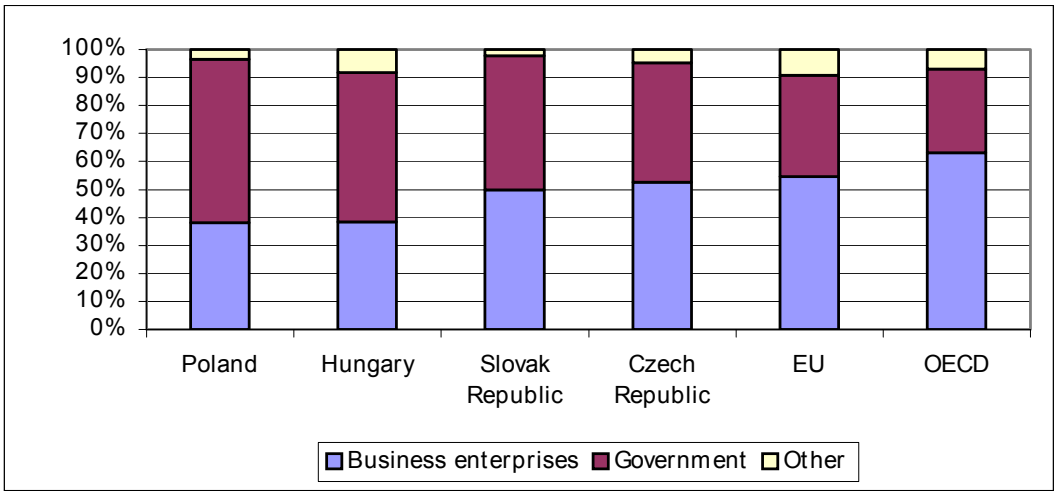
The structure of the state R&D financing between 1994 and 2001 have shifted towards financing university research rather than applied R&D projects (see beginning of this section), which in the current environment can be seen as a negative development since research conducted by industry-specific R&D institutes is much more likely to be commercially viable than basic university research.

R&D expenditure financed from other sources (business, international grants etc.) has represented some additional two thirds of the amount spent by the state budget in 2002. In 1999 the share of business spending on R&D in total amounted to 38.1%, a level comparable with Hungary, but lower than in the Slovak (49.9%) and Czech Republic (52.6%) (Graph D10). Share of business outlays on R&D in Poland is exactly the opposite of prescriptions of the EU Lisbon targets, which recommend that business share in total R&D spending hovers around 70% of the total, the rest being financed from the state budget.

In order to meet the Lisbon target of R&D spending on the level of 3% of GDP by 2010, Poland would need to increase state funding by three times, while business would need to

invest in R&D almost seven times more. This seems to be very unlikely, particularly because given current situation of the state budget any substantial increase in R&D financing is not possible. Hence, reaching the Lisbon target by 2010 is very unlikely. Realistically speaking, Poland is likely to increase R&D spending to more than 1% of GDP by 2010 from current 0.66% of GDP as of 2002.

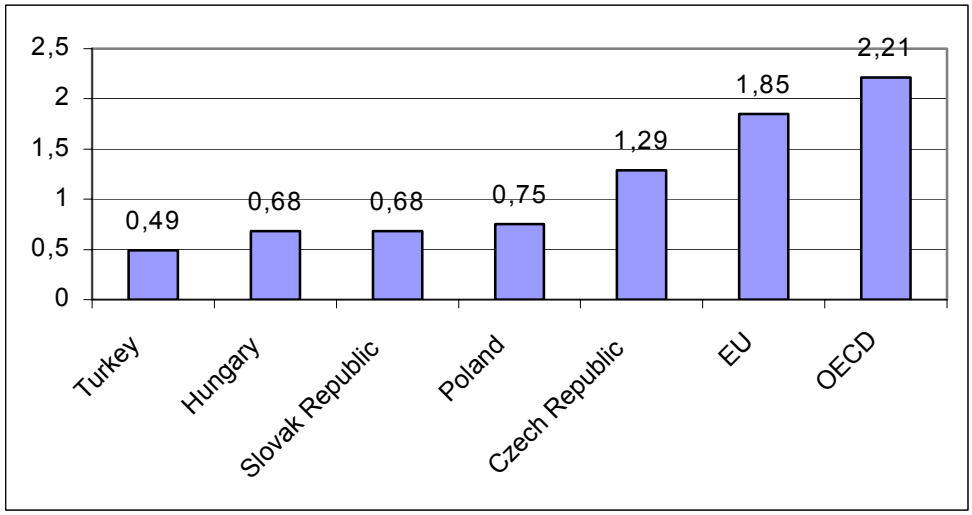
Graph D9. R&D expenditure by source of financing in1999



Source: OECD Science, Technology and Industry Scoreboard 2001

According to the OECD in 1999 R&D spending was higher than in 2002 as it amounted to 0.75% of GDP (Graph D10). In that year Poland spent more on R&D as a share of GDP than Hungary and Slovakia, but less than Czech Republic.

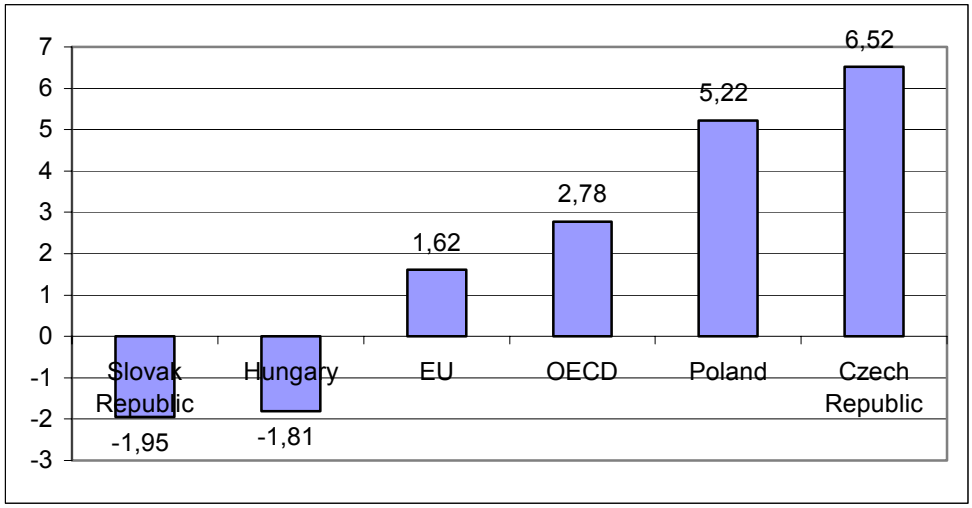
Graph D10: R&D spending as % of GDP in selected countries in 1999



Source: OECD Science, Technology and Industry Scoreboard 2001 available at http://www1.oecd.org/publications/e-book/92-2001-04-1-2987/

In spite of a decrease in the share of R&D spending in GDP, the nominal R&D spending between 1991 and 1999 was nevertheless increasing at an average rate of 5.22% annually (Graph D11).

Graph D11. Evolution of gross domestic expenditure on R&D (average annual growth rate 1991-99)



Note: Slovak Republic, Hungary, Poland (1994-99)
Source: OECD Science, Technology and Industry Scoreboard 2001

R&D spending per researcher in Poland amounted in 2001 to USD 39 thousand PPP and was the lowest in all of the OECD countries, four times lower than the EU average, three times lower than in the Czech Republic.[30] According to the OECD, business R&D as a share of GDP in Poland amounted to 0.42% in 1999 versus 0.43% in 1991. This compares to Hungary's 0.33% of GDP in1999, 0.69% in the Slovak Republic, 0.95% in the Czech Republic and the EU average of 1.61% of GDP.

According to the Central Statistical Office, business expenditure on R&D in the last couple of years in Poland was lower than reported by the OECD and amounted to some 0.3% of GDP, that is bit less than a half of the total expenditure. Quite worryingly, of the total R&D spending (both state and business) in 2001 only 10.2% of R&D outlays were for innovation activity (defined as development or adoption of new technologies and development of new products and services).[31]

The effects of investment in R&D are not significant as measured by either a ratio of cited publications on a Philadelphia list per one million inhabitants or by a number of commercialized projects. In 2001 Polish research community produced some 200 publications per one million inhabitants versus the EU average of 600. Nonetheless, some progress has been recorded as Polish publications share in total publications on the Philadelphia list increased from 0.98% in 1990-94 to 1.17% in 1996-2000.[32] This situation seems to result from a lack of adequate financial incentives for researchers (financial remuneration is only to a minimal extent linked to results and quality of research) and probably often too low quality of research.

[30] „Main Science and Technology Indicators", OECD, 2002/2.
[31] „Stan nauki i techniki w Polsce", Departament Polityki Naukowej, KBN, Warszawa, 2002
[32] „Zalozenia reformy finansowania nauki". From: http://www.mnii.gov.pl/pub/kbninfo/zopan/index.html

Between 2000 and 2002 there were about 2 500 Polish patents granted annually for local applicants and approx. 700 abroad. As a result, the ratio of innovation (measured by a number of patents per ten thousand inhabitants) is roughly ten times lower than the OECD average.[33]

Table D7 illustrates Poland's weakness in terms of a number of patent applications at the European Patent Office (EPO). Poland's patents represented only 0.03% of all patents filed at the EPO. Poland's share is much smaller than Czech Republic's or Hungary's.

Table D7. Share of selected countries in total EPO patent applications, 1997 (%)

	1997	Average annual growth rate 1990-97
Slovak Republic	0.02	22.17
Poland	0.03	5.51
Czech Republic	0.05	9.99
Hungary	0.08	0.33
United States	28.54	4.78
EU	46.98	5.66

Source: OECD STI 2001

Innovation in Poland is mostly driven by adoption of technology from abroad through imports and to a large extent by FDI. In 1999 foreign firms were responsible for 40% of total business R&D spending, up from 6% in 1995. In spite of growing FDI and technology transfer, the ratio of innovative enterprises to total number of enterprises in Poland is declining: it went down from 37.6% in 1994-96 to 28.9% in 1997-98 and 16.9% in 1998-2000. This trend has clearly negative consequences for innovation potential of the domestic economy.

Similarly to the EU countries, service sector firms are much less likely than manufacturing ones to introduce innovations. Between 1997 and 1999 only 16% of all firms in the service sector were innovative (EU average for 1994-96 amounted to 41%) (Górzyński 2003). This low result stemmed from a large share of wholesale and retail trade companies in the service sector, which happen to be the least innovative in the whole sector. According to the OECD, the share of services in business sector R&D in 1999 amounted to only 14.1% versus 27.7% in the Czech Republic and a low EU average of 10.9%.[34] According to the OECD STI Scoreboard 2002, in 1998 manufacturing sector companies in Poland spent 4.3% of their total revenue on R&D. This compares with the EU average for 1996 of 3.7%. In 2000 in Poland there were only 700-800 companies, whose products and services could be considered as technologically advanced. Almost all of these companies were private.

Górzyński (2003) argues that low innovativeness of the local industrial sector is due to:

a) lack of market incentives to innovate - as growth in production in the 1990's was driven by a large pent-up demand for consumer products and services, which were scarce under socialism, firms - in order to stay in the market – needed to go ahead with rather basic economic restructuring, which would allow them to meet the growing market demand, particularly for lower value-added products. Companies did not need to focus on innovation to stay competitive.

[33] More specific data on innovation in Poland and other EU accession countries: „2002 European Innovation Scoreboard: Technical Paper 2 Candidate Countries", November 2002, available at http:/trendchart.cordis.lu/Reports/Documents/report2.pdf

[34] Source: OECD Science, Technology and Industry Scoreboard 2001 available at http://www1.oecd.org/publications/e-book/92-2001-04-1-2987/

b) Insufficient public financing for innovation activity, particularly as concerns co-financing for innovative projects developed by the industry.
c) Outdated structure of the public R&D sector, which has not been adjusted to the requirements of the market economy, i.e. a need for collaboration with the private business sector
d) Poor access to financing for innovation projects (banking sector's lack of skills to finance innovation and R&D, low level of venture capital financing).
e) Lack of long-term strategic vision in management of enterprises. Innovation is not seen as a key to long-term growth.

To sum up, the level of innovation and quantity of R&D in Poland is proportionately much lower than the EU average, but also than in Slovenia, Czech Republic and Hungary. In face of poor budgetary situation, increase in R&D spending and in innovation will have to come mostly from the business sector. High economic growth and growing competition will be the driving factors behind increase in spending. State policy should focus on increasing the quality and commercial viability of research financed from the state budget. Additional focus should be placed on strengthening links between research institutions and business. Reform on R&D financing should be directed towards creating incentives to researchers to commercialize the results of their research.

So far the state policy towards R&D and innovation lacked coherence and comprehensiveness. State financing for R&D is still in large part spent on low quality research or wages and salaries of researchers in order to ensure their survival in spite of the results of their work (state in essence provides social welfare payments through R&D financing).

The Ministry of Scientific Research and Information Technology (MSRIT) is now working on the reform of R&D and science financing with a view to reforming the system so as to achieve higher quality and commercial applicability of research. The reform will also promote absorption of the EU funds for R&D research. The MSRIT has recently adopted a draft of a „Law on Financing of Science", which should soon be adopted by the government.[35]

Promotion of R&D and innovation activity is also underscored in the „National Development Plan 2004-06" („Growth of Competitiveness of the Polish economy" is one of the four main objectives of this program) and a government's program „Entrepreneurship – Growth – Work II". Both documents however are quite general in their prescriptions. In the end, MSRIT is assigned the coordinating role for the state science and R&D policy.

D.4.1. Venture capital financing

Innovative start-up companies will not grow without financing. According to Global Entrepreneurship Monitor 2001 Poland's domestic venture capital investment to GDP in Poland in 2000 amounted to less than 0.1 per cent compared to 1.0% in the US.[36] According to the OECD STI (2001) data, investment in venture capital as a percentage of GDP between 1998-99 in Poland amounted to some 0.083% of GDP, of which 0.02% was invested in early

[35] The MSRIT's document describing main objectives of the reform is available on the MSRIT's web site at (in Polish): http://www.mnii.gov.pl/pub/kbninfo/zopan/index.html
[36] Global Entrepreneurship Monitor (2001), Executive Report. From www.entreworld.org

stages VC funds, while the remaining 0.06% of GDP in expansion financing VCs. Investment in VC in the Czech Republic and Hungary was much lower at 0.032% and 0.047% of GDP.

According to the same source, the share of high-technology sectors in total venture capital investment in Poland between 1998-98 amounted to some 34% of total investments (Table D8).

Table D8. Share of high-technology sectors in total venture capital, 1995-99 (%)

	Communications	Information technology	Health/biotechnology
Czech Republic (1998-99)	28.93	0.62	0.00
Poland (1998-99)	22.60	9.03	2.44
Hungary (1998-99)	4.48	11.42	72.78
EU	8.15	11.46	6.77

Source: OECD Science, Technology and Industry Scoreboard 2001

According to PriceWaterhouseCoopers (2002), private equity funds in Poland invested some EUR 13 million in high-technology companies in 2002 versus EUR 31 million invested a year earlier. Poland's share in total European VC investments declined from 0.4% in 2001 to 0.2% in 2002. In spite of lower value of investments, a number of investments in high-tech increased in 2002 to 31 from 10 in 2001 as VC funds focused on smaller value deals. VC funds in the Czech Republic in 2002 invested only EUR 4 million in high-tech companies, EUR 5 million in Hungary and EUR 1 million in the Slovak Republic.[37]

Evidently, the role of VC funds in financing innovative companies, although growing, is not significant. Accession to the EU is very likely to increase flows of VC money to the Polish economy. Nonetheless, for long venture capital financing will only marginally support innovative firms, which will mostly have to rely on their own sources of financing, at least in very early stage of their development.

D.5. R&D investment levels in the ICT sector

According to the OECD STI 2001, Poland's ICT manufacturing industry's R&D spending amounted in 1999 to some USD 72 million PPP, that is 0.02% of GDP. This compares with a 0.3% ratio for the Czech Republic. ICT services industry spent additional 0.01% of GDP on R&D (Czech Republic's 0.02%) or USD 195 million PPP.

According to the same source, ICT patents as a percentage of national patents filed at the European Patent Office (EPO) amounted to 2.1% for Poland in 1997. This compares with the Czech Republic's 4.8%, Hungary's 6.2% and the EU average of 10.6%. Admittedly, the level of innovation of ICT industry in Poland, as measured by the OECD ratio, is very low. It seems that it is also due to reported problems with filing patents at the European level (long bureaucratic procedures, high costs etc.).

[37] PriceWaterhouseCoopers „Money for Growth 2002". From: http://www.pwcglobal.com/pl/eng/ins-sol/publ/2003/tice_mfg.pdf

D.6. Summary and conclusions

ICT investments in Poland in the 1990's were growing quite rapidly. They contributed to some 8.9% of average GDP growth between 1995 and 2000 or 0.47 of a percentage point out of 5.31% average output growth in that period. ICT capital deepening has also contributed 0.65 of a percentage point or 12.74% of labour productivity growth in the same period.

The relatively large contribution of ICT capital to output growth is based on an extraordinary acceleration in real ICT investments, which were growing between 1995 and 2000 at an average cumulative rate of 50.9% a year. Consequently, by 1998 Poland has caught up with other middle and lower income countries in terms of ICT spending per GDP. Among transition economies, Poland is fourth in terms of ICT spending as per cent of GDP, but number one in nominal terms of total spending on ICT.

One can plausibly assume that given the small size of the ICT-producing sector in Poland, which is roughly estimated to have represented some 1% to 2% of GDP in 2002, its impact on output growth and productivity would not be significant. For the same reason, the contribution of TFP growth in ICT-producing industry to economy-wide TFP is likely to be marginal. As for the spillover effects of ICT production, given the small size of the ICT producing sector and relatively low penetration of ICT networks, any potential effects are poised to be negligible. Hence, the overall impact of ICT on output growth seems to be predominantly dependent on ICT capital.

Recent research on the effects on ICT investment in Poland showed that ICT-using industries report much higher growth rates in labour productivity than non-ICT using industries. This suggests that ICT investments can have higher-than-normal returns (the so-called spillover effects) to the industries that use them intensively. Anecdotal evidence suggests that industries and services sectors, which intensively invest in ICT, also report increases in quality and scope of their products and services. Table D9 provides a summary of the composition of the Polish economy in terms of the use of ICT, growth prospects, and exports intensity.

Table D9. Industry-level composition of the Polish economy in terms of growth prospects, ICT-use, and export intensity (ICT intensive sectors underlined, major exports sectors with an asterisk*).

	Smaller sectors of services or industry	More important sectors of services or industry
Growing sectors of the economy	*Emerging sectors: smaller but growing sectors of the economy:* ✓ Hotels and restaurants ✓ Medical & precision equipment* ✓ Radio, TV and communication equipment* ✓ Office machinery & computers* ✓ Printing and publishing ✓ Education ✓ Health and social work	*Dominating sectors: important sectors of the economy, showing further growth:* ✓ Transport, storage, communication ✓ Financial intermediation ✓ Transport equipment* ✓ Trade and repair
"Stable" sectors	*Modernising sectors: smaller sectors of the economy, that have to ensure their survival through modernisation* ✓ Mass Media ✓ Insurance ✓ Furniture* ✓ Metal products* ✓ Plastic and rubber ✓ Pulp and paper	*Challenging sectors: important sectors of the economy, that have to consolidate their position through modernisation* ✓ Public administration and defence ✓ Machinery* ✓ Food and beverage ✓ Chemicals ✓ Electricity, gas, water ✓ Real estate and renting
Declining sectors	*Disappearing sectors: smaller sectors of the economy, on the decline:* ✓ Textiles ✓ Agriculture ✓ Basic metals	*Losing sectors: important sectors of the economy, but on the decline:* ✓ Mining and quarrying ✓ Steel industry* ✓ Shipyards*

Source: author's own

The above table shows that ICT is being intensively used by the growing sectors of the economy. None of the declining industries is an intensive ICT-user. This suggests – along with van Ark (2003) results - that ICT seem to be an important driver of economic restructuring and productivity.

One can speculate that given the likely continuation of growth in ICT investment above the growth rates for non-ICT capital, as reported by various local data sources, the contribution of ICT capital to output and productivity growth both on the industry and macro-level is likely to gradually increase.

The level of innovativeness of the Polish economy is very low. It is due to low level of public and private R&D financing, insufficient focus of local business on innovation as a key to long-term competitiveness, inadequate incentive framework for public R&D spending, which is biased towards fundamental rather than applied research, and weak links between business

and academia. It can be argued that unless the public R&D financing is reformed, more spending on R&D would most likely be - quite paradoxically – squandered. The recent project of a reform of financing of science, which is likely to come into force in mid-2004, would be a welcome step towards enhancing the effectiveness of public R&D spending. Low interest of the private sector in innovation may slowly change due to an increase of a competitive pressure as a result of the EU accession.

Strengths	**Weaknesses**
1. Large investments in ICT infrastructure 2. Sizeable contribution of ICT capital to economic growth between 1995-2000 3. Large R&D base in terms of infrastructure and human capital 4. Modernisation of several economic sectors	1. Low level of R&D financing 2. Misplaced focus of the state R&D policy 3. Weak links between R&D institutes and business 4. Low interest in innovation in the private business sector
Opportunities	**Threats**
1. Financial support from the EU for state and business R&D investments 2. Growth in foreign R&D in Poland upon accession to the EU 3. Successful implementation of a new R&D strategy developed by the Ministry of Scientific Research and Information Technology	1. Failure to utilize EU funds 2. Lack of progress in enhancing business applicability of state-sponsored R&D 3. Continued disintegration of domestic R&D facilities 4. Low absorption of ICT

Strengths

Thanks to large investments in ICT infrastructure in the recent decade, Poland has been closing the gap in ICT infrastructure relative to the EU countries. Large investments in ICT capital had a surprisingly tangible effect on the economic growth between 1995 and 2000. In terms of its R&D capabilities, Poland maintains a relatively large base of R&D state-sponsored institutions. ICT seem to have contributed to a large increase in productivity in a number of industrial and service sectors of the economy. Most of the growing sectors of the Polish economy intensively invest in ICT.

Weaknesses

Low level financing for R&D undoubtedly represents a big impediment to development of R&D capabilities, which is a prerequisite to progress in building of the IS. Insufficient R&D funding is further aggravated by a misplaced state R&D policy, which has so far focused on fundamental rather than applied research. The lack of an appropriate incentive framework along with a low level of interest in collaboration between academia and business results in low economic productivity of R&D outlays. Finally, business does not seem to emphasize innovation as an imperative for long-term competitiveness. Low penetration of ICT in a number of industrial and services sectors seems to have accelerated their decline.

Opportunities

Financial support from the EU for state and business R&D investments is poised to substantially contribute to improvement in funding of R&D. Stringent conditions of the EU funding (monitoring, follow-up, focus on results) may lead to improvement in overall quality

of R&D projects, even those not funded by the EU (spillover effects of the EU-style project management). Accession to the EU is also likely to result in enhanced foreign R&D investments in Poland. Successful implementation of a new R&D strategy developed by the MSRIT, which aims to introduce global best practices into the local market and enhance participation of business in R&D projects, might contribute to enhancement of the productivity and relevance of R&D expenditures. The emerging sectors of the economy, which also intensively use ICT, are very likely to increasingly espouse innovation as a competitive tool.

Threats

As the state budget in the next couple of years will not be in a position to substantially increase outlays on R&D, failure to productively use EU funds may compromise the otherwise positive prospects for R&D development. Lack of funds is likely to lead to further disintegration of domestic R&D facilities through loss of researchers and outright liquidation. Even if funding for R&D increases, its productive utilization will not materialize without enhanced cooperation between business and academia and stronger focus on quality of research. New incentive systems need to be put in place, which would stimulate state R&D institutions to actively engage in active collaboration with business. Low absorption of ICT may lead to a worsening of a international competitive position of a number of sectors, which so far have not been able to increase ICT investments or have not used them productively.

E. INFORMATION SOCIETY TECHNOLOGIES (IST) PENETRATION RATES

E.1. General trends

In international comparisons among the EU accession countries on the ICT infrastructure per capita, Poland usually is ranked in the 6th place behind Slovenia, Czech Republic, Estonia, Hungary and Slovakia. Poland's ICT penetration rates due to the country's large size and relatively high proportion of rural population are unlikely to exceed in the next decade penetration rates for smaller accession countries like Slovenia or Estonia. Nonetheless, Poland has made a sizeable progress in developing its infrastructure since the transition began in 1989. The below sections present the detailed account of the changes.

E.2. Penetration and diffusion of IST

Poland ranks near the bottom in international comparisons of ICT infrastructure (Table E1). This is a legacy of infrastructural underdevelopment of the communist period, large rural population and relatively large size of the country, which decreases a rate of return on ICT investments (it is much less profitable to invest in infrastructure in rural areas and in long distances).

The most recent results of the Network Readiness Ranking 2003-04, published by the World Economic Forum, show that Poland is ranked in the 47th place, behind Estonia, Czech Republic, Hungary, Slovenia and Slovakia.[38] Poland's position declined since the 2002-03 ranking, where it occupied 39th position. Low penetration of ICT and underdeveloped ICT infrastructure has been the major reasons for Poland's low ranking.

Nevertheless, substantial progress in increasing of ICT penetration has being achieved during the last decade. Between 2000 and 2003, penetration of mobile phones increased to almost 45%, percentage of Internet users reached 25%, penetration of computers exceeded 10%. It is expected that these trends will continue, although the current growth rates, due to increasing saturation of the market, are likely to slow down (although growth in GDP per capita will stimulate further progress). It is being projected that the mobile penetration rate will reach 50% by the end of 2005 and 70% by 2007-08.[39]

In the long run, the penetration rates of IST will very much depend on disposable income of the society, which in turn is closely related to the rate of economic growth. Since it is projected that the economic growth will increase from 3,5% in 2003 to 5% in 2004 and onwards, it can be assumed that progress in penetration of ICT will continue at a proportional rhythm.

[38] From: http://www.weforum.org/pdf/Gcr/GITR_2003_2004/Rankings.pdf

[39] Based on "Biała Ksiega, Part II: Liberalizacja i integracja rynków przemysłow sieciowych. Trwały rozwoj", Forum Strategii Lizbonskiej, available in Polish at http://www.strategializbonska.pl/

Table E1. Information society statistics for EU member and candidate countries (per 100 inhabitants) in 2001

Country	Personal computers	Internet users	Internet hosts	Mobile subscribers (in 2000)
EU15	**30.0**	**31.5**	**3.3**	**63.5**
Bulgaria	4.4	7.4	0.33	8.2
Czech Republic	12.1	13.6	2.09	29.2
Cyprus	25.1	19.7	0.30	26.2
Estonia	17.5	31.7	3.57	32.0
Hungary	10.0	14.5	1.68	29.7
Latvia	15.3	7.3	1.06	15.6
Lithuania	7.1	7.2	0.96	11.4
Malta	23.0	25.3	2.23	21.1
Poland	**8.5**	**9.8**	**1.27**	**15.0**
Romania	3.6	4.5	0.21	12.6
Slovak Republic	14.8	16.6	1.34	21.5
Slovenia	27.6	30.2	1.48	57.4
Turkey	4.1	3.8	0.16	19.3
CC13	**6.9**	**7.8**	**0.7**	**18.5**

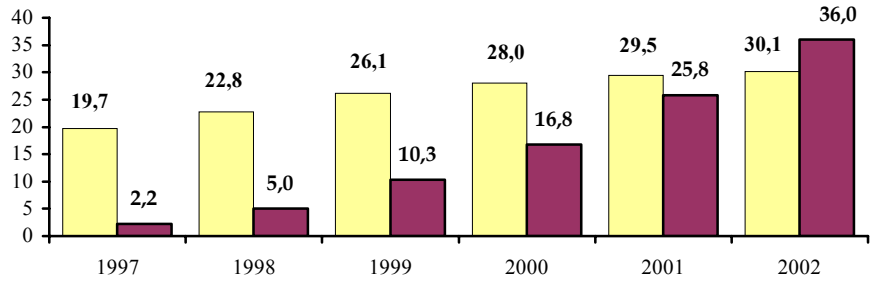
Source: International Telecommunication Union (ITU). From: http://www.itu.int/ITU-D/ict/statistics/

E.2.1. Telephony

E.2.1.1. Fixed line

Poland entered the transition period with one of the lowest fixed line penetration rates in the region, with only 13 lines per 100 inhabitants. However, as of the end of 2002, on the back of large telecommunication investments, penetration of fixed line telephony per 100 inhabitants exceeded 30 (almost 11 million subscribers), while mobile phone penetration reached 36% (Graph E1). In historical perspective, it compares to 43,5 thousand subscribers in 1920, 535 thousand in 1960 and 1.466 thousand in 1975. As of the end of 2001 there were 8,277 thousand main lines in cities and 2,626 thousand lines in rural areas. In percentage terms in urban areas mainline penetration as of the end of 2001 amounted to 36,5 per 100 inhabitants compared to 18,0 in rural areas. This large discrepancy evidences a large gap in access to telephone services between urbanized and rural areas. The growth in fixed line penetration is likely to continue, yet at a much slower rate than before as more and more customers choose the mobile over the fixed line telephony in response to falling prices of mobile calls.

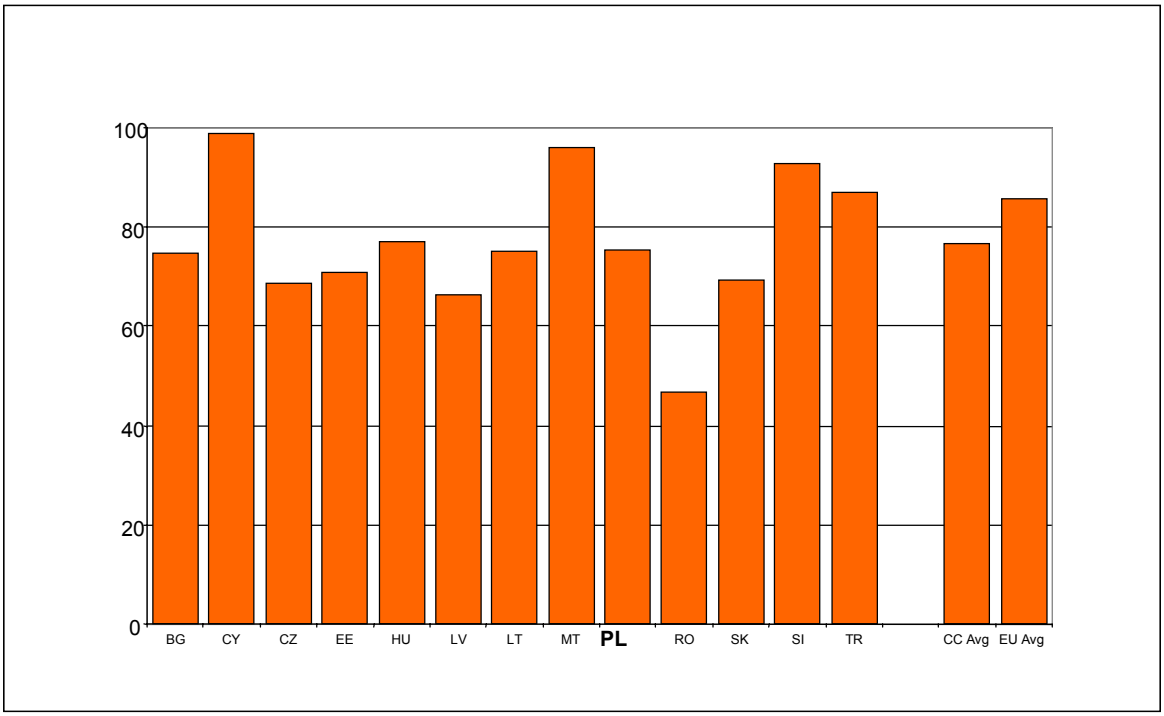
Graph E1. Fixed line (yellow) and mobile telephony (purple) penetration in Poland (as % of population, 1997 – 2002, end of the period)



Source: Office of Telecommunications and Post Regulation (URTiP), www.urtip.gov.pl

As of the end of 2001 approx. 75% of households in Poland had access to fixed telephone service (Graph E2), which placed Poland close to the average for EU candidate countries.

Graph E2. Percentage of households with fixed telephone service as of the end of 2001



Source: „eEurope 2003 – Progress Report" (2002). Available at www.kbn.gov.pl

Similarly to other countries in the region, Polish tariff structure used to be biased toward subsidizing local calls and subscription rates. However, by 2003 a tariff rebalancing process has been mostly completed: for instance, monthly subscription rates have more than doubled in the last couple of years. In return, prices of intercity and international calls, in tandem with market liberalization, were quickly going down.

As for the future of the fixed line market, according to TPSA, the national telecom operator, the fixed telephone line penetration will never exceed 37% as new and old subscribers switch to mobile telephony. In 2008 the fixed line penetration is projected to start to decline (the

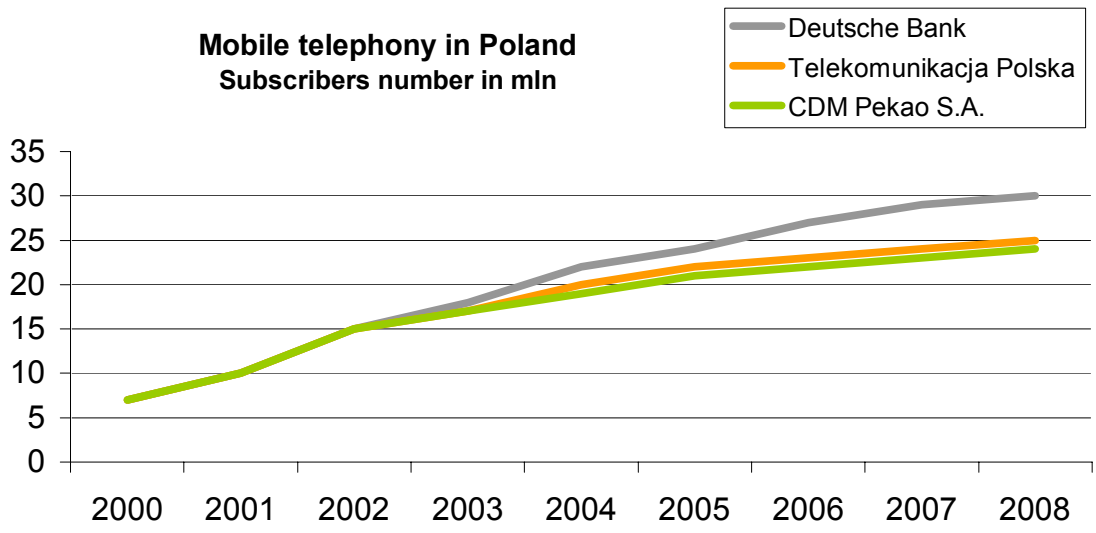
number of subscribers would decrease from 14.1 million in 2007 to 13.5 million in 2003). Until 2008 the growth in fixed line penetration will be mostly driven by ISDN and ADSL technologies as subscribers will increasingly use the fixed lines to access the Internet. TPSA also projects that the total value of the fixed telephony market will decrease from PLN 14 billion in 2002 to PLN 13 billion in 2003 and to PLN 11.7 billion in 2013.[40]

E.2.1.2. Mobile telephony

The number of mobile subscribers increased from 75 thousand in 1995 to more than 10 million (penetration of 36%) as of the end of 2002. It is projected that in 2003 and 2004 the existing three mobile operators (PTC Era, Polkomtel and IDEA Centerel) will acquire one million of new subscribers each per year. Mobile phone penetration thus may exceed 50% by the end of 2005.

According to the Eastern Europe Wireless Analyst, as quoted by Rzeczpospolita, Poland's mobile telephony market is the second largest in the CEE region, next to Russia. As of the end of November 2003, there were 16.8 million cellular subscribers. Their number increases by some 900 thousand per quarter.[41] Local analysts project that the number of subscribers will quickly increase (Graph E3). According to Deutsche Bank, their number will reach some 29 million by 2008, which would translate into a 75% penetration rate.

Graph E3. Projected mobile telephone penetration in Poland, 2004-08, in million of subscribers.



Note: Projections by Deutsche Bank, Telekomunikacja Polska, national telecom operator, and Brokerage House of Pekao S.A., a local bank (CDM Pekao S.A.). Source: Rzeczpospolita, 25 November 2003.
Source

E.2.2. Computers

According to WITSA (2002), as of the end of 2001 the computer penetration rate in Poland was quite low and amounted to 8.1 PCs per 100 inhabitants (Table E2).

[40] Rzeczpospolita, 2 October 2003
[41] Rzeczpospolita, 25 November 2003

Table E2. Computer penetration in Poland, 1993-2001

PCs installed in:	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**
Education	44 816	55 544	68 840	100 178	123 994	150 477	180 179	219 416	252 713
Homes	55 145	76 401	105 850	146 651	200 591	260 781	334 878	414 152	492 218
Business & Gov.	499 041	618 502	766 561	935 203	1 157 531	1 404 761	1 682 034	2 042 606	2 352 578
Total PCs installed	599 001	750 447	941 251	1 182 032	1 482 116	1 816 019	2 197 091	2 676 174	3 097 510
Growth rate of total PCs		25.28%	25.43%	25.58%	25.39%	22.53%	20.98%	21.81%	15.74%
PCs per 100 inhabitants	1.6	2.0	2.5	3.1	3.9	4.8	5.7	7.0	8.1

Source: author's calculations based on WITSA (2002)

This penetration rate placed Poland at the lower intermediate part of the table of the EU accession countries (Table E3)

Table E3. Computer penetration in selected CEE countries in 2001

Czech Republic	14,5
Hungary	10,0
Poland	8,1
Romania	3,5
Russia	4,9
Slovakia	14,8
Slovenia	27,5

Source: WDI (2003)

The low computer penetration results from years of underinvestment and technological retardation (also due to restrictions on imports of high-tech equipment from developed countries, which were imposed on all socialist countries until 1989) dating back to socialist period, low disposable incomes and a large proportion of rural population with no access and no interest in computers.

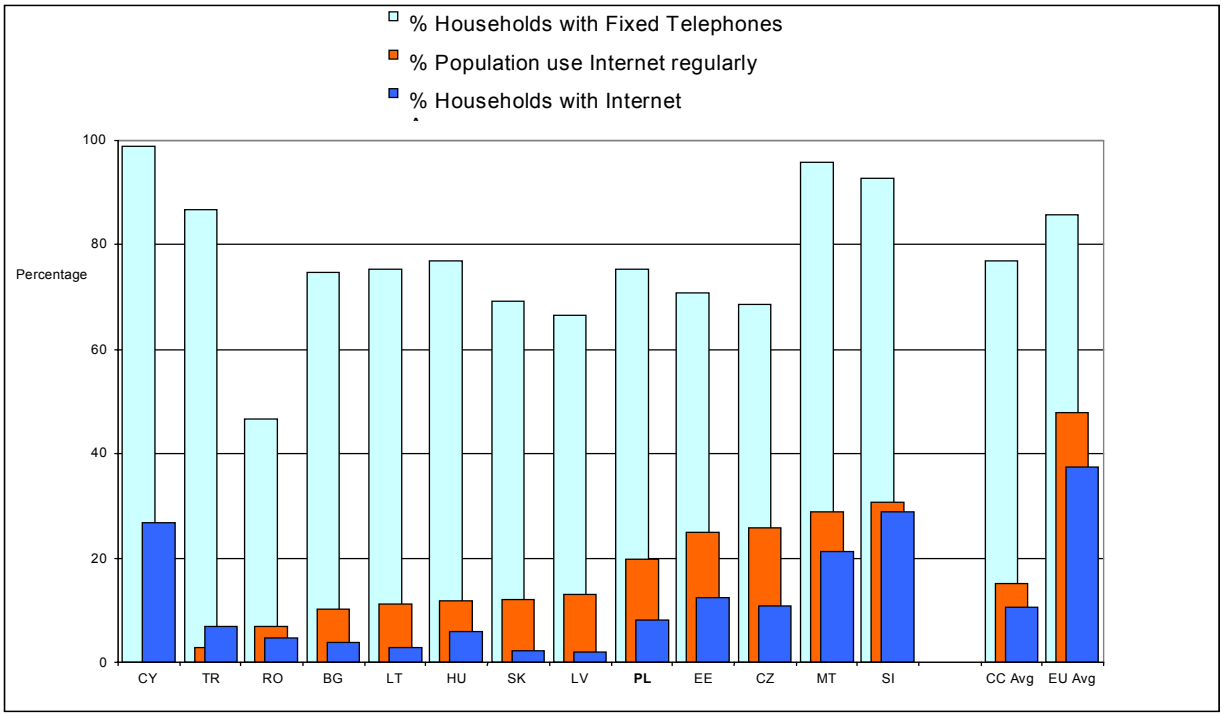
Nevertheless, as shown in Table E2, the growth of computer penetration between 1993 and 2001 was quite robust and averaged 22.6% per year. Assuming that a growth rate of more than 15% annually will be sustained until at least 2006, computer penetration rate would reach 16.3% by the end of 2006.

E.2.3. Internet

The use of the Internet has been rising rapidly from a 10% penetration rate as of end of 2001 to 25% rate as of June 2003 (use of the Internet at least once per month). This compares with the EU average of some 50%. Lower penetration in Poland is mostly due to relatively high

costs of Internet access, low interest in accessing Internet and often poor telecommunication infrastructure. As of 2001, some 8% of households had access to the Internet (Graph E4).

Graph E4. Percentage of households with Internet access as of 2001 in selected countries



Source: „eEurope 2003 – Progress Report"(2002). Available at www.kbn.gov.pl

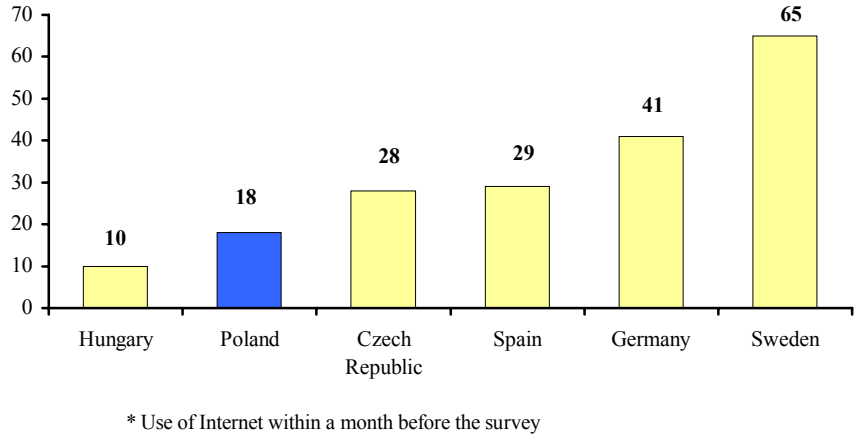
In terms of the Internet penetration, Poland as of 2002 ranked in the group with low Internet penetration of below 20% (Table E4 and Graph E5). This, as said above, is rapidly changing as according to most recent surveys the Internet penetration as of June 2003 reached 25% of the population.

Table E4. Internet penetration rates in selected countries in 2002

Low penetration (below 20%)	Medium penetration (from 20% to 40%)	High penetration (above 40%)
Argentina	Czech Republic	Australia
Bulgaria	Estonia	Belgium
Hungary	France	Denmark
India	United Kingdom	Finland
Indonesia	Italy	Germany
Latvia	Malaysia	Hong Kong
Lithuania	Slovak Republic	Ireland
Mexico	Spain	Israel
Poland	Turkey	South Korea
Romania		Netherlands
Serbia		Norway
Thailand		Singapore
Ukraine		Taiwan
		United States

Source: Taylor Nelson Sofres Interactive, Global eCommerce Report 2002, www.tnsofres.com

Graph E5. Internet users in selected European countries in 2002
(as % of population)

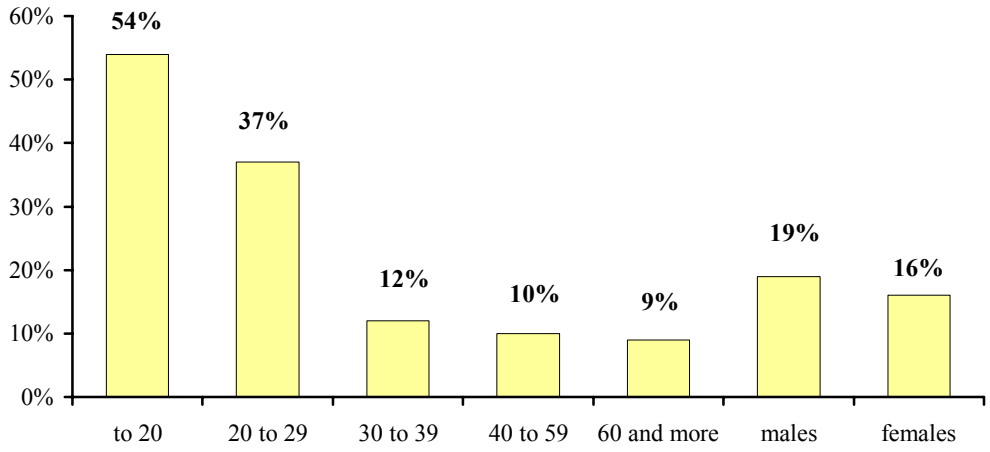


Source: Taylor Nelson Sofres Interactive, Global eCommerce Report 2002, www.tnsofres.com

As for the future trends, according to projections of TPSA, the Internet penetration will reach 27.6% by the end of 2003, 54% by 2006 and 73% by 2013.

As in most countries, Internet in Poland is mostly used by the youngest part of the population (Graph E6). More than a half of population aged 20 and less uses the Internet. Men are slightly more likely to use the Internet than women, which seems to be due to differences in education, closely correlated with the Internet use.

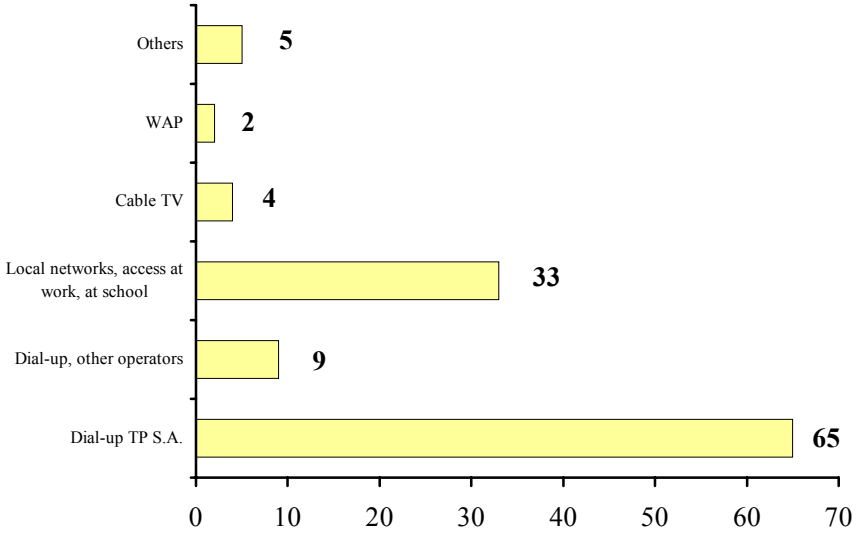
Graph E6. Internet users in Poland per age and sex in 2001



Source: Taylor Nelson Sofres Interactive, Global eCommerce Report 2002, www.tnsofres.com

Almost two thirds of the internet user population accessed the Internet in 2001 through dial up connection to the local dominant telecommunications company TPSA, which controls more than 90% of the local telecommunication market (Graph E7). Its lower share in dial up connections suggests that the market for access to the Internet is more competitive than the telephone market.

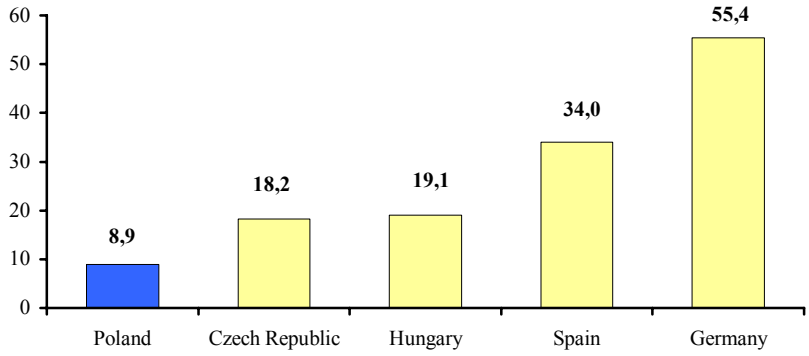
Graph E7. Types of access to the Internet in Poland in 2001 (in %)



Source: The ePoland: eCommerce & Technology Use Report, Polish Market Review, www.kbn.gov.pl

The relatively low penetration of the Internet is partly due to high costs of Internet access, which relative to annual income of the population is one of the highest in the whole of Europe (Graph E8).

Graph E8. Costs of access to telecommunication services in selected European countries in 2001 - number of baskets* of telecommunication services per annual income

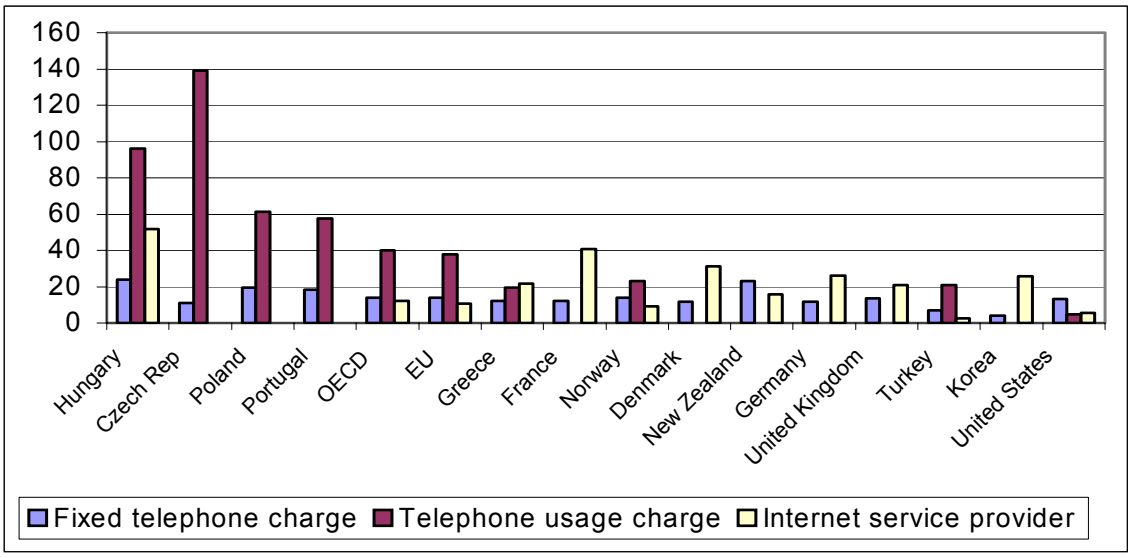


*Basket (in home) telecommunication services include: installation payment, subscription and variable cost 1 200 connections

Source: Office of Telecommunications and Post Regulations (URTiP), www.urtip.gov.pl

According to the OECD, the price of the Internet use in Poland in 2001 was the third highest among the OECD countries, behind only Hungary and Czech Republic (Graph E9)

Graph E9. Price of 40 hours of Internet use at peak times, August 2001, at PPP prices
(OECD Internet access basket for 40 hours at peak times using discounted PSTN rates)



Source: OECD, Telecommunications Database, June 2002. Taken from OECD (2002), "Measuring the Information Economy 2002".

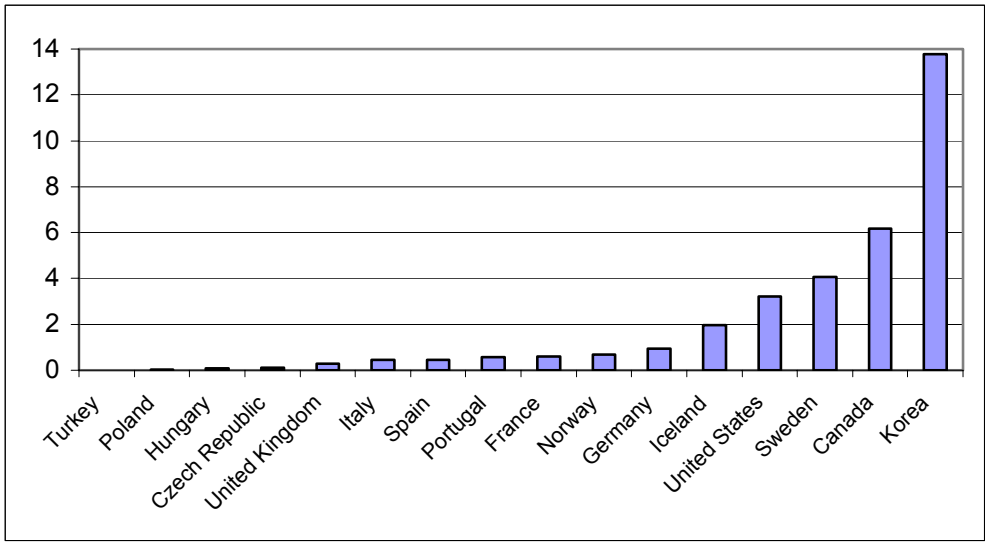
Broadband

As of the end of June 2003, TPSA – the largest telecommunication operator with a 90% market share – had more than 500 thousand ISDN subscribers, 36 thousand DSL subscribers and 110 thousand SDI subscribers.[42] As of the end of November, the number of TPSA DSL subscribers (so-called "Neostrada" with a 512KB speed of transmission) increased to 180 thousand. TPSA projects to end the year with some 250 thousand subscribers. By the end of 2005, TPSA plans to have some one million subscribers. Large cable companies (Aster, UPC, Multimedia) as of November 2003 had 150 thousand subscribers.[43] Another 10-20 thousand subscribers are serviced by local networks and cable companies. Overall, the broadband penetration rate as of the end of November 2003 approached 1% of population.

In terms of international comparisons, Poland in 2001 was well behind other OECD countries (Graph E10). In spite of vigorous growth, this position has not materially changed since then.

[42] Rzeczpospolita, 29 July 2003.
[43] Gazeta Wyborcza, 30 November 2003.

Graph E10. Broadband penetration rates in Poland and OECD countries, June 2001 (Number of DSL,[1] cable modem lines and other broadband[2] per 100 inhabitants)



1. Digital Subscriber Lines. 2. The other technologies that were deployed in 2001 to provide broadband services are fixed wireless broadband, direct satellite broadband and various forms of "fibre to the residence".
Source: S. Paltridge (2001), "The Development of Broadband Access in OECD Countries" OECD, Paris, October. From OECD (2002)

Faster growth of broadband is limited by relatively low disposable income of the population (for instance, Neostrada costs PLN 149 monthly, i.e. some EUR 32), high costs of computers relative to average wages (even in big cities, only 30% of households have computers), and low level of awareness of the benefits of broadband among potential subscribers. TPSA projects that the value of the broadband market between 2002 and 2013 will increase by 575% to PLN 5.3 billion.

ICT goods and services as a share of total household consumption
Spending on ICT goods and services represented some 3% of total household consumption spending in 1999. This was one of the lowest shares among the selected CEE countries (Table E5). Although still small, the ICT share in total consumption is poised to be growing on the back of increasing computer, telephone and Internet penetration.

Table E5. Share of consumption of ICT goods and services in total household consumption in selected CEE countries, 1999

	Total ICT	**Telephone and telefax equipment and services**	**Audio-visual, photographic and information processing equipment**
Slovak Republic	3,0	1,9	1,1
Poland	**3,0**	**1,3**	**1,7**
Czech Republic	3,4	1,9	1,5
Hungary	5,8	4,3	1,5

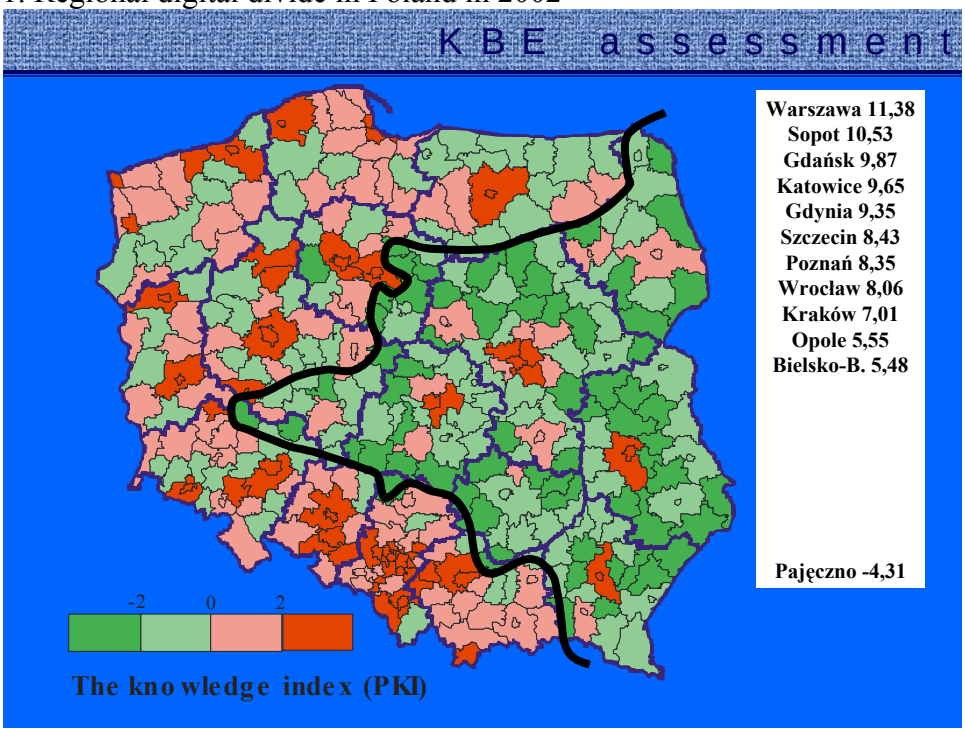
Source: OECD, Purchasing Power Parities Database, www.oecd.org

E.3. Regional differences in IST penetration

There are large disparities in penetration of IST in Poland (illustrated earlier by the number of registered ICT firms in 326 poviats - NUTS 4, middle-level entities of local government - Graph C11, Chapter C 1.3). Eastern and central southern Poland substantially lags behind other parts of the country.

Similar conclusions can be drawn from Graph E11, which underlines the regional divide in Poland between eastern and western part of the country. The digital divide is here based on a value of a "Knowledge Index" developed by Guzik (2003). The index is a weighted composite of a number of ICT firms registered in poviats, a number of cash machines per poviat, and a number of web sites in poviat-level public administration.

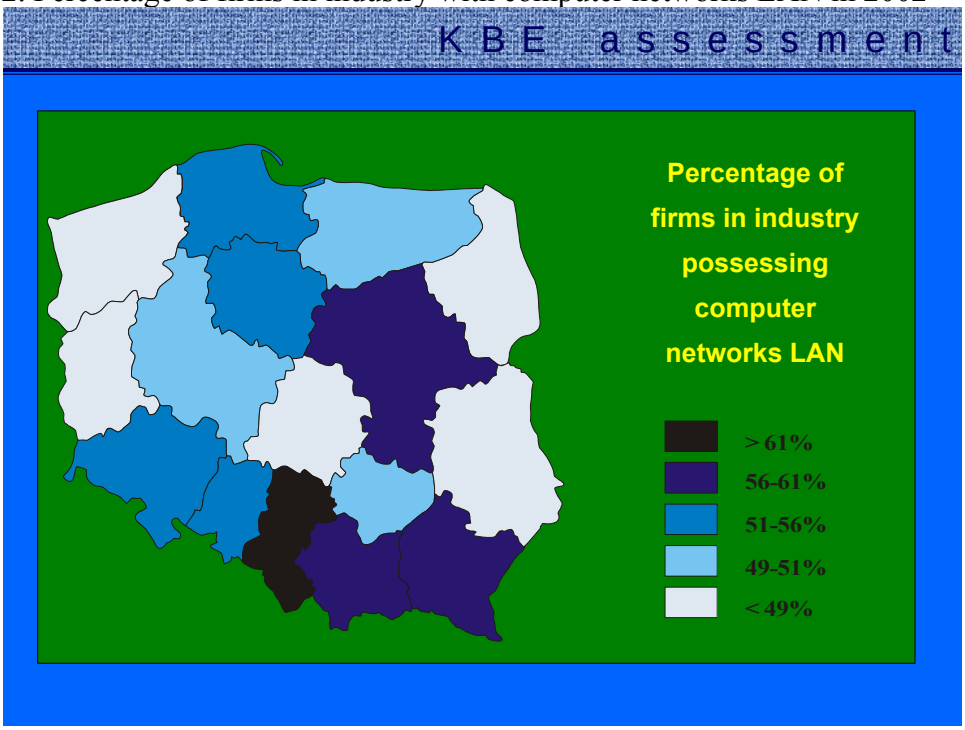
Graph E11. Regional digital divide in Poland in 2002



Source: Guzik (2003)

Graph E12 on the penetration of computer networks LAN in firms paints a similar picture to that in Graph E2: Podlaskie and Lubelskie regions on the eastern border of Poland are among the least developed regions in terms of IST penetration. Equally low LAN network penetration is reported in Lodzkie (central Poland), Zachodnio-Pomorskie and Lubuskie (western Poland).

Graph E12. Percentage of firms in industry with computer networks LAN in 2002



Source: Guzik (2003)

The pattern of fixed line penetration in regions is however quite heterogenous, yet the lowest penetration rates are recorded in – again – Lubelskie and Podkarpackie in eastern Poland and Swietokrzyskie (eastern central), Opolskie (southern) and Wielkopolskie (western) (Table E6). It seems that the differences in penetration are due to the level of urbanization: more urbanized regions report higher penetration rates and vice versa. Hence, the eastern-western divide could also be thought of as a urban-rural divide.

Table E6. Regional fixed line penetration as of the end of 2002

	Fixed lines per 100 inhabitants
Dolnoslaskie	31,22
Kujawsko-Pomorskie	27,77
Lubelskie	25,34
Lubuskie	28,53
Lodzkie	28,95
Malopolskie	27,34
Mazowieckie	33,88
Opolskie	24,97
Podkarpackie	21,11
Podlaskie	31,96
Pomorskie	29,75
Slaskie	29,40
Swietokrzyskie	22,69
Warminsko-Mazurskie	28,57
Wielkopolskie	25,59
Zachodnio-Pomorskie	30,19

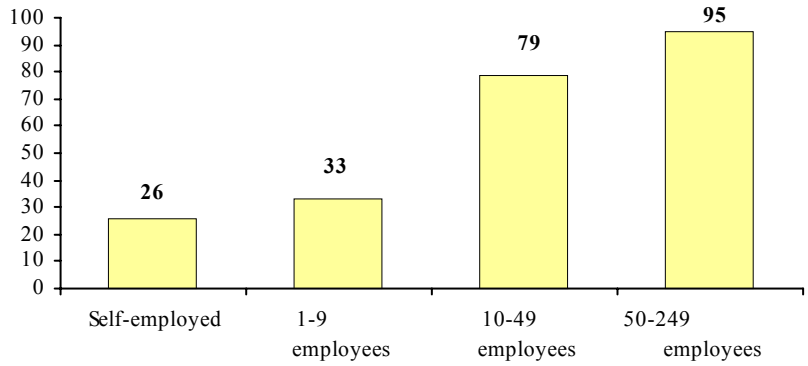
Source: Janiec (2003) based on the Ministry of Infrastructure.
From: http://www.instytut-rp.pl/content/attachments/MJprezkonf021203.pdf, p. 3.

E.4. IST penetration in the business sector

E.4.1. Internet access

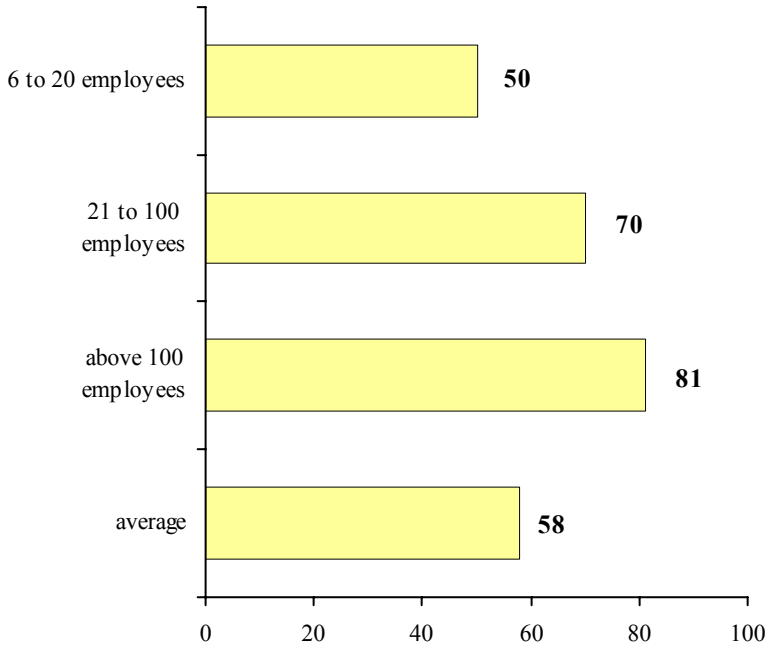
Large companies (in terms of employment) in Poland are the most likely to have access to the Internet (Graph E13 and E14 from two data sources). Almost all companies employing between 50 and 150 people had access to the Internet versus only 33% of companies employing fewer than 10 people. It seems that large companies, due to their size, higher complexity of business and larger financial resources, are better positioned to benefit from the Internet than small companies.

Graph E13. Access to the Internet in enterprises in Poland (per level of employment in 2002, in per cent)



Source: Ipsos-Demoskop, www.demoskop.pl

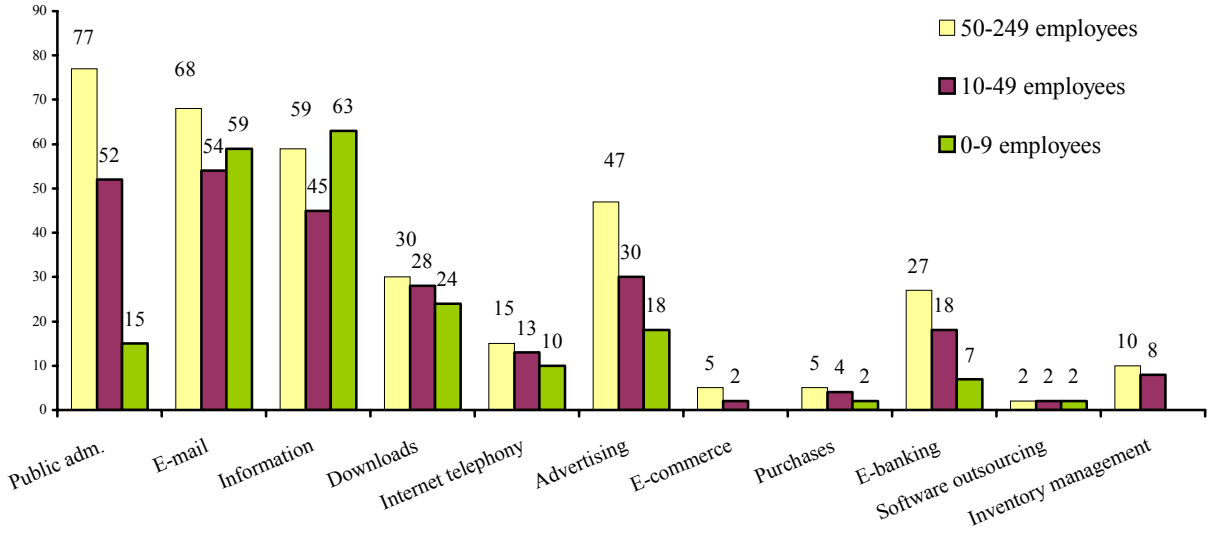
Graph E14. Access to the Internet in enterprises in Poland (per level of employment in 2002, in percent)



Source: ARC Rynek i Opinia, www.arc.com.pl

Polish corporations use the Internet for contacts with the public administration (mostly filing of social security documentation), e-banking, and access to various types of information. Large corporations use the Internet much more often than smaller companies. Only 7% of companies use Internet for eCommerce transactions (Graph E15).

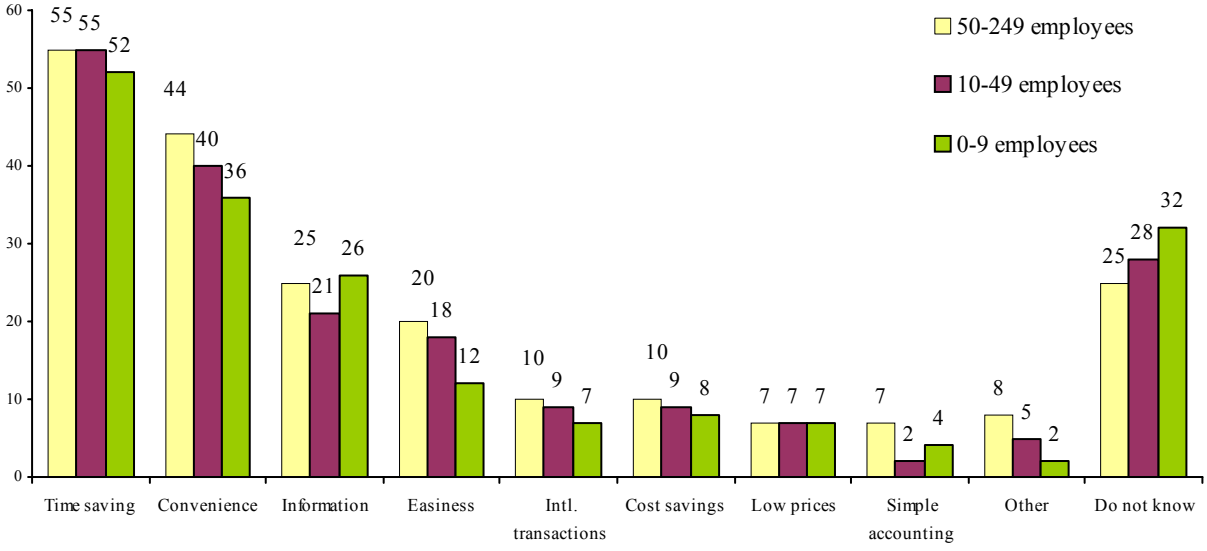
Graph E15. Use of Internet in enterprises in Poland in 2002
Data in per cent, total answers „often" and „very often"



Source: Ipsos-Demoskop, www.demoskop.pl

Time saving, convenience and access to information are perceived as the main benefits of the use of Internet (Graph E16).

Graph E16. Perceived benefits of the use of Internet in enterprises in Poland in 2002
In per cent of respondents



Source: Ipsos-Demoskop, www.demoskop.pl

E.4.2 Computer and software penetration rates

In 2002 approximately 60 thousand small firms (up to 50 employees) in Poland bought software programs to facilitate management of their operations. Some 600 thousand small firms use computers to manage basic accounting. The remaining one million small firms seem not to use computers at all in their operations.[44] This comes in contrast with the results of a recent survey on IT penetration in the SME sector performed by Microsoft Poland. According to the survey, which focused on a representative group of more than 300 companies from the SME sector, almost all of the surveyed companies had computers and an access to the Internet (99% and 97% for medium and small companies, respectively, up from 86% in January 2002). This discrepancy in results can be explained by the fact that a large number of computers bought by firms, particularly the small business, end up being utilized at home (for personal purposes) rather than at work.

According to another survey on the SME sector, in 2003 43% of middle size companies and 32% of small companies invested in IT. As a result, the overall computer penetration in the SME sector (per 100 employees) increased from 32.7 as of the end of 2002 to 46.4 as of the end of June 2003. More than half of 1.6 million small companies employing up to 50 people had fewer than 5 computers, while only 10% had more than 20 computers. Among the middle size companies, more than 40% had more than 20 computers. Among all the SME companies, 93% used software applications to manage accounting and basic operations (85% mostly use accounting and HR software). Sale-supporting software is being used by some 70% of all SME companies. However, only 10% of them have installed CRM systems to manage their client contacts. The survey also reported that only 40% of companies planned to invest in IT in 2004.[45]

While then the ICT penetration in the SME sector is growing, it seems that most of the growth results from installations of basic software applications. Quite clearly, Polish SME sector is not yet skilled enough to implement advanced software applications, which could revolutionize their operations and jack up their productivity. Low awareness of the possible benefits of IT solutions coupled with insufficient IT-use management skills limits the growth potential of ICT use in the SME sector.

According to IDC Poland, more than 40% of large entreprises in Poland (annual revenue of at least PLN 50 million or EUR 11 million) do not use management software systems. They only use basic software applications to manage accounting, sales and inventory.[46]

E.5. IST penetration in major manufacturing sectors

There is no specific data on the penetration of ICT in manufacturing sector of the economy. Existing data on ICT investment, cited in Chapter D, together with anecdotal evidence suggests that the following manufacturing sectors intensively use ICT:

1. Transport equipment – FIAT, GM, Volkswagen
2. Radio, TV and communication equipment – Philips, LG, Thomson.
3. Office machinery and computers – NTT Systems, Optimus, Maxdata etc.
4. Printing and publishing – Gruner and Jahr, Springer etc.

[44] Rzeczpospolita, 8 September 2003
[45] Rzeczpospolita, 13 December 2003.
[46] Rzeczpospolita, 1 December 2003.

5. Medical and precision equipment – Philips.
6. Metal products – Magneti Marelli, Delphi, Toyota, Isuzu.
7. Pharmaceuticals
8. Power generation

All of the above sectors are dominated by foreign companies, which intensively use advanced and sophisticated IT systems. All large companies in the pharmaceutical sector, both Polish (Jelfa, Polfa Tarchomin, Polpharma, Polfa Kutno, Polfa Pabianice, Polfa Warszawa) and international (GlaxoSmithKline, Aventis Pharma, Pliva, Roche, Hexal Pharma, Pharmacia&Upjohn) use advanced management software systems (SAP, Oracle and others). The leader in IT spending, GlaxoSmithKline Poland, invested in IT some USD 12 million between 2000 and 2003 (Computerworld TOP 200 [2003], p. 74-75). In the power generation sector, advanced software systems have been implemented by major market players: Elektrownia Rybnik S.A., Elektrownia Turów S.A., Elektrownia w Połańcu, Elektrownia Bełchatów S.A., ZE PAK S.A and others. Yet, not all available functions of the software systems are being utilized (Computerworld TOP 200 [2003], p. 86-87).

The 2003 edition of the annual competition of "Leaders of Informatics" organized by Computerworld, the leading monthly magazine on IT, has been won by Sanitec Kolo Sp. z o.o., a Finnish-owned producer of sanitary equipment[47]. The competition rewards the most successful companies in application of IT solutions. The runner ups were:

- Elektrociepłownia "Kraków" SA, a French-owned power-heat company based in Krakow,
- Hutmen SA, non-ferrous metal manufacturer based in Wrocław, owned by Impexmetal, a local trading company,
- Icopal SA - a Danish-owned producer of izolation materials based in Zduńska,
- Lubella SA, a Polish-owned noodles manufacturer based in Lublin.
- Procter and Gamble Operations Polska Sp. z o.o. based inWarsaw
- Zespół Elektrowni Pątnów - Adamów - Konin S.A., a power generation company owned by the state and Elektrim S.A., a local company.

The penetration of IST in manufacturing sectors seems to be dependent on the share of foreign ownership of the sector (the higher, the better), the level of a market competitive pressure (the higher, the better) and the financial situation of a particular industry (the better, the higher penetration). Hence, the overall picture of the manufacturing is quite patchy: here and there particular companies, mostly foreign owned, implement state-of-the-art IT systems, while other companies, mostly locally owned, use either basic software applications or – even if advanced systems are implemented – use only some functions of it. ICT penetration in particular companies seems to be also driven by the level of business competence of the management, ability to re-organize business around new IT systems, and quality of human capital, which is indispensable to implementation and productive use of IT.

[47] From: http://www.computerworld.pl/lider/2003/Liderzy.html

E.6. IST penetration in major services sectors

As in manufacturing, there is a scarcity of information and data on the use of IST in the service sector. Yet, available evidence suggests that IST are used most intensively – similarly to developed countries – in wholesale and retail trade, banking, insurance and financial services, telecommunications, mass media and entertainment and transport. As shown in Chapter D (Graph D9), telecommunications sector spends 4.54% of its total revenue on IT investments. It is followed by banking (3.31%), media and entertainment (1.86%), insurance (1.34%), and transport (1.05%).

E.6.1 Telecommunications

According to DiS (2002) the whole telecommunication sector in Poland invested PLN 1.8 billion (approx. EUR 450 million) in IT in 2002, which represented some 15% of the overall IT investment. All market players (TPSA, Netia, Energis, Tel-Energo, Telefonia Dialog, El-Net, PTC, Polkomtel, Idea Centertel) use sophisticated software systems. The level of the IT penetration and use of IT in this sector seems to be on a comparable level to the developed countries as evidenced by the available offering of services and quality of the network.IT investments seem to be driven by a need to increase competitiveness through a decrease in costs as well as a more efficient management of the network.

E.6.2 Banking, insurance, financial sector

The banking and financial sector has been one of the main engines of absorption of IST in the Polish economy. High absorption is due to the weightless, intangible nature of financial services, which makes them a natural candidate for electronic, Internet-based delivery. It also seems to be due to the fact that more than 80% of the banking market is in the hands of foreign strategic investors, which have implemented locally the same IT systems as in their headquarters in developed countries. The remaining banks owned by the state have also heavily invested in IT (although, state owned PKO BP, the largest retail bank in Poland, has still not implemented a centralized IT system. It is scheduled to be completed by 2005) in order to cope with increasing competition.

Banking industry invested some 3.3% of its total revenue in 2002 in IT, just behind the telecommunication sector, which spent 4.5% of the total revenue. In terms of IT employment, in 2002 IT specialists represented 3.4% of all employed in banking (4.2% in the telecom sector). Banks had the highest number of computers per 100 employees in the whole economy: 84, versus 71.2 in the insurance sector, 69 in telecom sector and the overall average of 35.2.[48]

All companies in the financial sector maintain web sites, which display information on offered products and services. Currently more than ten local banks, out of 59 banks operating in Poland (excluding 605 cooperative banks) offer e-banking services to its individual customers. Almost all banks offer electronic services to corporations.

Corporate e-banking has a long history. First electronic banking services based on intranet networks were introduced back in 1995 by Citibank and BRE, a local bank. Since then, in order to cope with competition, all corporate banks introduced various kinds of e-banking

[48] "Gazeta Wyborcza", 7 July 2003. All data refers to 100 largest Polish enterprises.

services. In the least, they would offer electronic payments, deposits and account information. More sophisticated electronic systems offer advances cash management products and services.

Personal e-banking has witnessed a phenomenal growth from virtually zero in 1999 to almost 2.5 million as of November 2003[49]. The three purely Internet-based banks - MBank, Inteligo and Volkswagen Bank - have so far attracted almost one million customers. The other 1.5 million people use Internet to access their existing accounts in brick-and-mortar banks. Further fast growth in e-banking is almost certain due to lower costs of Internet access, growing awareness of the benefits of e-banking and higher PC penetration. According to a recent survey, almost 8% of all owners of bank accounts have accessed their accounts through the Internet.[50]

It is widely predicted that the banking sector will remain one of the leaders in the absorption of ICT. It will be due to increasing competition from EU banks, growing appetite of local population for more sophisticated banking products and a need to cut costs in order to offset decreasing margins due to low interest rates.

Insurance companies, investment funds, pension funds and other financial institutions have all espoused Internet as another important distribution channel. Similarly to banking, most of the sector has been sold to foreign investors, who have imported advanced IT applications from abroad to manage local operations. The state-owned market leader (almost 50% market share) – PZU – is now implementing a new, centralized IT system. It is due to be completed by the end of 2004.

While sale of insurance policies on the Internet, despite many efforts, has not yet been successful, a number of local insurance companies have already developed capacity for Internet-based sales (Warta, Compensa). Internet-based access to investment and pension accounts is now a market standard (for instance, ten million of Poles, who have signed up to the so-called "second pillar" of the social security, can check their pension accounts on the Internet). In line with development of the sector, a number of on-line financial institutions have been established. Among them, Expander.pl (www.expander.pl) has become the market leader in financial intermediation (personal loans, credit cards, insurance policies etc.)

Warsaw Stock Exchange introduced back in 2000 a new electronic system based on the state-of-the-art electronic trading system used on the Lyon Stock Exchange. It allows continuous, real-time Internet-based stock trading by individuals. As of the end of October 2003 there were approx. 38.7 thousand Internet brokerage accounts, versus 25.3 thousand as of the end of 2002. The value of all Internet trades in total turnover of brokerage houses ranges from 10% to 50%. There are altogether 16 brokerage houses, which offer Internet based accounts and trading. BZ WBK Brokerage House is the leader with 9.8 thousand accounts. Brokers are projecting that the Internet-based share trading will quickly develop, although the growth rates may not be as high as this year. [51]

E.6.3. Trade

As with other sectors, there is no specific data as to the penetration of ICT in the trade sector.

[49] From: www.dis.waw.pl
[50] Rzeczpospolita, 21 August 2003
[51] Rzeczpospolita, 25 November 2003.

In wholesale and retail trade, foreign supermarket chains (Tesco, Carrefour, Geant, Leclerc, Media Market, Macro Cash & Carry, Selgros, OBI etc.) represent more than half of the market in terms of revenue. All of them use sophisticated IT inventory systems. The rest of the trade sector is dispersed among almost a million of small stores, which use IT much less intensively, mostly for basic functions of accounting, database maintenance etc. Anecdotal evidence suggests that international chains increasingly require their suppliers to use IT systems for servicing of the product delivery. This process may have potential positive spillover effects on the use of IT systems and internet-based exchange of data in the Polish economy. However, no reliable estimates exist for the number of companies, which use internet-based systems in distribution of their products.

E.6.4. Transport

Transport sector in Poland is very fragmented. Largest companies – Pekaes and Euroad – represent not more than 10% of the overall market. Large companies, in response to growing competition from the CEE and the EU countries, are increasingly using sophisticated IT systems (Internet and GPS), which allow for real-time management of delivery.

IST seem to have become a potent competitive tool. According to one of the recent studies on the transport industry in Poland (Brdulak 2002), the market share of transport companies in Poland using sophisticated software increased from 45 per cent in 2000 to 60 per cent in 2001, thus evidencing benefits of the use of IT.

Vos Logistics Polska Sp. Z o.o., a Dutch-owned logistics company based in Warsaw, has won the 2003 award of the "Leader of Informatics" for the most efficient and productive application of IT technology[52]. The runner-ups were the following:

- Brenntag Polska sp. z o.o. – an Austrian-owned logistics company dealing with delivery of chemical products, based In Kędzierzyn-Koźle.
- Carman Polska sp. z o.o. – a car-repair chain owned by a local venture capital fund, based in Katowice.
- Servisco/DHL Express – a local branch of DHL based in Warsaw.

E.6.5. eCommerce

eCommerce in Poland is in its infancy. The B2C commerce is estimated to have been worth some PLN 25 million in 2002. However, in the first half of 2003 alone the value of B2C transactions increased to PLN 27 million[53]. According to various sources, the B2C commerce is projected to grow rapidly in line with increasing awareness of the benefits of eCommerce among individuals and enhanced online security. Nonetheless, in terms of total market share, eCommerce will for very long remain a niche market, with a share in total retail sales not higher than 1%.

There are more than ten B2B marketplaces. The total amount of trade on B2B markets in 2002 is estimated to have exceeded EUR 25 million. CE-Market (www.ce-market.com), a successful B2B platform for transactions in non-ferrous metals, in 2002 - the first year of its activity - attracted more than 750 customers and recorded roughly EUR 10 million of revenue (See also Box E1)

[52] From: http://www.computerworld.pl/lider/2003/Liderzy.html
[53] Rzeczpospolita, 27 July 2003

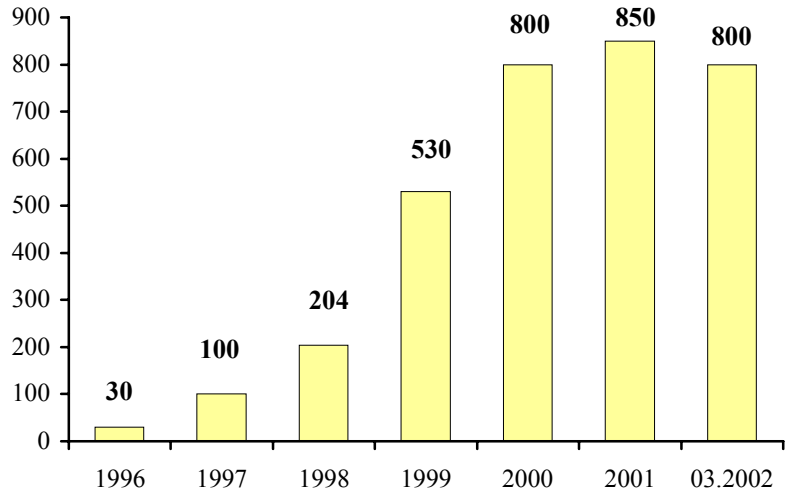
Box E1. Success of a B2B eCommerce platform

Marketplanet, an electronic platform for B2B transactions owned by TPSA, the national telecom operator, since its inception in 2001 has traded goods of the total value of PLN 500 million (approx. EUR 110 million). The company handles some 14 thousand orders per month. TPSA estimates that thanks to electronic auctions handled by Marketplanet, it cut costs of procurement by 5-15%. Aside from TPSA, another 70 companies use the electronic platform, which have cut their procurement costs on the product ordered through the platform by on average 33%

Marketplanet is now gearing up for offering its services to the public administration, which – thanks to a new law on public procurement – in 2004 will be able to organize electronic auctions for all purchases of a maximum value of up to EUR 60 thousand. Source: Rzeczpospolita, 21 November, 2003.

As of March 2002, there were roughly 800 Internet stores in Poland. Their number has increased significantly from 30 in 1996. In the recent years, after the end of the Internet bubble, the number of stores stabilized at roughly 800 (Graph E17).

Graph E17. Internet stores in Poland



Source: Gartner Group Forecast Analysis, wws.gartner.com

Polish eCommerce legal environment is mostly already compliant with the EU standards (see Chapter B). State policies are now focused on an efficient implementation of adopted laws and actions aimed at raising the confidence of the public in eCommerce. "Network Security" is one of the projects being implemented. The creation of an on-line register of "business integrity" of companies is another idea, which is to give out certificates for companies to take part in public tenders. The database could also be used to issue "e-integrity certificates". Table E7 gives a detailed timetable of actions aimed at stimulating the use of eCommerce as spelled out in the "Strategy for Informatization of Poland".

Table E7. eCommerce: timetable of actions as per the "Strategy for Informatization of Poland".

Actions	Ministry Responsible	Timing
Launch a voluntary accreditation scheme to be open to operators of Web shops and marketplaces to enhance consumer confidence	Ministry of the Economy, Labour and Social Policy	mid 2004
Create an electronic register of business integrity for companies wishing to transact business with the administration: join public tenders, seek financial support for investments etc.	Ministry of the Economy, Labour and Social Policy	end 2004
Design procedure of awarding the status „Complies with Poland's Gateway Standards" to websites and promote the scheme and its logo.	Ministry of Scientific Research and Information Technology	end 2003

Source: "Strategy for Informatization of Poland".

E.7. IST in public services

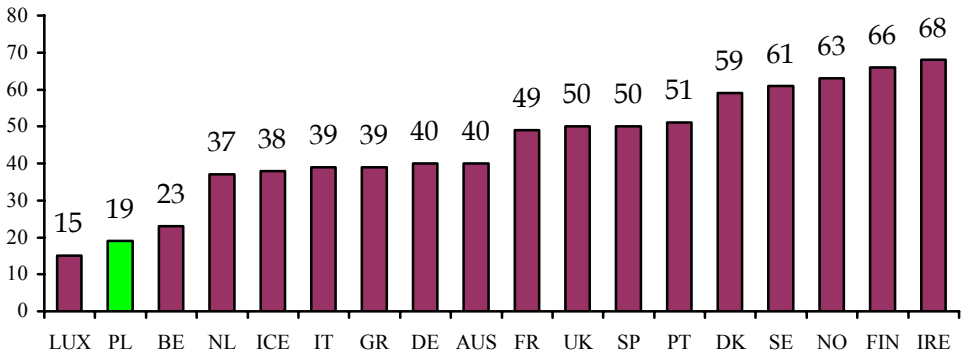
In spite of a recent rapid progress in adopting IST, Polish public services still lag behind other countries in the EU in terms of interactivity of public administration's web sites. It is evidenced by a recent study of Cap Gemini Ernst and Young, a consulting company, which assessed the level of development of public services in Poland on the basis on the following three criteria[54]:

a) information content
b) passive access (downloading of applications etc.)
c) full interactivity (from information through on-line application to on-line confirmation and delivery).

Fully interactive web sites could score a maximum of 100 points (75 points being the minimum for the category), while other two criteria were worth 50 and 25 points, respectively. In the study for 2002, Poland scored 19 points only, i.e. most of the web sites surveyed had only satisfied the first criteria. The low score gave Poland the next-to-last place among the surveyed countries (Graph E18).

[54] From: http://www.pl.cgey.com/news/pl_egovsurveyii.pdf

Graph E18. Level of electronic public services in Poland and in the EU in 2002 (in per cent)

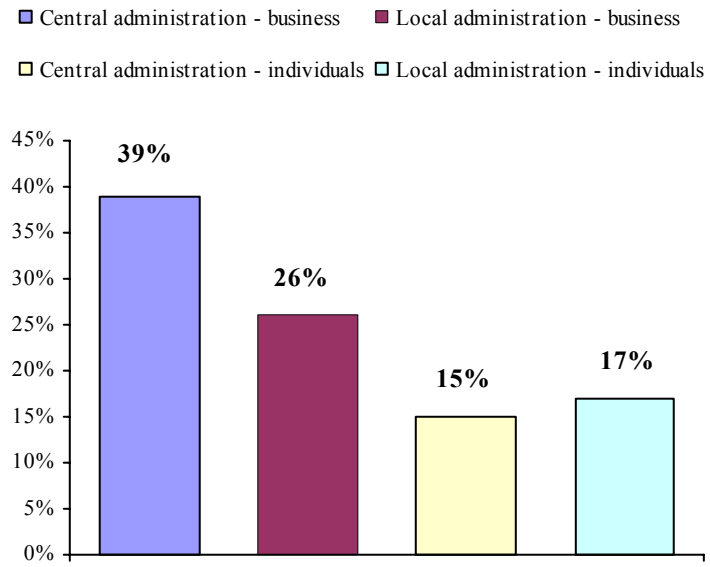


Source: Cap Gemini Ernst & Young Polska, www.pl.cgey.com

The low score suggests that most of the public administration web sites have complied only with the first criteria. Quite worryingly, between the first edition of the survey (April 2002) and the second edition (October 2002), the distance between Poland and the EU average has increased from 36% to 39% as Poland's improvement in score amounted to only 2 points versus 15 points for the EU. These results show that progress in achieving interactivity in local public services is very slow. The slow progress in informatization of public services, as mentioned earlier, seems to be due to a lack of a clear and comprehensive plan for internetization of public services, low level of human skills in administration, lack of clear incentives to implement new, electronic-based services, insufficient political support (lack of clear leadership), and low level of available financing for both coordination of IT policies (MSRIT) and development and implementation of electronic services.

Central public administration seems however to be more advanced in delivery of Internet based services than local administration (Graph E19). It suggests a top-down pattern of absorption of IST in the administration. The rendering of Internet services to business is more advanced than to individuals in both central and local administration. It points to the fact that there is quite rightly more emphasis put on servicing the business, which can bring larger benefits due to higher value of services delivered to business.

Graph E19. Level of development of electronic public services on the central and local level in 2002 – interaction with business and individuals.

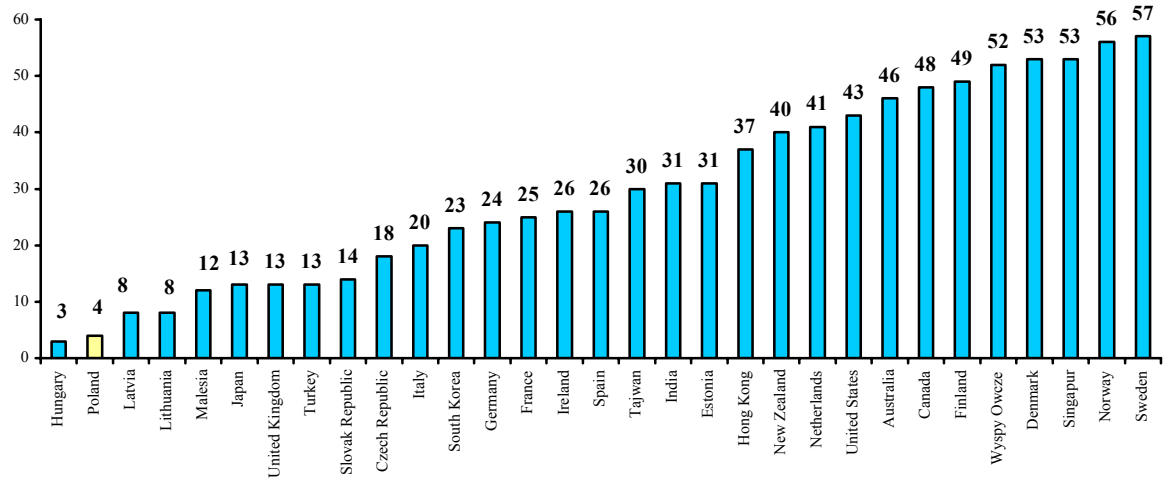


Source: Cap Gemini Ernst & Young Polska, www.pl.cgey.com

No surprise than that a number of users of public electronic services is non satisfactory and amounted to only 4% of the population as of the end of 2002 (Graph E20).

Graph E20. Users of electronic public services in 2002 in selected countries (as per cent of population)*

* By 12 months before the research



Source: Taylor Nelson Sofres, www.tnsofres.com

All of the national ministries, agencies and institutions have web sites (gov.pl), which – at the very least – provide information on their specific activities.[55]

At the level of local governments, all voivodships maintain web sites with a regional content. Malopolska voivodship has been successfully running the pilot project "Gateway to Malopolska" (available at http://www.gateway.malopolska.pl/index.html) of the national project "Gateway to Poland", which is meant to provide complete eGovernment services (application for passports, IDs, announcements of public tenders etc.). Recently Podlasie voivodship has followed into the footsteps of Malopolska and by the end of 2003 should be running its own eGovernment web site. Other cities have also made substantial progress (Box E2).

Box E2
Poznan, a large city in the Western part of Poland, has recently introduced an Internet based application for business registration. Soon more business services are to follow. Poznan authorities are now waiting for the new Act on Business Activity, which will allow for Internet-based application for a much larger number of business-oriented procedures. From: http://www.city.poznan.pl/msp

Nevertheless, the development of fully interactive public administration web sites still has a long way to go as illustrated by the results of a recent online survey (Box E3).

Box E3. "Public Administration Online 2003" survey
According to a second edition of a survey "Administracja Publiczna w sieci 2003" (Public Administration Online 2003) of web sites of 66 public offices – 15 ministerial, 16 voivodship offices, 16 local government authorities, and 18 cities – done by a NGO "Internet Obywatelski" (Citizens Internet), still there is not a single public administration web site, which would be interactive, i.e. where it would be possible to download documents, fill them in, and re-send to the respective authorities. Only a few regional public administration web sites offer documents downloads. Most web sites do not offer search capabilities in foreign languages (English), although half of web sites surveyed had an English language version. None of the web sites offered enhanced access for disabled people (hearing and sight impaired). All in all, despite all the shortcomings, the authors conclude that some progress has been made since the first report from 2002. Nonetheless, the authors call the state of development of the public administration web sites as "embryonic". Source: Citizens Internet web site http://www.egov.pl/_baza/waes2003/raport_summary.pdf

Penetration of web sites at the local level has been quickly growing between 1998 and 2002 (Table E7) as local authorities were realizing the benefits of on-line presence.

Table E7. Number of local authorities with web sites

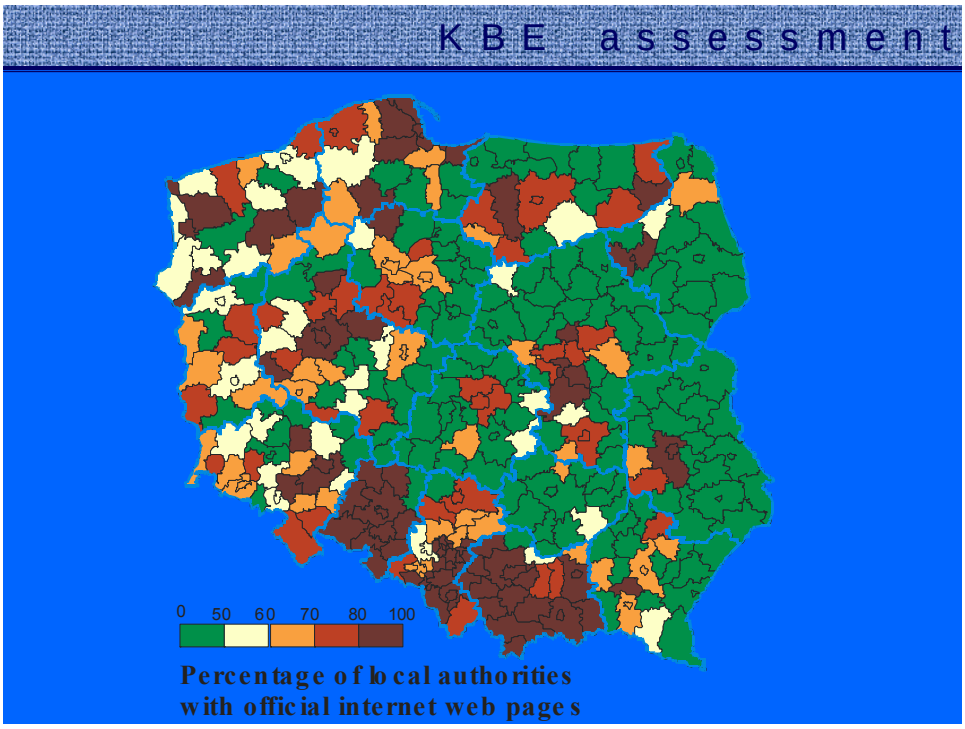
	1998	1999	2000	2001	2002
Rural communes	183	275	455	583	618
Urban communes	320	440	631	637	664
Powiats		154	349	267	295
Total	**503**	**869**	**1435**	**1487**	**1577**

Source: From http://www.egov.pl/opracowania/statystyki.php

[55] In February 2003 the Ministry of Finance have opened an Internet portal www.mf.gov.pl, which has proved to be the most comprehensive public administration web site so far.

The regional penetration of web site on the level of local administration is quite diverse (Graph E21). Central and eastern Poland is much less developed in this respect than the national average. It again points to the digital divide, which seem to exist between the western and central/eastern part of Poland.

Graph E21. Percentage of local authorities with Internet web sites as of the end of 2002 – per powiat (NUTS 4)



Source: Guzik (2003)

The regional digital divide is also confirmed by an alternative source of data (Table E5), which shows that Lodzkie, Podlaskie and Lubelskie voivodships from central and eastern Poland significantly lag behind local governments in western Poland (Opolskie) in terms of proportion of local authorities with web sites.

Table E8. Proportion of local authorities with web site in total as of the end of 2002

Leaders	%	Laggards	%
Opolskie	93.0%	Podkarpackie	36.2%
Małopolskie	72.6%	Świętokrzyskie	32.3%
Śląskie	66.1%	Lubelskie	28.2%
Dolnośląskie	58.6%	Podlaskie	28.0%
Lubuskie	57.8%	Łódzkie	26.5%

Source: from http://www.egov.pl/opracowania/statystyki.php

In order to increase the level of access to Internet-based public services, in early 2003 the government has adopted the "Strategy for Informatization of Poland". It takes stock of the current level of development of electronic public services, outlines the strategy for further development and assigns responsibility for carrying out the plan to various entities of public administration.

"Strategy for Informatization of Poland" (quoted) "envisages that 26 key public services will be migrated to the electronic platform. The following services are slated for earliest implementation:

Six services targeted at citizens:

- Filing of returns, submission of information and other documents required for assessment of taxes due under various tax laws affecting, *inter alia*, tax dues such as personal income tax, stamp duty on various legal and commercial transaction as well as handling of tax settlements/payments for the above
- Access to a catalogue of "positions vacant" announcements and aid in finding jobs
- Filing for and securing an entitlement to Social Insurance Office benefits
- Ordering the domestic identification document, a driver's license and a passport
- Access to catalogues of public libraries including search functionalities
- Booking a medical consultation
- Five services targeted at corporate and business users:
- Reporting payer's obligation with respect to social insurance payments on behalf of employees
- Customs declarations
- Filing of returns, submission of information and other documents required for assessment of taxes due under various tax laws affecting, *inter alia*, tax dues such as corporate income tax, VAT and excise tax and payments under customs duties
- Uploading statistical information
- Involvement in public procurement procedures".

"The Strategy" projects that when "appropriate electronic communications platform handling two-way communications between agencies and citizens is created and combined with reorganization of selected processes in agencies and changes to their IT support systems it will be possible to achieve a 40% increase in effectiveness for services that are delivered electronically. In assessing actual gains in effectiveness use will be made of such performance indicators as time needed to handle a request and other cost and time related ratios."

"The Strategy" establishes medium-term objectives, which call for the level of e-delivery of public services to reach the EU average by the end of 2005 (Table E9).

Table E9. Objectives and timetable for delivery of electronic public services – "Strategy for Informatization of Poland"

Poland's Gateway	The level of e-delivery of key public services reaches the average European standard.	end 2005
	Potential effectiveness of public administration improved by 40%	end 2005
	Procurement demands of central government agencies are „pooled" and orders are placed electronically.	end 2004

Source: "Strategy for Informatization of Poland"

According to the Ministry of Scientific Research and Information Technology, substantial improvement in the level of electronic public services requires some EUR 100 million of annual outlays. The maintenance of public services would cost some EUR 40-50 million per year. Yet, potential savings could be immense: e-procurement could slash administrative costs of servicing procurement by some 25%. Similar savings could be achieved on the decrease in prices of procured products. It is also estimated that electronic based services could decrease the cost of handling a single request from a citizen from current PLN 34 to PLN 4 (Gontarz 2003).

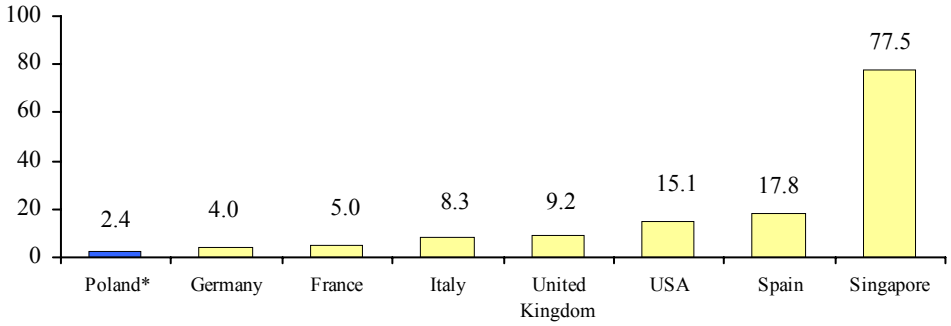
Yet, it is uncertain if the ambitious plans envisioned in the "Strategy" will be achieved. Based on the experience so far, it can be quite safely assumed that there will be some delays in implementation of the objectives of the "Strategy". Nonetheless, the "Strategy" is commendable in setting clear aims and timetable, which – even if with delays – is likely to stimulate progress in Internet delivery of public services. Funding from the EU (estimated at some EUR 200 million for informatization of public administration between 2004 and 2006) is very likely to substantially speed up the progress.

Box E4. Public Information Bulletin
By mid-2003 a centralized web site has been created in accordance with the provisions of the Act on Access to Public Information. The Act requires that public administration, all levels of local government, public agencies and other institutions (such as trade unions or political parties) provide a specified set of information, which is to be published on the home page of the Bulletin at www.bip.gov.pl for public access. Information that is not available of the web site is often made available through links to local websites. The introduction of PIB has led to a substantial increase in the level of informatization and internetization of all public institutions in Poland. Source: "Strategy for Informatization of Poland" and www.bip.gov.pl

E.8. IST in public administration

ICT penetration in public administration has been constantly growing in the last couple of years, albeit from a very low level. As of 2001, the annual spending on IT in public administration per capita was one of the lowest in Europe (Graph E22).

Graph E22. Annual spending on IT in the public administration in selected European countries in 2001 (in EUR per capita)



Source: Gartner Group, www.gartner.com

A number of large IT projects in public administration have recently been either completed (PESEL citizen identification system, POL-TAX system for tax administration, KRS – judicial registry of corporations, ZUS – social security system etc.) or are close to completion (CEPIK – car and insurance registry, IACS – registry for livestock, which will be a basis for direct farm subsidies from the EU, Zefir-Celina – customs system, which has recently received an "e-Europe Award"). Alas, most of these and other IT systems were built with no regard to intra-system compatibility. For instance, the same data is often inserted into a number of independent IT systems. This situation was due to a lack of coordination of IT projects handled by the public administration. The establishment of MSRIT in April 2003 as a coordinating ministry has finally brought some order. Yet, its powers of coordination still need to be specifically assigned. The bill of the information of public administration, set to be adopted in 2004, will finally empower the MSRIT to develop, implement, monitor and coordinate public ICT projects.

The „Strategy for Informatization of Poland" sets out a specific agenda for informatization of the public administration in Poland (Table E10). According to the timetable, by 2005 all centralized public databases will need to achieve inter-operability according to a common standard of exchange of data.

Table E10. Agenda for informatization of the public administration - „Strategy for Informatization of Poland"

Action	**Ministry Responsible**	**Deadline**
Draft an action plan detailing measures connected with creation, integration and rationalization of databases kept for registers of population, vehicles etc.	Ministry of Internal Affairs and Administration in collaboration with the Ministry of Finance (POLTAX)	Q2/Q3 2003
Draft (update) the action plan connected with the Register of Medical Services	Ministry of Health	Q1/Q2 2003
Develop a nationwide data model	State Committee for Scientific Research in close collaboration with relevant ministries	end 2003
Upgrades to databases and realignment with uniform data models and communication standards	Ministries responsible for individual databases	2004-2005

Source: „Strategy for Informatization of Poland"

According to the "Strategy", the following initiatives focused on the development of IT systems in public administration are currently going on (quoted):

- → Integrated IT System of the Ministry of Economy, Labour and Social Policy – document flow system that will cater for five processes – reviewing of applications for financial support of capital expenditure projects, register of the Governmental Legislation Centre, internal consultations, consultations with external partners, consultations with foreign partners. The documents provided by third parties are scanned.
- → The Integrated IT System of the Ministry of State Treasury – the audit of the system completed by the Ministry enabled adjustments to the Ownership Transformation Monitoring Subsystem whereby it was realigned with changing regulations and led to modifications affecting a number of modules with respect to back-up solutions, data security and access control. Other plans of the Ministry include, inter alia, electronic collection of surveys about registers of State Treasury assets and migration of document flow and archiving to an EDI platform providing for functionalities such as scanning of inputs and OCR [Optical Character Recognition].
- → In the Ministry of Internal Affairs and Administration an effort has started to modernize the PESEL-NET to enable its interoperability with the IDA System (Interchange of Data between Administrations). The Ministry is also working on integrating the system responsible for issuance of documents with relevant registering (including but not limited to the PESEL system). The network utilizes leased lines provided by Poland's incumbent operator – TP SA. Upgrades will result in better throughput of the network and lead to a more extensive geographical coverage whereby at least powiat (county) level access will be provided for. For documents that cannot be transferred electronically to citizens other delivery options such as courier mail are being considered.
- → The Ministry of Finance rolled out in all Customs Chamber a system called ZEFIR – Tax and Customs Settlement and Budget Accounting System. The system led to standardization of financial and accounting processes and is currently in use with the opening balance sheet as at 1 January 2003. In 2002 a contract was signed for functional development of the system and for rollout of the CELINA system (Support of Customs

Declaration Processing System) across all units of customs administration to be completed by the end of 2003. The Project is on track.

- → NTCS – The Ministry of Finance commissioned development of the NTCS system to provide for interoperability with the system handling Uniform Transit Procedure of the European Union. The system will be eventually implemented in 150 organisational units of customs administration by the end of 2003.
- → POLTAX – the information system supporting all functions performed by tax offices with respect to the tax system. The system is used in 350 tax offices nationwide. POLTAX includes the following integrated subsystems employing a single shared data model.
- → REGISTRATION – registration of entities on the basis of NIP [Tax Identification Number] forms, capture and storage of data about businesses and their operations.
- → ASSESSMENT – tracking and handling tax returns, administrative decisions and other documents specific for individual types of taxes.
- → ACCOUNTING – enables recording taxes and non-tax dues to the State Budget (appropriations, deductibles, payments and refunds) and handles transfers of monies to relevant target budgets and other debtors.
- → EGAPOLTAX – support to efforts aimed at recovery of tax arrears pursued by individual tax offices.
- → AUDIT – audit planning, selecting target auditees (manual or automated), handling of the audit process and maintaining appropriate documentary evidence
- → TICKETS AND FINES – keeps track of fines and tickets and manages repertory of penal and tax litigations.
- → In addition to satisfy reporting needs of all levels of the Ministry efforts were made to create and maintain appropriate data warehouses (EGACASES, ARREARS, CIT, PIT) populated with aggregated data feeds from POLTAX installations from all tax offices. Computer Networks of the Ministry of Defence – MOD developed infrastructure of its four proprietary compter networks
- → - Konsul – the Ministry of Foreign Affairs came up with the functional design for a system expected to handle support to consular duties.

The successful implementation of the plans spelled out in the "Strategy" will depend on the administrative efficiency of particular ministries, strengthening of the coordinating role for the MSRIT, and sufficient funding. EU structural funds are likely to help the latter. Yet again, based on the historical experience, it is quite likely that a number of projects will be implemented with a substantial delay as the incentive system is not strong enough to assure timely completion of the assigned projects. EU-driven monitoring will hence come in very handy. Overall, the progress in informatization is certain to be achieved, yet too slow of a pace will not allow Poland to substantially improve its position vis a vis the EU average, at least by 2006.

E.9. Health system

The "Strategy for Informatization for Poland" spells out the agenda for informatization of the public health system (Table E11). Based on the Strategy, the Ministry of Health has been working on a plan to develop by the end of 2004 a "patient electronic card", which would record all information on a patient when interacting with the public health sector (insurance, health, personal information, prescription drugs etc.). It is estimated that introduction of the

electronic card could save up to 10% of the cost of the public health system. The information saved on the card could also be placed on the Internet for fast checking by authorized parties (patient, family doctor, and local hospitals). The system, known as "RUM" (Rejestr Usług Medycznych"), is likely to be build within the offset program to the purchase of Poland of F-16 striker aircraft from US-based Lockheed Martin.

Table E11. Agenda for informatization of the public health sector – "Strategy for Informatization for Poland"

Actions	**Ministry Responsible**	**Deadline**
Evaluate legal environment for transfer of patent data and use of electronic communications in delivery of medical services	Ministry of Health	end 2003
Adjustments to Law	Ministry of Health	mid 2004
Draft recommendations for hospitals and outpatients wards on electronic patient-related data transfer	Ministry of Health	mid 2004
Launch a competition for best deployment of electronic communications in provisioning of e-health services	Ministry of Health, jointly with academics	mid 2004
Draft projects leading to implementation of the best ideas and secure funding to support them.	Ministry of Health	end 2004

Source: "Strategy for Informatization for Poland"

The "Strategy" has established an objective according to which by 2005 10% of intra-health system communication (electronic exchange of patients' files, x-ray pictures etc.) would be Internet-based.

Any progress in the health system IST penetration in the recent years has been constrained by a dire financial situation of the public health sector. The IST penetration would have been until now very low, had it not been for the World Bank financed project, which between 1998 and 2002 led to an implementation of management software systems in public hospital and regional public health administration ("Kasy Chorych"). As the program expired, sources of further financing for ICT investments are yet unkown.

The private health market has been growing very robustly since the beginning of the transition. While specific data is not available, all large private health companies (Medicover, Luxmed), which cater to mostly wealthy private individuals and corporations, use specialized software applications to manage their operations. As a result, anecdotal evidence suggests that the quality of services offered by the private health institutions is much higher than public establishments.

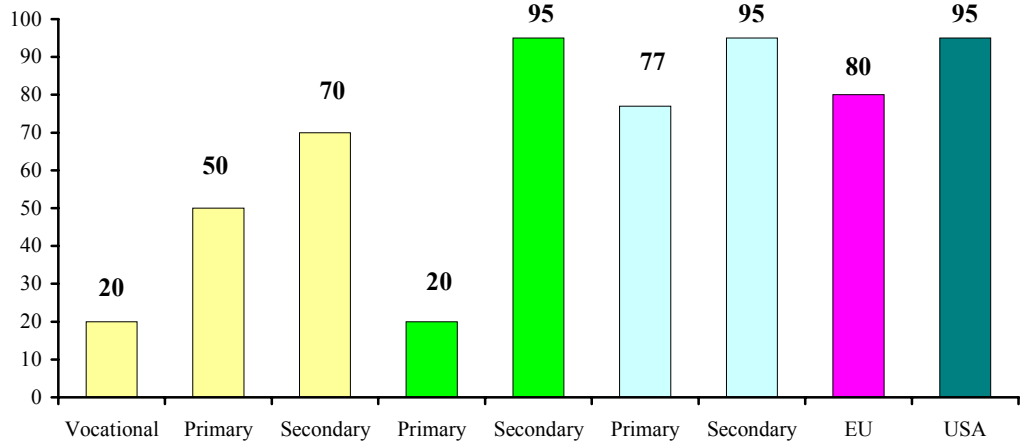
IST-driven progress in the public health system will be predominantly dependent of sufficient financing. This will be due to the final shape of the reforms of the public health care financing. As of now, it seems that owing to hard budget constraints imposed on the public health, not much progress in IST penetration can be expected at least until 2006. Funding from the EU could help, yet its impact at this point is hard to predict. In the meantime,

though, the private sector is very likely to intensively invest in IST in order to increase its competitiveness.

E.10. IST in educational services

As argued elsewhere (see section G), Polish government has recently put a lot of emphasis on providing Internet access to schools at all levels. As of mid-2001 more than half of all primary and secondary schools had access to the Internet (Graph E23). It is estimated that as of the end of 2002 the overall average of Internet penetration increased to 60% of all primary and secondary schools. More than 80% of secondary schools had access to the Internet. As of the beginning of 2003, there were 1.3 computers per 100 pupils in elementary schools and 2.5 computers per 100 pupils in secondary schools (Polskie Forum Strategii Lizbońskiej 2003). The government plans to provide universal access to the Internet in all schools by the end of 2005.

Graph E23. School access to the Internet in selected European countries
As percent of schools, 2000 - 2001



Source: Ministry of Education in Poland, Czech Republic and Hungary, Eurobarometr 2001. Note: for the EU and the US Internet penetration of primary and secondary schools combined.

"The Strategy for Informatization of Poland" calls for a development in eLearning (distance learning) (Box E5).

Box E5. "The Strategy for Informatization of Poland" on distance learning (quoted):
"Distance learning offerings may broadly be divided into two types of packages – fully fledged tertiary level courses of study and shorter courses e.g. vocational or professional training. Tertiary level courses, and especially those involving award of professional degrees and titles are subject to regulation by the State and inclusion of distance learning studies among courses eligible for official recognition may trigger the need for legislative changes. It should be noted that the new proposed e-delivery is akin to the already known and officially recognized extramural courses and hence a legal analysis may as well prove that tertiary level courses of study delivered as e-learning packages will be defined as an additional mode of extramural studies.
From the standpoint of service providers – institutions of higher education – it is equally important to provide funding for such studies hence it is required to include "distance learning" students in the algorithm used to determine the "headcount" of students eligible for state subsidies. In addition, it is necessary to design mechanisms ensuring that adequate standards of teaching and conduct of examinations are met as well as tie such mechanism with funding levels.
In case of other types of distance learning courses the State's role should be limited to providing aid in promotion of such efforts. It is proposed that a one-off tender (competition) be opened to providers of such offerings to identify the best distance learning package, to be then promoted as a reference standard.
Promotional efforts focused at raising the profile of distance learning initiatives should not be limited to Internet-based e-learning schemes. Drawing on the heritage of the now defunct Radio and Television University and educational programming for schools developed for public television we should strive to establish contacts with public and private broadcasters. It is necessary to accommodate proven foreign examples such as the Open University (UK)."
Source: "The Strategy for Informatization of Poland"

The Ministry of Education is to come up with a detailed plan on distance learning by the end of 2003 (Table E12).

Table E12. Agenda for "distance learning" - "The Strategy for Informatization of Poland"

Actions	**Ministry Responsible**	**Deadline**
Official recognition of courses of study delivered as distance learning packages and specify detailed conditions of eligibility	Ministry of National Education and Sports	end 2003
Establish rules governing inclusion „distance students" in the amount of subsidies granted to institutions of higher education.	Ministry of National Education and Sports	end 2003

Source: "The Strategy for Informatization of Poland"

It is quite likely that all Polish schools at all levels will have an access to the Internet by the end of 2006. Additional EU funding will help to achieve this objective. Nonetheless, there is still a lot be done, particularly as regards developing broadband access to schools as well as promoting distance learning.

E.11. Summary and conclusions

Poland's performance in the build up of the infrastructure and absorption of IST between 1990 and 2003 can be deemed satisfactory. On the one hand, Poland succeeded in rapidly increasing penetration of fixed and mobile telephone lines from very low levels of 1989. On the other hand though, in spite of the progress made, the penetration rates are still significantly lower than not only EU average but also the average penetration in other EU accession countries.

The large divide in access to IST infrastructure between – roughly speaking – the western and the eastern part of Poland mostly reflect the urban-rural divide. Very low penetration of IST infrastructure in rural areas has been mostly responsible for lower than in other countries penetration of computers and the Internet. Concerted efforts on the part of the public administration will be needed to bridge the divide and move closer to the target of a universal access to IST networks.

IST are increasingly used in service and manufacturing sectors in Poland. Foreign-owned companies are leading the way. Yet, when benchmarked against the EU countries, domestic companies still have a long way to go. It particularly concerns eCommerce, which – despite high expectations – is still in *statu nascendi.*

Since 2000 the progress in diffusion of IST in public administration, health and education sector has significantly accelerated as the government finally established a clear agenda for informatization of public services and administration ("Strategy for Informatization of Public Administration"). The successful implementation of the "Strategy" will depend on the administrative capacity of public institutions, sufficient funding and support from the responsible ministry (MSRIT). The EU structural funds will help to finance IST investments. By 2006 Poland is likely to achieve some tangible progress in IST penetration, yet its relative position, when benchmarked to the EU average, will improve only marginally.

Strengths	**Weaknesses**
1. Substantial progress in ICT infrastructure and penetration 2. Steadily increasing public and private interest in the use of Internet 3. Clear, comprehensive and coherent state strategy for development of eGovernment	1. In spite of progress, still low ICT penetration rates 2. 2. Regional digital divide in uptake of IST 3. 3. Insufficient level of internetization and informatization of public administration
Opportunities	**Threats**
1. EU sponsored investments in technologically disadvantaged regions 2. Larger FDI investments and increased competition should increase uptake of ICT and create spillover effects 3. Successful implementation of the state "Strategy for Informatization of Poland"	1. Widening regional digital divide in ICT use 2. Failure of the state-driven development of eGovernment 3. Lack of interest in Internet use of the older part of the population (aged 50 and more)

Strengths:
Poland has achieved a substantial progress in development of ICT infrastructure when measured by penetration rates of computers, telephones, and the Internet. The growth is being driven by a steadily increasing public and private interest in the use of Internet, which is in turn stimulated by better access to the infrastructure, "learning by doing" of benefits of the use of the Internet, particularly in terms of the use of electronic mail and access to up-to-date information, and change in lifestyles, particularly of the young, who adopt Internet as the preferred communication channel. A growing part of the Polish economy, particularly sectors with large foreign ownership, has productively implemented IST applications. Adoption of the "Strategy for Informatization of Poland" has established a clear agenda for development of the use of IST in public administration. Poland is very likely to report a steady progress in the increase in penetration of ICT on the back of rising disposable incomes of the population, decreasing costs of access to the Internet, growing awareness of the benefits of the Internet, increasing competition, growing FDI, and additional funding from the EU.

Weaknesses:
In spite of all the progress, ICT penetration rates in Poland are still much below the European average. It limits the potential benefits (the so-called network effects) of the IST. Insufficient level of internetization and informatization of public administration compromises the opportunity for development of the IS. The public "push-strategy", i.e. increasing availability of online public services, is needed to stimulate the use of Internet by individuals and corporations alike. Progress in IST penetration has not been universal. There are large differences between regions. Eastern parts of the country seem to substantially lag behind. A concerted effort of the central and regional authorities, along with financial support from the EU, will be needed to close the digital divide.

Opportunities:
The use of EU structural and cohesion funds to finance investments in infrastructure in underdeveloped regions may go a long way towards closing the development gap or at least mitigating the risk of growing digital divide. Development of projects acceptable to the EU might however represent a significant challenge to the regional local government, businesses, and NGOs. Larger FDI investments and increased competition due to the accession to the EU should increase uptake of ICT among corporations and contribute to emergence of spillover effects of the ICT use as more and more participants join the ICT networks. Foreign corporations, which on average are much more likely than local corporations to fully use ICT, are likely to lead the way. Successful implementation of the state "Strategy for Informatization of Poland", which sets ambitious goals for development of the eGovernment until 2006, would potently contribute to the progress in emergence of the IS.

Threats:
Since the use rather than production of IST is known to be the main source of a faster economic growth and productivity, the existing regional digital divide in uptake of IST may contribute to further widening of regional differences to the detriment of the overall prospects of the national economy. Failure of the state-driven strategy for development of eGovernment may lead to substantial delays in implementation of efficient state administration. Equally importantly, insufficient progress in eGovernment would minimize chances for the use of the Internet by corporations. Their inability to absorb ICT, in the face of a lack of proper incentives, might result in a decrease in international competitiveness of the Polish economy with all its negative implications for growth. Low utilization of ICT by domestic businesses would also compromise prospects for an increase in individual use, which is closely

correlated with penetration rates among businesses. Finally, information society in Poland will not fully develop in the next 20 years without arousing interest in the use of the Internet among the older part of the population (aged 50 and more). Should it not happen, penetration rates could soon reach a plateau as penetration rates among younger population reach the point of saturation. As the value of networks increases with any new participant in the network, the inclusion of the most part of the population in the network is imperative to fully benefit from the positive impact of network effects.

F. INSTITUTIONAL CAPACITIES AND REGULATORY BACKGROUND

F.1. Regulation of the major markets affecting the IST industries

F.1.1 Privatization

After the beginning of the transformation, Poland espoused a gradual pattern of privatization. State-owned companies were privatized through:

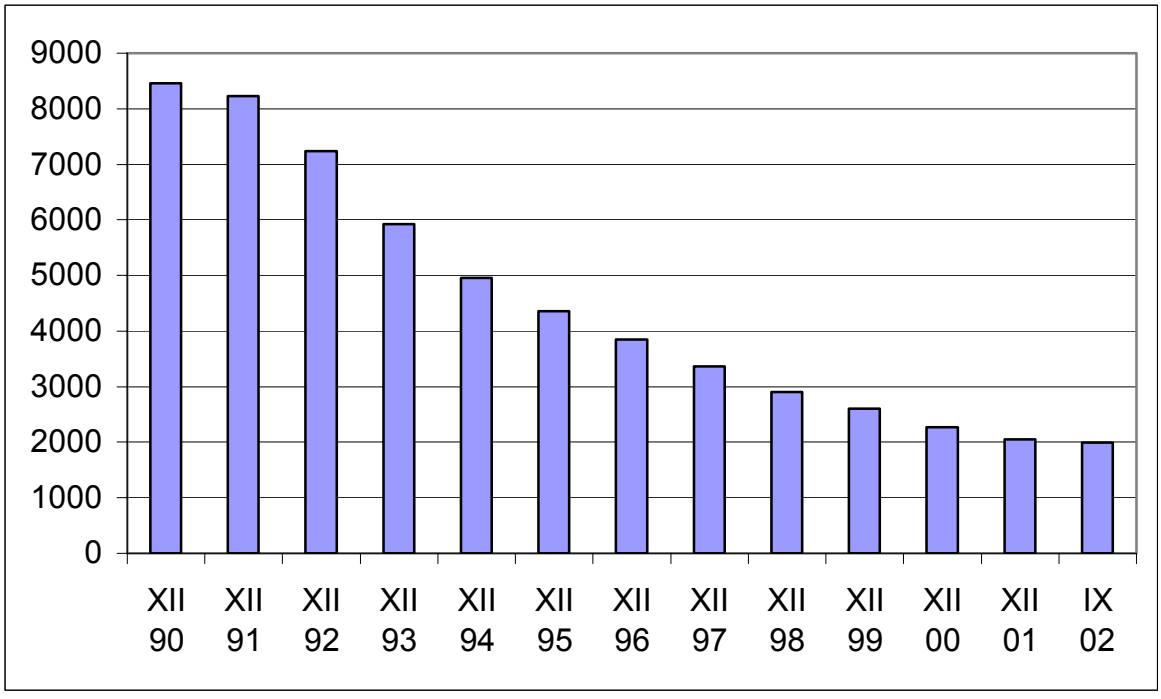
a) direct sale to foreign and domestic investors,
b) commercialization and subsequent listing on the Warsaw Stock Exchange
c) employee leasing schemes - employees would take over the company in return for lease payments to the State
d) mass privatization program – 512 companies were privatized through sale of ownership certificates to all eligible citizens
e) liquidation and subsequent sale of assets.

By September 2002, out of the original 8,591 state-owned companies in June 1991, more than 80% were privatized (see Box F1 for a history of privatization process in Poland).

Box F1. Privatization process in Poland

As shown in Graph F1, as of September 2002 almost two thousand companies were still in the hands of the state. The speed of the privatization process was quite steady during the last decade, although it was slowly losing steam towards the end of the 1990's and in 2000-03 since the remaining companies were either hard to sell because of their dire financial situation (a large number of the state-owned companies is now close to bankruptcy), strategic interest of the state (PKO BP – the largest retail bank, power, utilities, chemical sector) and often lack of political resolve (privatization of a Warsaw power distribution STOEN in 2002 resulted in large social protests).

Graph F1. Progress of privatization: number of state-owned companies, 1992-2002



Source: Ministry of the Treasury, www.mst.gov.pl

Privatization has led to an accelerated modernization and restructuring of domestic companies, increase in competition, higher absorption of technological and managerial know-how (mostly from foreign investors) and a much larger focus on the quality of human capital and job skills. High labour productivity growth rates reported by Poland in the 1991-2003 period (Chapter A) are partially due to positive economic effects of privatization and re-allocation of resources. Privatization has also however led to reductions in workforce, which partly contributed to an increase in unemployment to more than 18% of the labour force as of early 2003.

In November 2003 the government adopted a privatization strategy for years 2004-06 (available at www.mst.gov.pl), which projects privatization of the remaining sectors of the economy, including partial privatization of the so-called "strategic sectors" (railways, power generation and distribution, the two largest domestic financial institutions - savings bank PKO BP and largest insurer PZU, oil refineries, gas mining and distribution, bulk chemical sector and pharmaceutical companies).The total privatization proceeds in the three-year period are projected at PLN 24.6 billion (EUR 5.7 billion). The Ministry plans a partial sale of PKO BP, the largest local retail bank, a sale of a controlling stake in LOT Polish Airlines, further privatization of the power generation, pharmaceutical and heavy chemistry sector. Consequently, by 2006 the ownership structure of the Polish economy should resemble that of EU member states, where state-owned companies generate some 15-20 per cent of GDP (as of the end of 2003, state-owned companies in Poland generated some 28% of GDP). The overall value of the state-owned assets as of mid-2003 was estimated at PLN 93.8 billion, of which 57.3 billion in assets in the business sector. The Ministry plans to retain in state hands airports, railway network, gas and oil pipelines, power grid, Polish Post and public radio and TV.[56]

The completion of the privatization process will contribute to an increase in productivity and efficiency of the local economy. Since privatized companies are on average much more likely to absorb ICT, privatization should also result in higher absorption and diffusion of ICT.

F.2. Regulation in the main services and infrastructure sectors

Since 1989 Poland has been gradually following the liberalization process of services and infrastructure sectors. While most of the EU legislation has been already adopted and relevant institutions are in place, implementation and execution of regulations is quite unsatisfactory. This is mostly due to a weak performance of the national telecom market regulator – URTiP – which owing to a lack of relevant experience, inadequate number and training of people, insufficient financing, poor follow-up, a lack of instruments of law execution, and a overall culture of skirting the law, has proved unable to efficiently and decisively implement existing legislation. Insufficient support from the Ministry of Infrastructure, which had failed to issue a number of important ordinances regulating the telecom market, has also contributed to ineffective implementation of the regulatory framework.

F.2.1 Telecommunications

Deregulation and liberalization processes of the telecommunication market in Poland commenced on November 23, 1990 with an introduction of the Bill of Telecommunication, which prompted the creation of two independent companies (December 1991) Polska Poczta

[56] Rzeczpospolita, 10 December 2003.

(Polish Post, www.poczta-polska.pl) and Telekomunikacja Polska S.A. – TPSA – www.tpsa.pl), which were split from the previous combined monopoly of Polish Post, Telegraph and Telecommunications. Both TPSA and the Polish Post were granted a monopoly of the predominant part of their markets. TPSA was given exclusive rights to carry local, intercity and international voice services.

The liberalization in earnest started in 1992. Until 2003, based on a new telecommunication law adopted in 2001, Poland has gradually introduced competition in local calls (1997), intercity calls (complete liberalization as of 1 January, 2002) and international calls (1 January, 2003). Yet, in spite of the recent adoption of an amendment to the telecommunication law (1 October, 2003), as argued by Strężyńska et al. (2003), the current regulatory and legal framework still needs to be updated to entirely conform to the EU regulations so as to promote fair competition and a decrease in prices.[57]

Table F1 shows the list of the major telecom market players as of the end of 2003.

Table F1. A list of major telecom market companies – 2003

Company	Founded in	Ownership
Telekomunikacja Polska S.A. www.tpsa.pl	December 1991	France Telecom (33,93%), Kulczyk Holding S.A. (13,57%), state (5,91%). The rest in free float on the Warsaw Stock Exchange
Telefonia Lokalna S.A. (Dialog) www.dialog.pl	August 1997	100% KGHM Polska Miedz S.A., controlling stake in the state hands
Netia S.A. www.netia.pl	October 1991	76,01% in free float on the Warsaw Stock Exchange, Montpelier Asset Management Ltd., 6,14%, SISU Capital Ltd., 6,89%, Griffin Capital Management Ltd. (5,94%), Pioneer Pekao Investment Management SA (5,01%)
El-Net S.A. www.elnet.pl	1996	100% by Elektrim Telekomunikacja Sp. z o.o., which in turn is owned by Elektrim S.A. (49%) and Vivendi (51%). Majority stake sold to Netia in January 2004.
Energis Polska S.A. www.energis.pl	September 1999	National Grid UK and Energis plc, UK (51%) and Polish Railways S.A. (49%)
Tel-Energo S.A. www.telenergo.pl,	1992	
NOM S.A. (www.nom1044.pl)	November 1999	Controlling stake of Tel-Energo S.A.
BPT Telbank S.A. (www.telbank.pl)	September 1992	Controlling stake of Tel-Energo S.A.
Telenet Sp. z o.o., www.tnp.pl	1994	Private - not available
Tele2 S.A. www.tele2.pl	2000	100% Tele2 AB, Sweden

Source: based on information from the companies

[57] See also http://europa.eu.int/eur-lex/en/archive/2002/l_10820020424en.html

F.2.2. Fixed line telephone market

In spite of the gradual liberalization, the incumbent national telephone company TPSA still controls more than 90% of the fixed line market in local and intercity calls (Table F1 and F2).

Table F2. Structure of the local calls market, the end of the third quarter 2003

TPSA	90.4%
Telenet	1.2%
El-Net	0.7%
Dialog	3.1%
Netia	2.9%
Other	1.7%
Total	100.0%

Source: Janiec (2003) based on TP S.A.

Table F3. Structure of the inter-city calls market, the end of the third quarter 2003

TPSA	87.7%
NOM	2.4%
Tele2	2.2%
Energis	3.3%
Netia	4.4%
Total	100.0%

Source: Janiec (2003) based on TP S.A.

In the international calls market, TPSA share is also close to 90% (Janiec 2003). The remaining part of the market is divided into a number of small operators (Netia, Tele2, Energis, VOiP operators).

In 2002 carrier selection and pre-selection for inter-city long distance calls was introduced in Poland. In the beginning of 2002, NOM, an alternative operator to TPSA, introduced inter-city long distance services based on the TPSA network without a need to sign a separate agreement. Within six months, TPSA lost 30% of the market. Alas, TPSA cannily refused to invoice its own customers for services rendered by NOM. In the end, despite help of the national regulator URTiP, NOM had to change its strategy and asked clients to sign separate service agreements. Soon enough, TPSA regained most of the lost ground.

Local access has not been liberalized yet. RUO (Reference Unbundling Offer) is not compulsory for the fixed incumbent. There are now over 50 small local operators. Only two TV cable operators provide phone services using their own networks (out of over 500 TV cable operators). This is largely the result of the anti-competitive behaviour of TPSA, which leases its so-called “ducts” to cable operators on the condition that they would not provide telephone services (URTiP has not yet resolved this issue). There were no unbundled local loops as of 30 June 2003. It is likely to gradually change thanks to the recent amendment to the telecommunication law. Nonetheless, without strong support from the national regulator, any progress in local loops unbundling would not have a tangible effect on the position of TPSA.

This near-monopoly situation has led to high prices of telephone services, particularly those most insulated from competition. According to the OECD (2002), the price (PPP) of international calls in Poland, mostly dominated by TPSA, in 2001 were one of the highest

among OECD countries. Average cost of international calls in OECD countries amounted to 2.96 USD/PPP for private clients and 1.3 USD/PPP for business, whereas in Poland it amounted to USD 8.43 and USD 3.05, respectively. Since 2001 they have gone down (as TPSA introduced deep cuts in price in mid-2003), yet nonetheless Poland's position vis a vis other OECD countries has not materially changed.

As reported by Janiec (2003) and Strężyńska et al. (2003), prices of local and intercity calls are also one of the highest among the OECD countries, although lower than in Hungary, Slovakia and Czech Republic.

Domestically, TPSA international calls are on average 30-50% more expensive than alternative operators (featured in Table F4) and up to 90% more expensive than small VoiP operators, which often charge a flat price as low as PLN 0.23 per minute (www.dzwoneczek.pl, www.halo2.pl, www.telepin.pl and others).

Table F4. Average unit price of selected international calls in Poland per various operators as of September 2003 (in PLN per minute)

Country	TP S.A.	Netia	NOM	Energis Polska	Dialog
Afghanistan	**6,25**	5,50	3,98	3,50	6,05
Australia	**2,00**	1,69	1,18	1,19	2,00
Croatia	**1,69**	1,53	0,94	1,14	1,64
Czech Republic	**1,20**	1,05	0,94	0,89	1,20
Ecuador	**3,46**	3,15	3,98	3,50	3,36
Germany	**1,20**	1,05	0,88	0,84	1,20
Ukraine	**1,39**	1,19	0,94	1,14	1,35
USA	**2,00**	1,69	1,18	1,19	2,00
UK	**1,20**	1,05	0,88	0,84	1,20
Venezuela	**3,46**	3,15	3,98	3,50	3,36

Source: Data from the operators and URTiP (2003)

Prices of international calls are likely to further decrease as TPSA position is being eroded by established competing operators as well a myriad of small and medium size companies offering VoiP-based international calls. The larger competitors like Netia, Energis, Dialog, with help from the regulatory office URTiP, recently forced TPSA to sign agreements on sharing the revenue from rendering mutual services, which opens the way for nationwide access to international calls without a need to utilize TPSA. As for the local and inter-city calls, it may be expected that while prices of local calls will not decrease (due to tariff re-balancing) it is quite likely that prices of inter-city calls will gradually decrease to the level of local prices. Full adoption of the EU legislation upon the accession, which will further liberalize the market, is poised to speed up the process of price decreases.

F.2.3. Mobile telephony

There are three mobile phone operators: PTC, Polkomtel and Centertel (Table F5).

Table F5. Three mobile market operators in Poland

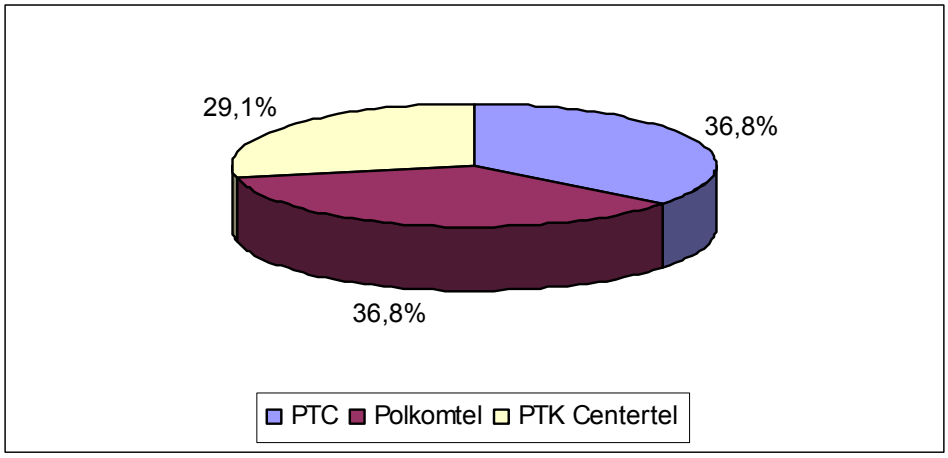
Company	Founded in	Ownership
PTC Era Sp. Z o.o. (ERA) www.era.pl	1995	51% Elektrim and Vivendi, 49% Deutsche Telekom
Polkomtel Sp. z o.o. (PLUS) www.plusgsm.pl	1995	19,61% TeleDanmark, 19,61% Vodafone, 19,61% KGHM Polska Miedz S.A., 19,61% PKN Orlen S.A., 16,05% Polish Power Grid (PSE), 5,51% others
PTK Centertel Sp. Z o.o. (IDEA) www.idea.pl	December 1991	66% TPSA, 34% France Telecome

Source: companies' websites

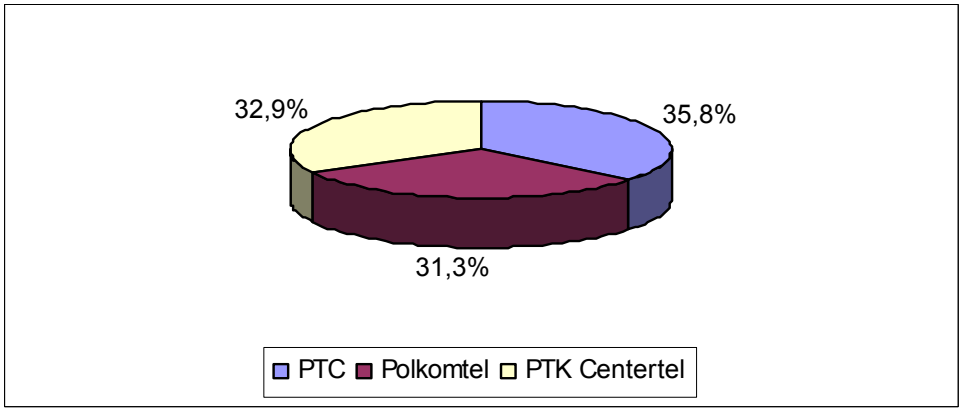
PTK Centertel, a subsidiary of TPSA, was established in 1991. It started operating an analogue NMT system in June 1992. The number of users quickly reached 250 thousand. In 1996 two GSM licenses were granted to Polkomtel and Era GSM. In 2000 PTK Centertel received the third GSM license.

As of the third quarter of 2002, PTC maintained the largest share in the market and boasted of almost 4 million subscribers (Graph F2).

Graph F2. Market shares of incumbent GSM operators as of the end of III quarter 2003
a) by share in total market revenue after three quarters



b) by share in total number of subscribers



Source: Rzeczpospolita, 3 December 2003

UMTS licenses were granted in 2001 for a price of EUR 650 million each payable in installments until 2020. The deadline for the launching of 3G services is now set for the beginning of 2006 (postponed from 2004). The three operators are obliged to cover 20% of Poland's population by the end of 2006 and increase the coverage to 40% by the end of 2007.

F.2.4. Internet access and data transmission

Internet access is the market least dominated by the TPSA, whose share as of November 2003 has been estimated at some 85%. The remaining part of the market is divided into 41 national operators (including two of the three largest internet portals – Onet.pl and Interia.pl – which in cooperation with Energis Polska, a telecom operator, offer dial-up internet connections) and 150 local operators (including cable TV companies). According to the Institute of the Electronic Market, in 2003 the value of the market for Internet access, leasing of telephone lines and data transmission will increase to some PLN 5 billion (EUR 1.07 billion), that is up 44% from 2002. In 2004 the value of the market is projected to increase by another 40%.[58] As discussed in Chapter E, local and national cable companies, which access 55% of all Polish households, retain an almost 50% share in the broadband Internet access market. The success of "Neostrada" broadband access offered by TPSA it likely to improve TPSA's market position in the coming years (TPSA plans to increase broadband penetration to one million subscribers by 2005). Assuming that cable companies would be able to double their broadband penetration to some 300 thousand by 2005, their share in total market would amount to some 25% by the end of 2005. Other operators are likely to garner only a small share of the market (Box F1). Additional stimulus to Internet and broadband penetration can stem from development of WiFi networks. By the end of 2003, PTC Era (www.era.pl) plans to activate more than 60 hotspots all over Poland (57 already active as of the end of November). The other two mobile operators are likely to soon follow the suit. Nevertheless, at least until 2006, the WiFi based broadband Internet is not likely to garner more than a 5% market share.

Box F2. Alternative broadband

MPEC, a heat distribution company based in Wroclaw in southern Poland, has recently expanded its broadband Internet access services to almost three thousand customers. The monthly service fee amounts to 58 PLN per month (approx. 15 EUR), which is by far the most attractive offer for broadband in Poland (TPSA offer costs some 150 PLN for a connection of a much lower speed). The company installed fiber optics network after 1997 floods, which destroyed the then existing infrastructure. "Parkiet" daily, 13 August, 2003.

F.2.5. National regulator

The Office of Telecommunication and Post Regulation (URTiP) (www.urt.gov.pl) was established in January 2002. URTiP replaced the Office of Telecommunications Regulations (URT), which was established on 1 January 2001 as the sole regulator in charge of telecommunication, radio bandwidth management and electromagnetic compatibility. URTiP is a government agency financed from the state budget. The President of the URTiP is appointed by the Prime Minister at the request of the Ministry of Infrastructure.

URTiP is responsible for regulation of the market for telecommunication services, interconnection settlement rates, infrastructure, numbering resources, radio frequency spectrum, and for monitoring of the quality of universal postal services provided by the Polish

[58] Gazeta Wyborcza, 5 December 2003

Post (Poczta Polska). The Chairman of URTiP issues permissions for telecommunications operators (more than 145 licenses were issued as of the end of November 2003, out of which 85 were licenses for rendering of telephone services). As opposed to national regulators in other countries, URTiP does not have prerogatives to issue ordinances to telecommunications laws. These are issued by the Ministry of Infrastructure.

Despite substantial progress in the regulatory framework since 1998, poor performance of URTiP, along with low quality of legislation ("cut and paste" from the EU legislation) mistakes and delays in issuance of ordinances by the Ministry of Infrastructure (for instance, by October 2003 the Ministry has yet not issued all administrative ordinances to the telecommunication bill adopted in 2001!), has been the main reason for the relatively low level of liberalization of the telecom market. URTiP has so far largely failed to tangibly contribute to the decrease in prices of telecom services and increase in the penetration of telecommunications networks as evidenced by the level of prices and penetration. URTiP has also been unable to constrain the market power of TPSA and support the alternative operators.[59]

Poor track record of URTiP seems to be due to a lack of relevant experience, low financing, insufficient number and quality of employees, high turnover of URTiP chairmen, lack of decisiveness, and poor execution of existing legislation. Unclear division of competences between URTiP and UOKiK (Office for Competition and Consumer Protection, a competition watchdog – www.uokik.gov.pl) has also contributed to inefficient enforcement of law.

To sum up, the process of telecom market liberalization could have been much faster had it not been for the monopoly position of TPSA and inability of the regulator, URTiP, to enforce existing laws.[60] Current regulatory framework has still a number of drawbacks resulting from an insufficient understanding of competition principles in the telecommunications industry, lack of consultation in the legislative process, and incomplete implementation and execution of laws due to their adoption without key administrative ordinances. The whole reform process seems to have lacked a coherent, consistent, and determined approach to improvement of the regulatory framework.

Accession to the EU will make it incumbent on national authorities to fully implement EU regulations. This on its own will significantly strengthen the regulatory framework. One can also be cautiously optimistic about the future role of URTiP – the "learning by doing" process should soon bring tangible results. By 2006 the level of the liberalization of the telecom market is likely to be comparable with the EU average, although in all likelihood TPSA will largely retain its dominant market position.

[59] Although it has been rumoured that URTiP's failure to deal with TPSA was due to the stipulations of the privatization agreement signed in 2000 (35% and then 12,5% of TPSA was sold to France Telecom and Kulczyk Holding), which supposedly assured that TPSA would enjoy monopoly in the domestic market until 2003. Yet, these assertions have never been confirmed.

[60] For instance, URTIP has been unable to collect fines imposed by itself on TPSA for unfair market practices and monopolistic behavior. All cases has so far been successfully litigated by the incumbent operator. Instead, as a panaceum for TPSA's dominant market position, URTiP strongly encourages a project of creating a strong alternative telephone operator, which would be able to effectively compete with TP S.A.

F.2.6 Financial and insurance sector

Poland's legislation of the financial sector (banking, insurance, investment funds, pension funds etc.) is by now largely compatible with *acquis communataire.* Pending amendments to the existing laws will bring Poland to an almost complete harmonization with the EU rules.

The financial market is already one of the most competitive due progressive privatization and deregulation. As of November 2003, more than 80% of the banking sector (in terms of assets and equity) was in the hands of foreign investors (Citibank, Deutsche Bank, HypoVereinsbank, Creditanstalt, Raiffeisen, Unicredito, Nordea, SEB, HSBC and others). The share of foreign ownership in the banking sector is – next to Hungary – the highest among all the post-socialist countries. According to the current government's strategy, PKO BP, the largest domestic savings bank, will be partially privatized in 2004 through a sale of a minority stake on the Warsaw Stock Exchange. The state will however remain the majority shareholder.

The insurance sector was opened to international competition already in the early 1990's. Yet, PZU, the erstwhile monopolist, still controls more than 50% of the market. PZU, already partially owned by a Dutch insurance company Eureko, is slated for an initial public offering on the Warsaw Stock Exchange in 2004, which will complete its privatization and – consequently – the privatization of the whole insurance sector as all of the other market players are in private hands. Other segments of the financial sector in Poland, which saw a phenomenal growth in the last decade (investment funds, venture capital, pension funds etc.) are entirely private.

Three institutions supervise Poland's financial sector:

- Banking system - National Bank of Poland (NBP, www.nbp.gov.pl) together with the Commission of Banking Supervision.
- Insurance sector - Office of Insurance and Pension Funds Supervisory Commission (KNUiFE, www.knuife.gov.pl).
- Capital markets - Polish Securities and Exchange Commission (KPWiG, www.kpwig.gov.pl).

F.2.7. ECommerce and eBanking

Regulatory framework of eCommerce was partly established in 2002 with the adoption of the Act of Electronic Signature, which – in accordance with the relevant EU directives - provides for equal validity of electronic and hand signatures. However, the adoption of e-signatures has so far been quite slow due to insufficient demand for eCommerce products and unresolved issues of online security and consumer protection. Nonetheless, it is likely that by 2006 - in line with the growing awareness of the benefits of eCommerce and e-banking - a substantial progress in utilization of eCommerce can be expected.

F.2.8. Transport

The predominant part of the regulatory framework is consistent with the EU regulations. The railway market is slated for gradual liberalization, with the cargo market due to be fully liberalized upon the entry to the EU. Similarly, the road transport will be opened to full EU competition upon the accession. Since - due to lower wages - Poland's freight industry is

considered to be more competitive than its Western counterparts, the EU countries have negotiated transitory periods for Polish freight companies to render cabotage services within the EU.

F.3. Regulation of the IST based public information and services sector

In December 2002, a program document "Gateway of Poland" was adopted by the State Committee for Scientific Research (currently Ministry of Scientific Research and Information Technology – www.mnii.gov.pl). The document specifies strategy and actions aimed at providing public services by organs of public administration through the use of modern IT and telecommunication technologies, especially the Internet.

The main objectives of the "Gateway of Poland" project are to provide information and services from different public administration units and to enable its users single access to all public data bases, administrative procedures and corresponding forms.

The main concept is to transfer onto the electronic platform 26 basic public services. These would be first the following:

- ✓ six services for citizens: income tax accounting, search for work offers, social security payments, identity cards, driving licenses, passports, access to catalogues of public libraries, appointments with doctors.
- ✓ five services for companies: registration and accounting connected with social security payments, customs applications, accounting for corporate income tax and VAT, transfer of statistics data, participation in public procurement tenders.

The strategy was prepared and is being coordinated by the MSRIT, which is responsible for the planning, consultation and formulation of methodological and technical solutions for developing the IT infrastructure of state organizations.

The Mission of "Gateway of Poland" is to increase by 10% the real and by 40% the potential effectiveness of public administration. The short-term target for the year 2003 is a preparation of a detailed concept of the project, which should describe the methods of implementation of e-services along with accompanying regulatory measures: online privacy, access to public databases, e-signature in public administration, and intra-administration national and regional coordination.

F.4. Summary and conclusions

The privatization process in Poland is almost complete. More than 80% of state-owned enterprises have been privatized by September 2003. Yet, the privatization has so far largely eluded the so-called strategic sectors of the economy: power generation and distribution, heavy chemical sector, pharmaceuticals, railway services, the largest saving bank and the largest insurer. However, the privatization of these sectors is in the pipeline. It can be assumed that by 2006 the Polish economy will reach an ownership structure of the EU countries, where the public sector generates from 10% to 20% of GDP.

The liberalization process of the services and infrastructure sectors had made a large progress since the beginning of the transformation. Most of the EU legislation is already in place. Yet, the implementation and execution of laws and regulations remains insufficient. It is due to inefficient public administration, lack of political support for swift law enforcement and low

respect for law. The activity of URTiP, the regulator of the telecommunication market, is a case in point. In spite of the *de iure* liberalization of the local, inter-city and international telephone services, the market is *de facto* still largely monopolized by the incumbent TPSA. Various efforts of URTiP to increase competition in this market have so far been quite ineffective when faced with staunch resistance from the TPSA and apparent lack of political will to force TPSA to fully comply with the law.

In spite of all the shortcomings, accession to the EU will bring additional stimulus for increase in market competition. The telecommunication market is likely to be liberalized by the end of 2006. The development of IS, based on the decrease in telecommunication prices and increase in access to IST networks, is very likely to accelerate within the next couple of years.

Strengths	**Weaknesses**
1. Advanced stage of privatization 2. Predominant part of laws and regulations compliant with the EU 3. Institution building mostly complete	1. Incomplete adoption of EU-regulations 2. Inadequate implementation and execution of law 3. Low political support for increase in market competition 4. Low level of human skills and lack of experience 5. Slow privatization of the strategic sectors, which is likely to have slowed the technological transformation.
Opportunities	**Threats**
1. Completion of institutional and regulatory compliance with *acquis communataire* upon accession to the EU 2. Gradual progress in efficiency of law implementation and execution 3. Positive effects of "learning by doing" of all stakeholders	1. Lack of political support for necessary but sometimes controversial privatizations 2. Telecom tariffs maintained high above EU25 averages 3. Too slow progress in effective execution of laws (URTiP)

Strengths:
Privatization is at a very advanced stage. The remaining sectors of the economy still controlled by the state are to be privatized by 2006. Poland has already adopted most of the EU regulations in run up to the EU accession. The same applies to the process of institution building, which is largely complete.

Weaknesses:
Poland's regulatory framework in the run-up to the EU accession has been mostly build on a "cut and paste" strategy of implementing the EU law. It often led to misunderstandings as to the intentions of the EU regulations and consequently it resulted in a legislation that is not entirely compatible with the EU framework. Even where regulations and institutions are in place, execution of existing laws is poor. The inability of URTiP, the national telecom regulator, to enforce telecom market legislation is a case in point. This seems to be due to a lack of experience and adequate knowledge and skills, low level of financing, insufficient

human resources, high people turnover and strong opposition from interest groups (including TPSA, the incumbent operator). Half-hearted political support for enforcement of law and promotion of competition has also had its negative impact on the pace of market liberalization and deregulation. Finally, relatively slow privatization of the strategic sectors of the economy, due to low political and social support, is likely to have slowed down the pace and extent of adoption of modern technologies in these sectors, ICT included.

Opportunities:
Upon accession to the EU, Poland will have introduced the predominant part of *acquis communataire*. This will help to further liberalize and deregulate the domestic economy and hence contribute to enhanced competition and subsequent fall in prices towards the EU average as well as an increase in quality of offered services. This would likely lead to a much faster growth in IST penetration. The need to implement EU directives could be a powerful tool to prevent local interest groups from exerting undue and harmful influence on the pace of liberalization. Moreover, positive effects of institutional and regulatory „learning by doing" should contribute to enhancing the efficiency of implementation and execution of law.

Threats:
Lack of political and social support for necessary but sometimes controversial privatizations, particularly of the "strategic industries", may result in a slowdown of privatization. Continued progress in effective execution of laws should not be taken for granted either: without strong commitment from the major actors, the situation may not be improving. It may well be that because of a history of leniency and impotence in the execution of law, URTiP and other public regulatory institutions might entirely lose the badly needed credibility. This could lead to a significant slowdown in price decreases of telecommunications services. Poland's tariffs could then for long be on a higher level than the EU average. This would have very negative effects on the absorption and diffusion of IST technologies.

G. EDUCATIONAL SECTOR

G.1. Structure of the educational system

G.1.1 Educational reform and system

An educational reform was introduced in Poland in 1999. Starting from the 1999/2000 school year, children aged 7 to 13 attend 6-year primary schools versus 8-year school before. At the end of the primary school, pupils take an external competence test. All primary school graduates then have to enroll in a 3-year gymnasium – a lower secondary school. Another external exam marks the end of the 3-year period. Having completed gymnasium, pupils are free to choose between 3 to 4 year general and technical secondary schools and 2-year vocational secondary schools.

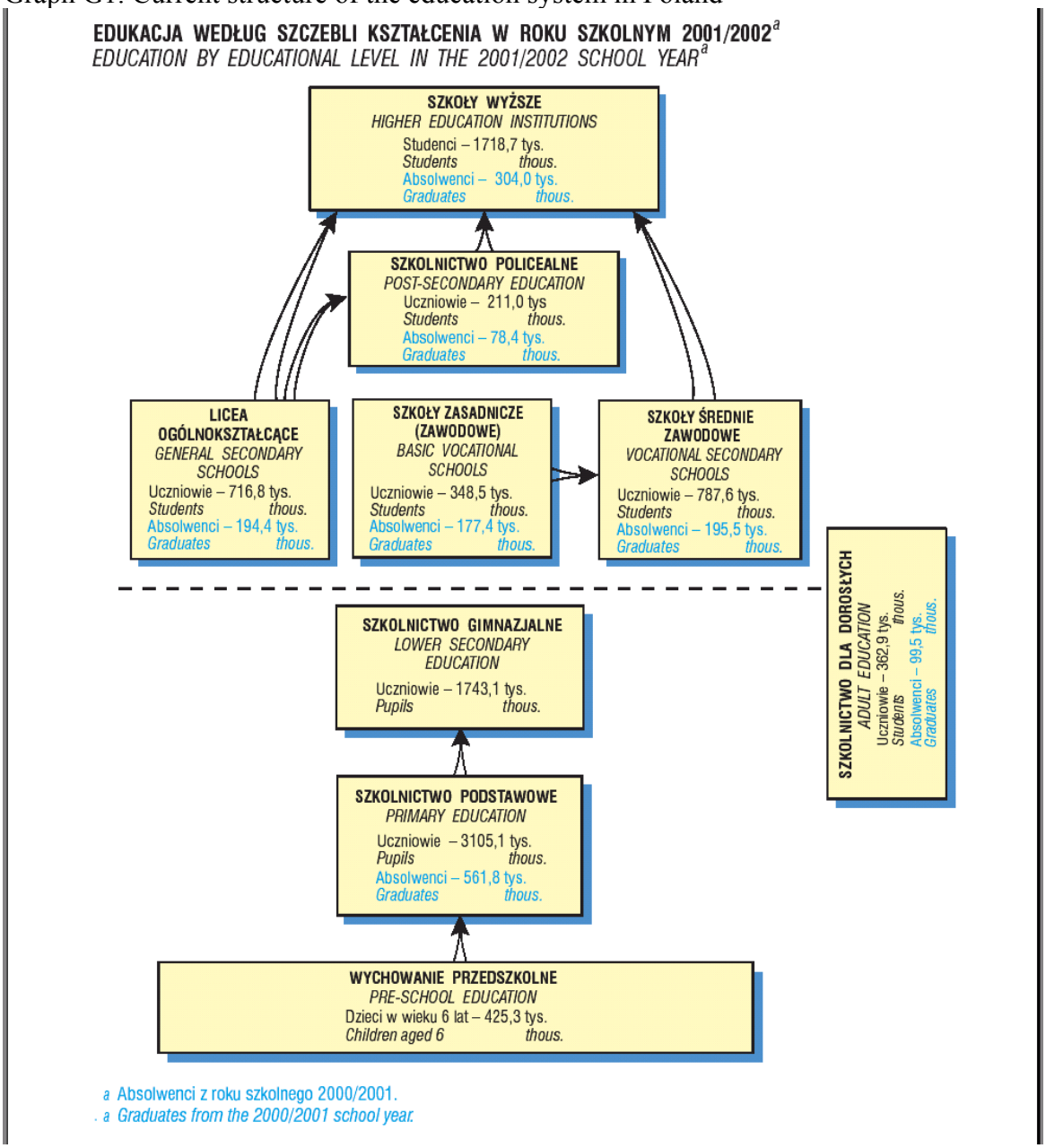
The general and technical secondary education ends with an external (previously internal) final "maturity exam" (baccalaureate, A-levels), which allows pupils to apply for public tertiary education. The "maturity exams" are slated to gradually (2005-06) replace existing entrance exams to universities. Students not accepted into tertiary education can enroll in post-secondary vocational and general schools, which last anywhere from 1 to 2.5 years. Graduates of vocational secondary schools, unless they join the other two types of secondary education and pass the final exam "maturity exam", finish their education at the age of 18. There are plans to introduce an additional year of primary education in 2005-06. Pupils would then enter the educational system at the age of 6.

Until 1989 the obligatory foreign language taught at the elementary level was Russian. Introduction of a second foreign language – mainly English, German, French, sometimes Spanish or Italian - was subject to availability of teachers and financial resources. After 1989 English and German replaced Russian as a language of choice. In 2003 the government announced a plan of reform, according to which all children at an elementary level would be taught English. English as well as other European languages are taught by a myriad of private language schools and colleges. As a result of the large popularity of foreign language learning, the level of command of foreign languages has risen substantially in the last decade. The younger a person, the more she or he is likely to speak a foreign language. There is a widely shared perception that it is not possible to progress in professional career without command of at least one foreign language, preferably English.

According to Polish Statistical Office (2002) in the academic year 2001/2002 43.2% of pupils at the elementary level and 59.3% at the secondary level took classes in English (19.7% and 47.8% in German, respectively). Additional 8.2% (elementary level) and 0.4% (secondary level) took additional courses in English at private institutions. While sufficiently long time series do not exist, it is quite safe to argue that the shares have more than doubled since 1990.

As of the end of the school year 2001/2002 there were 6423 lower secondary schools, 10514 upper secondary schools, 2625 post-secondary schools and 344 tertiary level schools (Polish Statistical Office 2002). Graph G1 illustrates the structure of the educational system.

Graph G1. Current structure of the education system in Poland



Source: Polish Statistical Office (2002)

It is estimated that almost 100% of eligible pupils take classes at the obligatory elementary and lower secondary level. From an age of 12, however, there is a steady decrease in the rate of pupil participation: only 85% of the 18-year old and 25% of the 24-year old stay in school.

G.1.2 Tertiary education – area of training

As for the structure of student enrollment at the secondary level, in the last decade Poland witnessed a very positive shift from basic vocational schools to general secondary schools. Basic vocational schools (the so-called "factories of unemployment") offer very limited education and scope of skills. The collapse in enrollment in basic vocational schools in favour of a more versatile and higher quality of education in general schools has been driven by – on the one hand – the growing wage premium to higher education, and – on the other hand – the rising specter of unemployment among graduates with very narrowly defined skills.

As in most countries in the region, substantial demand for "new brains" in finance, banking, management, law, human resources etc. stimulated a large growth of student enrollment in business and law oriented majors, as seen in table G1.

Table G1. Students in tertiary education by area of training in 2001/02 academic year (in thousand)

Area of studies	Number of students	% of total
Education	198,5	11,5%
Arts	17,8	1,0%
Humanities	138,1	8,0%
Social science	237,7	13,8%
Journalism	10	0,6%
Business and administration	452,4	26,3%
Law	60,3	3,5%
Life science	23,3	1,4%
Physical science	19,1	1,1%
Mathematics and statistics	15,9	0,9%
Computing	38,9	2,3%
Engineering	171,2	10,0%
Manufacturing	25,7	1,5%
Architecture	49,6	2,9%
Agriculture, forestry, fishery	33,4	1,9%
Veterinary	3,8	0,2%
Health	43,9	2,6%
Personal services	20,6	1,2%
Transport services	16,3	0,9%
Environmental protection	39,8	2,3%
Security services	2,6	0,2%
Other	99,8	5,8%
Total	**1718,7**	**100,0%**

Source: Polish Statistical Office (2002)

G.2. Main challenges faced by the educational system

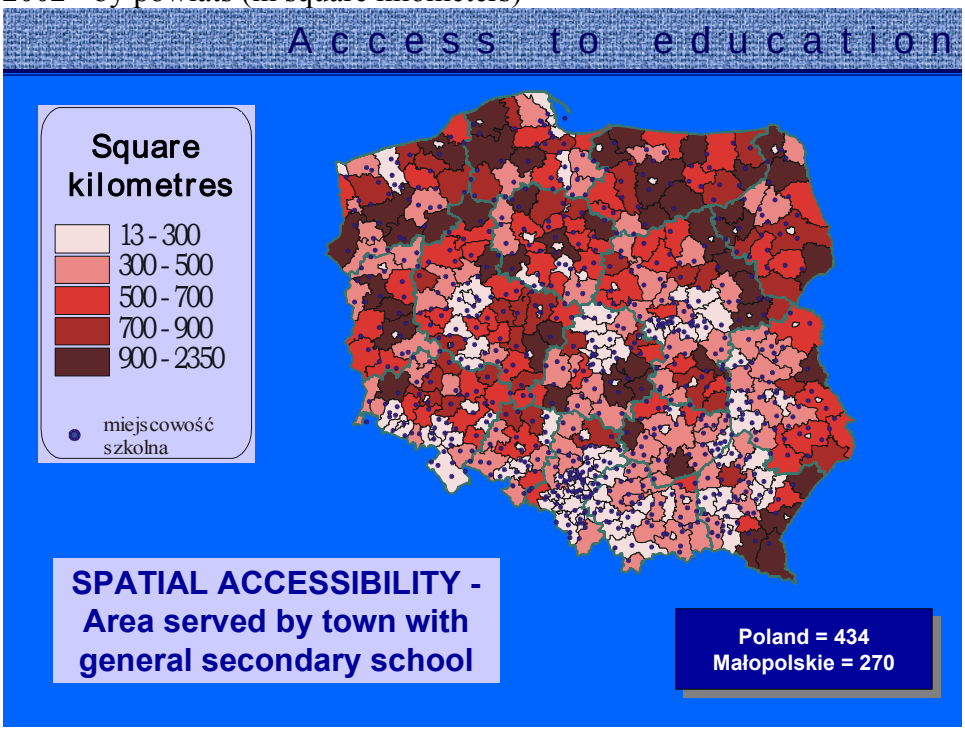
The following issues are widely considered to represent the main areas for improvement in the Polish educational system:

a) Unequal regional access to education - there are large regional disparities in access to all levels of education in Poland (both on a NUTS 4 level for 326 powiats[61] and NUTS 2 level for 16 provinces/voivodships).

The pattern of spatial accessibility of secondary schools to local inhabitants as measured by the space serviced by local secondary education establishment (the larger the area, the harder the access to education) shows that the northern and south eastern Poland have much harder access to secondary education (Graph G2).

[61] Lower middle level of the local government, encompassing a number of communes ('gminas'), which are at the lowest level of administration.

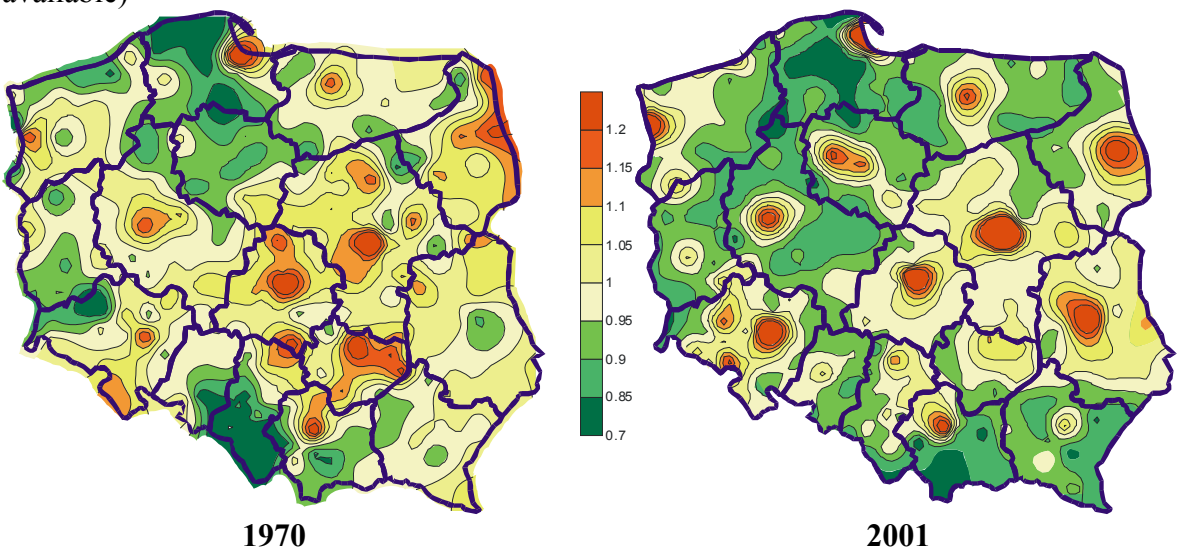
Graph G2. Spatial accessibility of education: area served by town with general secondary school in 2002 - by powiats (in square kilometers)



Source: Guzik (2003a)

Between 1970 and 2001 the overall accessibility of secondary school education has largely maintained the same pattern, although the central part of Poland south of Warsaw has recorded a decrease in educational accessibility (Graph G3).

Graph G3. General secondary school accessibility in 1970 and 2001 (by number of places available)



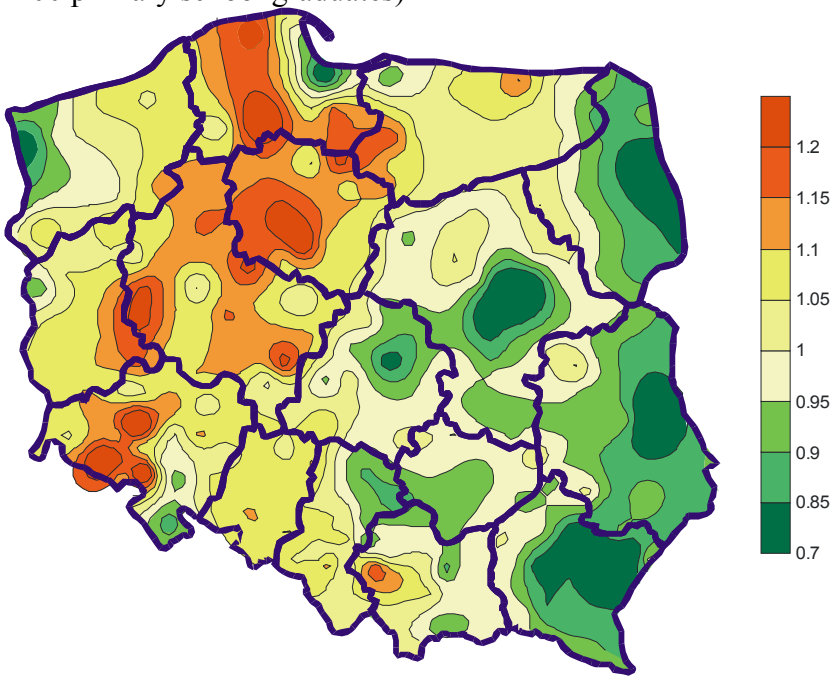
1970 **2001**

Source: Guzik (2003b). Note: green color represents low accessibility, red – high accessibility.

Graph G4 shows the supply of places in the first classes of basic vocational schools. There is large divergence between central-western and eastern regions. It reflects the urban-rural and industry-agriculture divide among the regions. The divide also stems from the legacy of socialist industrialization, when the government - in order to raise the supply of blue collar

workers in the industrialized parts of the country – increased the number of vocational schools in western Poland.

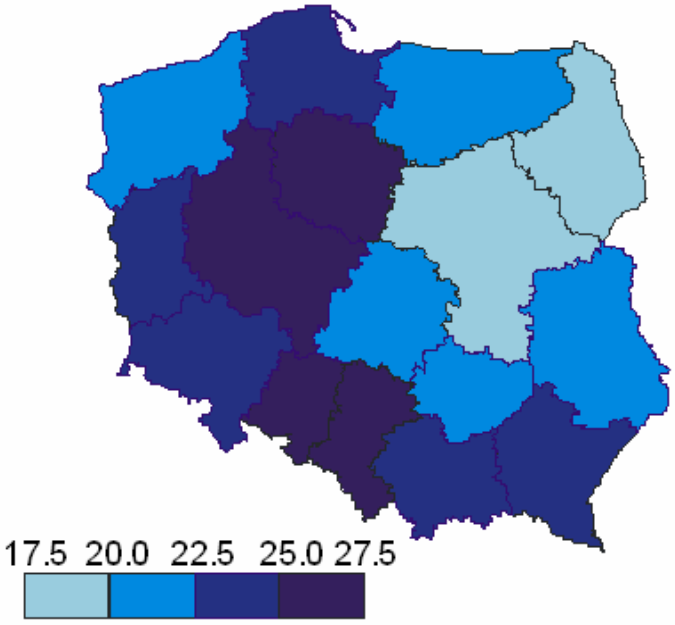
Graph G4. Supply of places in first classes of basic vocational schools in Poland in 2002 (per 100 primary school graduates)



Source: Guzik (2003b). Note: green color represents low accessibility, red – high accessibility.

Large concentration of basic vocational schools in western Poland resulted in higher than elsewhere share of population with an elementary education (Graph G5).

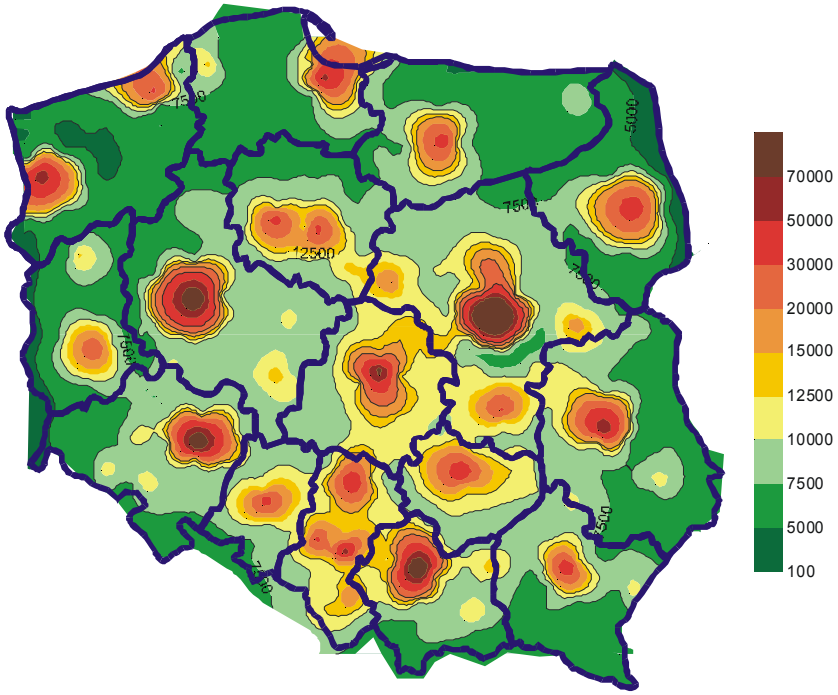
Graph G5: Population with elementary education (aged 13 and above) in 2002 (in % of total) population in a region)



Source: Guzik (2003b).

Regional distribution of tertiary education is similarly highly unequal, although admittedly better distributed than the secondary level of education. However, concentration of tertiary education in big cities is a natural phenomenon (Graph G6)

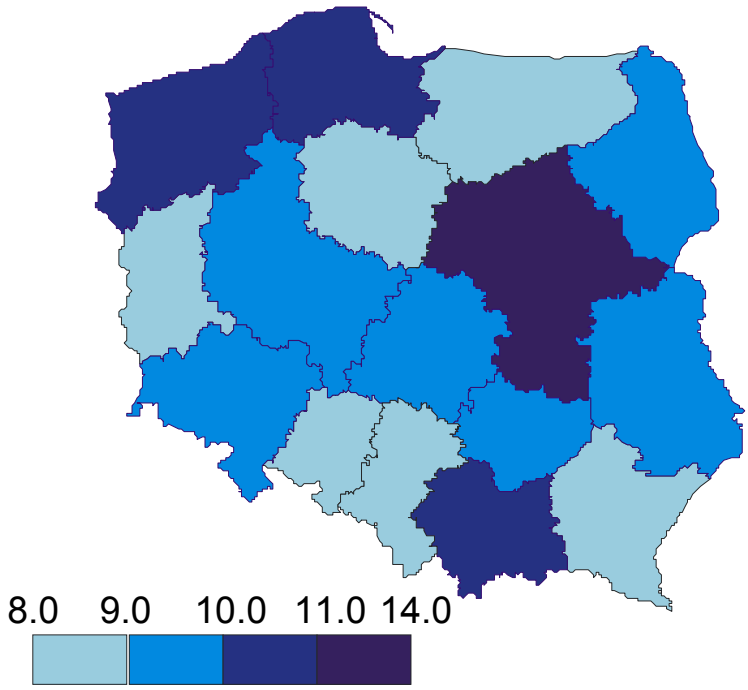
Graph G6. Regional distribution of tertiary education accessibility
(per 100 primary school graduates)



Source: Guzik (2003b). Red color stands for high accessibility of tertiary education.

The differences in the accessibility of tertiary education led to differences in educational attainment between the regions. Mazowieckie voivodhship (Warsaw) reported in 2002 the largest share of population with tertiary educationy, followed by north western (Szczecin, Gdansk) and south Poland (Krakow) (Graph G7).

Graph G7: Population with tertiary education (aged 13 and above) in 2002 (in % of total population in a region)

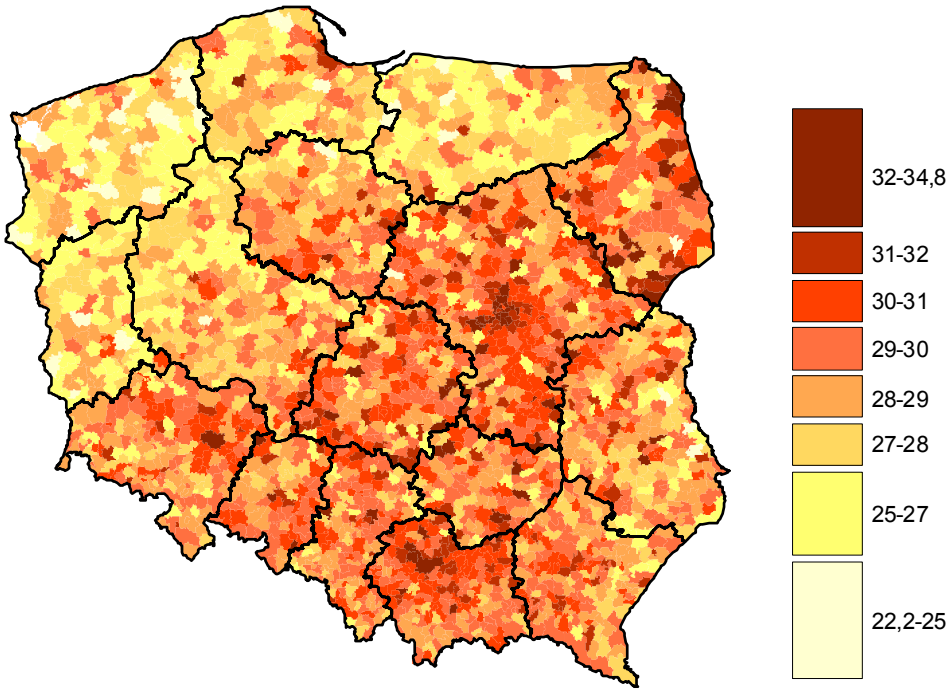


Source: Guzik (2003b). Red color stands for high accessibility of tertiary education.

The disparities in educational attainment show no clear geographical pattern. Nonetheless, regions with low educational attainment are much less likely to absorb IST and thus to develop the IS.

Quite interestingly, the differences in access to education and in educational attainment seem to have led to a large divergence in the educational achievement as measured by the results of entrance tests to gymnasium (lower secondary level) at the gmina level (lowest level of administration). Pupils in the north-western and north eastern Poland have had the lowest test scores (Graph G8).

Graph G8: Regional distribution of results of entrance tests to gymnasiums (lower secondary level) in gminas, combined average number of test scores



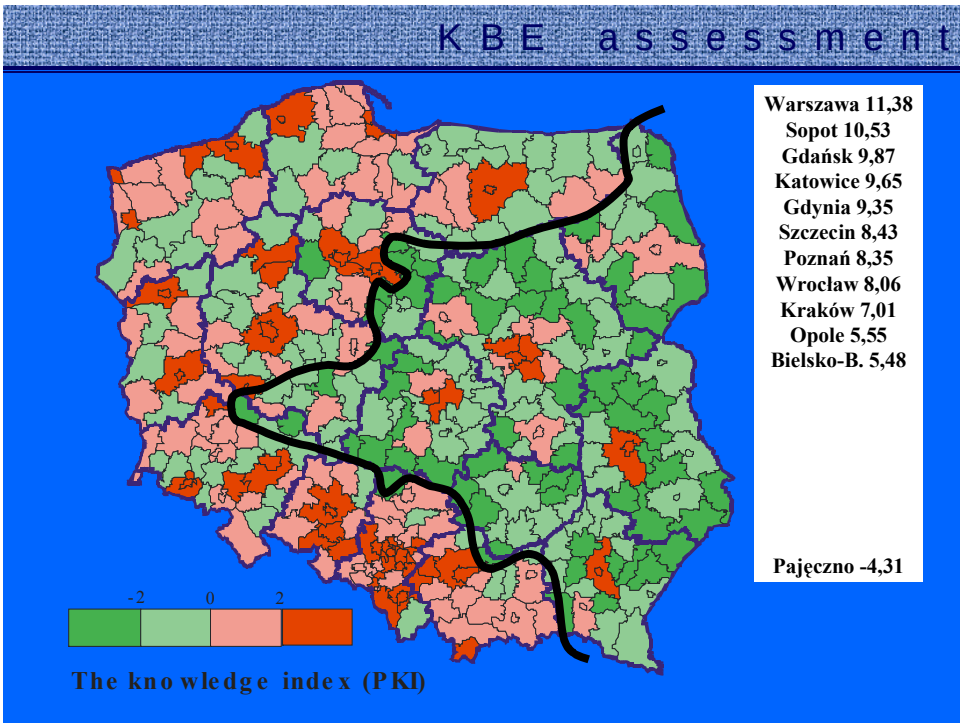
Source: Guzik (2003b)

The difference in the test scores seem to be mostly due to the differences in distribution of basic vocational schools: regions with the highest supply of vocational schools have had the lowest scores. Guzik (2003b) argues that this is due to a correlation between the educational attainment of parents (as measured by the share of population with elementary education) and their children. Hence, there is a large generational impact on the results of the test scores (children of parents with low educational attainment mostly follow their parents' education pattern). This finding has very potent implications: if the lagging regions in the test scores want to improve their standing, they would need to decrease the supply of places in basic vocational schools.

Guzik (2003b) compared the above test scores (he drew a line separating north western Poland to reflect the "intellectual divide") with a map of the "Innovation Index", also developed by him, which is meant to measure the digital divide between the regions.[62]. According to the Index, the eastern part of Poland, with the exception of Lublin and Rzeszow, clearly lags behind the western part of Poland (Graph G9).

[62] The Innovation Index is a weighted composite of three factors: a number of ICT enterprises in each powiat, a number of cash machines per 10,000 inhabitants in a powiat and a percentage of local authorities with internet web sites in each powiat (Guzik 2003b).

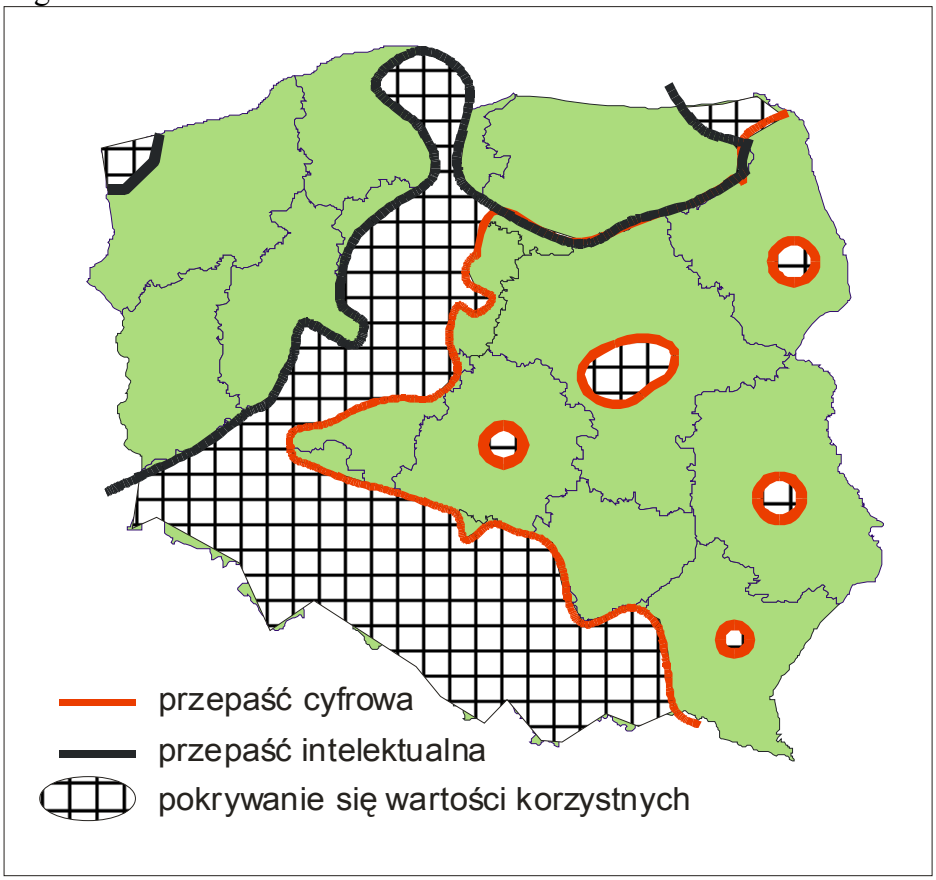
Graph G9. Regional digital divide in Poland (based on the Innovation Index)



Source: Guzik (2003b). Note: green color represents low value of the "Innovation Index" (here called the knowledge index), red – high value.

The comparison of the two maps has shows that southern Poland, a part of western central and northern Poland, and big cities in Poland seem to have the highest innovation and intellectual potential (Graph G10). These areas might also be thought of as also having the largest potential for the development of the IS.

Graph 10: Digital and intellectual divide in Poland



Source: Guzik (2003b). Note: "przepasc cyfrowa" – digital divide, "przepasc intelektualna" – intellectual divide. "pokrywanie sie wartosci korzystnych" – area of high potential

These assertions should however be interpreted with a large portion of caution. The "intellectual divide" is based on the results of only one test. Hence, it may not reflect the real differences in intellectual attainment.

Overall, there is no clear pattern as to the regional distribution of access to education and educational attainment. Clearly, however, the lagging regions are much less likely to absorb IST and thus develop the IS.

b) Low level of functional literacy: A number of recent international surveys have produced data, which raised concerns as to the readiness of the Polish education system for the IS[63]

Evidence from the OECD Adult Literacy Survey (IALS) suggests that Poland's education and training systems produces graduates who underperform in international rankings (OECD and Statistics Canada 1995). In the OECD Program for International Student Assessment (PISA), Poland ranks behind developed countries in reading literacy, mathematical literacy and scientific literacy.[64] Table G5 shows the reading proficiency of 15-year-olds in 2000: 8,7% of

[63] This part is mostly based on a World Bank Knowledge Economy Assessment Concept Note (2003).

[64] World Bank (2003): "The PISA study takes a broad approach to the measurement of reading, mathematics and science – looking at fifteen-year-olds' ability to use their knowledge and skills in order to meet real-life challenges rather than at the extent of their mastery of a specific school curriculum. The sample countries include 20 high human development countries and 5 transition economies".

Polish pupils had the lowest degree of text understanding ("functional illiteracy"), versus 6,1% in the Czech Republic, 6,9% in Hungary, and the OECD average of 6,2%.

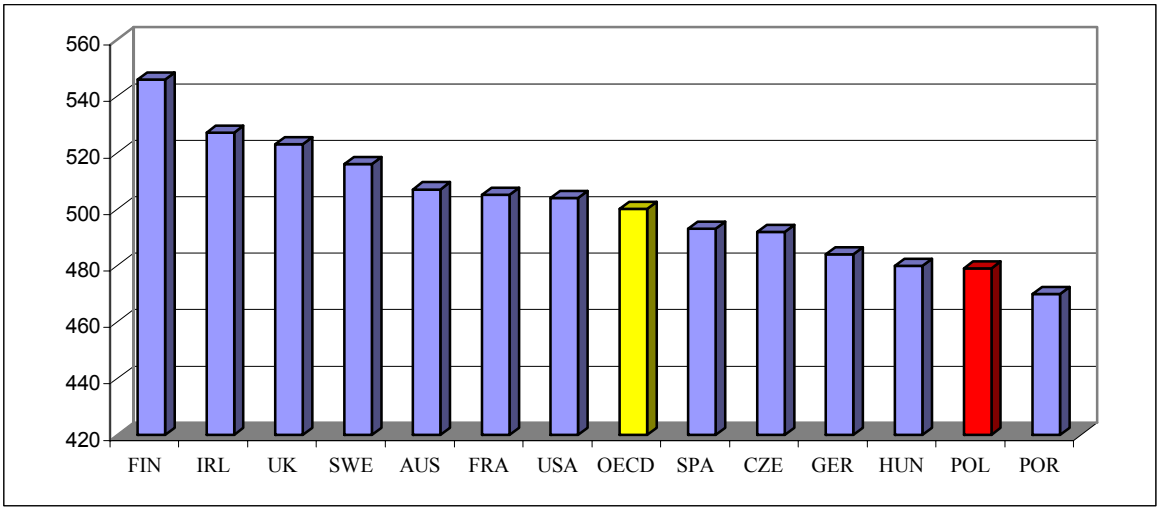
Table G5. Reading proficiency of 15-year-olds (2000)
Percentage of 15-year-olds at each level of proficiency on the PISA reading literacy scale

	Proficiency levels											
	Below Level 1 *(less than 335 score points)*		**Level 1** *(from 335 to 407 score points)*		**Level 2** *(from 408 to 480 score points)*		**Level 3** *(from 481 to 552 score points)*		**Level 4** *(from 553 to 625 score points)*		**Level 5** *(above 625 score points)*	
	%	**S.E.**	**%**	**S.E.**	**%**	**S.E.**	**%**	**S.E.**	**%**	**S.E.**	**%**	**S.E.**
Czech Republic	6.1	(0.6)	11.4	(0.7)	24.8	(1.2)	30.9	(1.1)	19.8	(0.8)	7.0	(0,6)
Hungary	6.9	(0.7)	15.8	(1.2)	25.0	(1.1)	28.8	(1.3)	18.5	(1.1)	5.1	(0.8)
Poland	8.7	(1.0)	14.6	(1.0)	24.1	(1.4)	28.2	(1.3)	18.6	(1.3)	5.9	(1.0)
OECD	6.2	(0.4)	12.1	(0.4)	21.8	(0.4)	28.6	(0.4)	21.8	(0.4)	9.4	(0.4)
Latvia	12.7	(1.3)	17.9	(1.3)	26.3	(1.1)	25.2	(1.3)	13.8	(1.1)	4.1	(0.6)

Source: OECD PISA database, 2001. See Annex 3 for notes on methodology (www.oecd.org/els/education/eag2002) and www.pisa.oecd.org

The overall reading literacy of the 15-year-old in Poland is one of the lowest among the OECD countries (Graph G11).

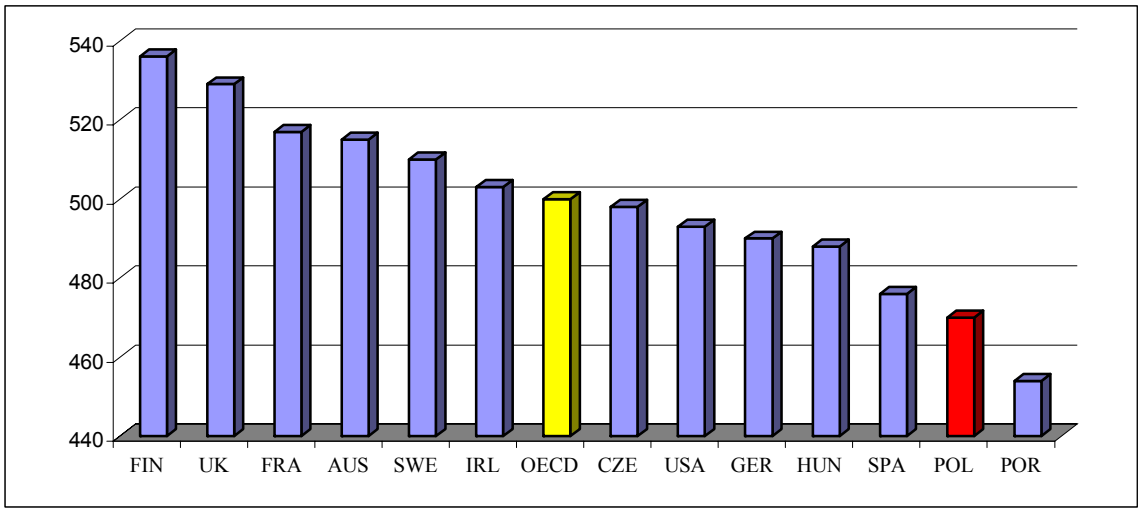
Graph G11. Reading literacy of 15-year-olds in selected OECD countries, in 2000, overall score



Source: OECD PISA database, 2001

Similar data on mathematical and scientific proficiency skills of 15-year-olds reveal the same pattern: Poland ranks much below the OECD average, Czech Republic and Hungary (Graph G12)

Graph G12. Mathematical literacy of 15-year-olds in selected OECD countries in 2000



Source: OECD PISA database, 2001

Pupils enrolled at the basic vocational level had the worst scores, which weighed on the overall average. The current trend of a decreasing number of vocational students in favour of general secondary schools students is then very positive and should result in better scores in future tests.

A survey of the quality of technology stocks of human resources and economic creativity (*inter alia* familiarity with new technology and a high level of competence in English) done by the 2002 Global Competitiveness Report reported the following ranking:

Table G6. Ranking of the quality of human resources in selected countries in 2002 (almost 100 countries classified)

Estonia	26		Slovak Republic	49
Slovenia	28		**Poland**	**51**
Hungary	29		Bulgaria	62
Lithuania	36		Romania	66
Czech Republic	40		Turkey	69
Latvia	44			

Source: Global Competitiveness Report 2002-2003, www.weforum.org

The evidence from the above table suggests that Poland's education systems needs to be reformed in order to stimulate flexible and independent problem-solving thinking and skills, which nurture creativity, the ability to work in teams and to innovate.

c) Low access to and popularity of lifelong learning - in spite of progress being made in the offering of lifelong education as evidenced by a growing number of post-degree education programs, Poland still has a long way to go to provide availability of learning anywhere, anytime, and for anyone. A recent report (Tuijnman 2002) argues that there are currently inadequate provisions for lifelong learning in Poland as defined by OECD[65]. Table G7, based

[65] The full report is available on the web site of the Ministry of Education and Sports at http://www.menis.gov.pl/ and then "Modernizacja ksztalcenia ustawicznego".

on the OECD data, shows that lifelong learning in Poland at all levels of education is lower than in both the Czech Republic and Hungary.

Table G7. Participation rate in continuing education and training during one year for 25 to 64-year-olds, by level of education, type of training and gender

		Job-related continuing education and training				**All continuing education and training**			
		Lower secondary education	Upper secondary and post-secondary non-tertiary education	Tertiary education	All levels of education	Lower secondary education	Upper secondary and post-secondary non-tertiary education	Tertiary education	All levels of education
Czech Republic	M+F	15	29	38	22	18	36	49	27
IALS 98/99	M	22	29	44	27	27	37	35	33
	F	7	29	30	17	9	35	44	22
Hungary	M+F	5	11	35	13	6	17	49	18
IALS 98/99	M	5	11	32	12	7	16	18	17
	F	5	11	37	13	5	18	56	19
Poland	M+F	5	18	27	11	6	23	37	14
IALS 94/95	M	7	20	26	12	8	25	22	15
	F	2	16	27	9	4	22	39	13

Source: Education at a Glance, OECD 2002, Table C4.1, www.oecd.org based on the OECD International Adult Literacy Survey 1994-1998 and national household surveys on adult education and training (see Annex 3 at www.oecd.org/els/education/eag2002 for details).

In response to the challenge of lifelong learning, the Ministry of Education and Sports formed an "Inter-Ministerial Committee on Lifelong Learning", which is making progress in developing a flexible policy, incentive and regulatory framework.

d) Low level of co-operation between education and the business sector - according to the Labour Force Survey from the 2nd quarter of 2002, 67.7% of the unemployed in Poland in 2002 were aged between 15 and 34. This fact seems to point to the fact that – aside from a demographic peak, low mobility, relative inflexibility of the labour market, and a decline in "on the job training" - that the educational curricula have still not been able to fully adjust to the labour market demand (mismatch of skills).

G.3. Domestic and international mobility of technical and scientific personnel

There is very sparse data on either domestic or international mobility of researchers. According to the OECD, in 1999 in the United States there were 767 Polish citizens with science and engineering doctorates. This compares with 323 Hungarians and 849 Turks.[66]

[66] Source: OECD Science, Technology and Industry Scoreboard 2001 available at http://www1.oecd.org/publications/e-book/92-2001-04-1-2987/

Anecdotal evidence suggests that domestic mobility of scientific and technical personnel is not significant, when compared to developed countries. Interestingly enough, very high level of unemployment, which now hovers around 18,0%, had a positive effect on the mobility between research and business: more and more young graduates faced with lack of opportunities in the labour market turn to academia in search of employment. Similarly, labour shedding in restructuring enterprises contributed to a wave of people formerly employed in business applying for positions in education and science.

International mobility of scientific personnel remains stable. The share of highly educated emigrants in total emigration is very low as in 2001 it amounted to only 1.2% (Table G8). Basic and secondary education prevails. Similarly, an outflow of IT professionals is not significant: there were fewer than one hundred Poles, who applied for visas in the German visa program for IT professionals.

Table G8. Immigration from Poland, 1991-2001

Years	1991-1995	1996-2000	2000	2001
Total	112 716	112 231	26 999	23 368
Tertiary education	2 764	1 553	322	277

Source: Polish Statistical Office (2003)

G.4. Tertiary sector and research performance in IST related subjects

There is a relatively small, but growing body of research in IST-related subjects. Academic think-tanks and large universities mostly drive IST research. The apparent increase in research capacity seems to respond to the growing interest of the domestic and international community in IST. Increasing availability of funding for IST research has also been an important factor. Last but not least, the recent "new economy' hype seems to have contributed to the surge in popularity of IST subjects. Forum Strategii Lizbonskiej (www.strategializbonska.pl) and TIGER economic think-tank (www.tiger.edu.pl) have been the leaders in IST research.

G.5. IST related education

IST-related education is relatively quite well developed. The educational system provides almost 6 000 graduates a year, who specialize in IT and telecommunications. In 2002 there were more than 38 000 ICT students (Table G9). Slaskie and Mazowieckie voivodships trained the largest number of students (Table G10). In response to the demand of the labour market for ICT skills, a large number of non-ICT students have also taken up ICT training during or immediately after the studies. While the exact numbers for those ICT-trained students are not known, anecdotal evidence suggests that it is a significant number.

The large supply of ICT-trained people coupled with a recent slowdown in economic growth, which decreased the growth rate of demand for ICT-skills, led to an apparent emergence of equilibrium between demand and supply.

Table G9. Enrolled students of IT and telecommunications in 2002

	Day studies	Evening studies	Weekend studies	Overall
Information Technology (IT)	15 981	2 634	2 535	21 150
IT and econometrics	3 483	498	1 220	5 201
Electronics and telecommunications	10 002	1 133	693	11 828
TOTAL	**29 466**	**4 265**	**4 448**	**38 179**

Source: Polish Statistical Office (2002)

Table G10. Graduates of IT and telecommunication studies in Poland in 2002 – per voivodships

Voivodship	Graduates in 2000/2001
Dolnoslaskie	470
Kujawsko-pomorskie	47
Lubuskie	379
Lodzkie	629
Lubelskie	0
Mazowieckie	1 016
Malopolskie	173
Opolskie	184
Podlaskie	134
Podkarpackie	118
Pomorskie	522
Slaskie	1 335
Swietokrzyskie	102
Warminsko-mazurskie	0
Wielkopolskie	324
Zachodniopomorskie	180
TOTAL	**5 613**

Source: Polish Statistical Office (2002)

The state "ePoland 2001-06" program sets ambitious goals for development of IST-related education, which would involve training of teachers, expansion of IT faculties at a tertiary level, and easier and faster access to computers and broadband Internet. In addition, a strong emphasis is put on completing internetization of all schools in Poland (including elementary and secondary) by 2006, along with requisite teacher training.[67] The Ministry of Education and Sports in its various programs is promoting distance learning and teaching based on IST capabilities. The results of these efforts have so far been not significant due to a lack of a comprehensive plan, insufficient financing and apparent resistance of the teachers' community.

[67] More on the objectives of the state policy in IST-related education: „ePoland. The Action Plan for the Information Society Development in Poland for the years 2001-2006" available at http://www.kbn.gov.pl/cele/epolska/epoland.html

G.6. Summary and conclusions

A five-fold increase in student enrollment within the last 12 years has substantially contributed to increase in the level of human capital in Poland. Yet, this fact alone does not guarantee fast progress in developing an information society. A number of challenges persist. Those concern large regional disparities in educational attainment, as measured by the ratio of tertiary education in the total regional population. The disparities are partly due to the regional structure of the education: regions with the highest supply of basic vocational schools tend to report overall lower educational attainment. Based on the map of the "digital" and "intellectual" divide in Poland, eastern and north western Poland seems to lag behind. These regions are much less likely to absorb IST and thus develop the IS.

Low functional literacy of pupils and students represents the second important challenge. Polish education promotes learning of facts rather than learning of ways of doing things. Poor results of various international surveys on functional literacy highlight the need for faster progress in realignment of educational curricula with the needs of the IS.

Lack of a culture of a lifelong learning represents another formidable obstacle to progress in IS. Various public and private efforts to promote lifelong learning should be stepped up. The recent project of the Ministry of Education and Sports is a welcome step towards enhancing the level of lifelong learning.

Finally, the low level of cooperation between education and business has led to a larger than it might have been otherwise increase in unemployment due to mismatch between skills offered by the educational system and the needs of the labour market. The recent reform of the educational system coordinated by Ministry of Education and Sports aims at ameliorating this situation.

Strengths	Weaknesses
1. Constant improvement in quality of human capital 2. Tertiary scholarization ratios equal the EU average 3. Market equilibrium in supply of ICT skills	1. Large regional disparities in access to quality education 2. Low functional literacy of pupils and students 3. Lack of culture of lifelong learning 4. Decline in quality of education due to a growth in enrollment not supported by equivalent growth in resources
Opportunities	**Threats**
1. EU and domestic funding for investment in education in poorly endowed regions 2. Continued progress in change of curricula in direction of higher functionality of knowledge 3. Further development of education based on private funding 4. Corporate initiatives in ICT education 5. International mobility and brain circulation	1. Growing educational and "digital divide" between the developed and underdeveloped regions 2. Insufficient funding for education due to poor budget situation 3. Strong opposition of relevant interest groups (teachers, university employees etc.) against changes in the educational system. 4. Absence of cooperation between the educational and business sector aimed at developing curricula compatible with the demands of the labour market.

Strengths:
Poland, like most of post-socialist countries, boasts of a relatively high quality of human capital as compared to its level of development. The phenomenal growth of private educational establishments in the 1990's, prompted by a liberalization of regulations, resulted in a fourfold increase of the tertiary scholarization ratio from some 13% in 1990 to more than 40% in 2002, on par with the EU average. The importance of education is acknowledged by the public and policy makers. Constant pressure is being exerted on the educational authorities to improve the accessibility, affordability and quality of education. Quite clearly, the development of the tertiary education is extremely positive for the prospects of the IS.

Weaknesses:
While remarkable progress has been made, most of it has been concentrated in the regions of Poland already endowed with good access and quality of education. Since most of new private schools are based in big cities, regional disparities in access to education seem to be currently wider than at the beginning of transformation. While there is a growing awareness of the issue, measures taken by the Ministry of Education do not seem to be adequate.

Poland's educational system produces pupils and students with low functionality of knowledge. In teaching still more emphasis is placed on memorization of encyclopedic facts rather than on problem solving capabilities. Teaching methods need to changed and teachers need to be trained in order to improve pupils' grasp of functional knowledge. Undoubtedly, though, the process of a change of curricula, although already started some years ago, will

still take some time. Likewise, the lack of culture and mentality of lifelong learning for adults will also take some time to change. People are slowly starting to realize that without continuous learning their prospects for better employment (or employment at all) will deteriorate. Since the IS requires continued learning, slow progress in lifelong learning would limit the speed of IS development.
The phenomenal growth in tertiary scholarization ratios have not been supported by equivalent growth in resources. The teacher-to-students ratios have deteriorated, which is likely to have a negative impact on the overall quality of education. It may also be compromised due to sometimes low quality of teaching in some private educational institutions. The current accreditation system run by the Ministry of Education should be then strengthened to weed out the schools, which do not meet the minimum quality criteria.

Opportunities:
Regional disparities in the access to education are likely to be to some extent remedied by an influx of the EU funds to the poorest regions of Poland. Functionality of knowledge among students and pupils should be increasing in line with a continued progress in reform of nationwide curricula as well as growing competitive market pressures on existing educational establishments to teach skills that are most in demand in the marketplace. Better quality of education should also result from a "learning by doing" process of honing curricula in order to better match skills with labour demand. Growing availability of private capital for funding of education (also from the EU) is likely to sustain the process of increasing access to knowledge. Corporate initiatives in ICT education, although still not implemented, are likely to raise the level of ICT skills. Finally, accession to the EU will increase international mobility of the local researchers (Socrates, Erasmus, Marie-Curie and other scholarship programs). To sum up, growing average educational attainment and higher mobility will strongly contribute to an increase in absorption and diffusion of IST.

Threats:
While the EU funds may contribute to regional progress, the improvement is by no means automatic as access to funds is contingent upon providing eligible projects. It well may be that richer, better-endowed regions can prove to be more adept than poorer regions in absorbing EU funds. This might lead to a further widening of the digital and educational divide in Poland with all the negative social and economic consequences.

The dire situation of the Polish budget, which is not likely to change for some years, may preclude any substantial increase in the funding of education. The needed changes to curricula are likely to be opposed by various interest groups (teachers, university employees, etc.), with no interest in either changing their ways or quality of their work for no commensurate compensation. A failure to reform the curricula could endanger the prospects of increasing functional literary of the population. This would have negative implications for the IS. An absence of cooperation between the educational and business sector aimed at developing curricula compatible with the demands of the labour market might result in the continued mismatch of skills between the supply and demand for labour.

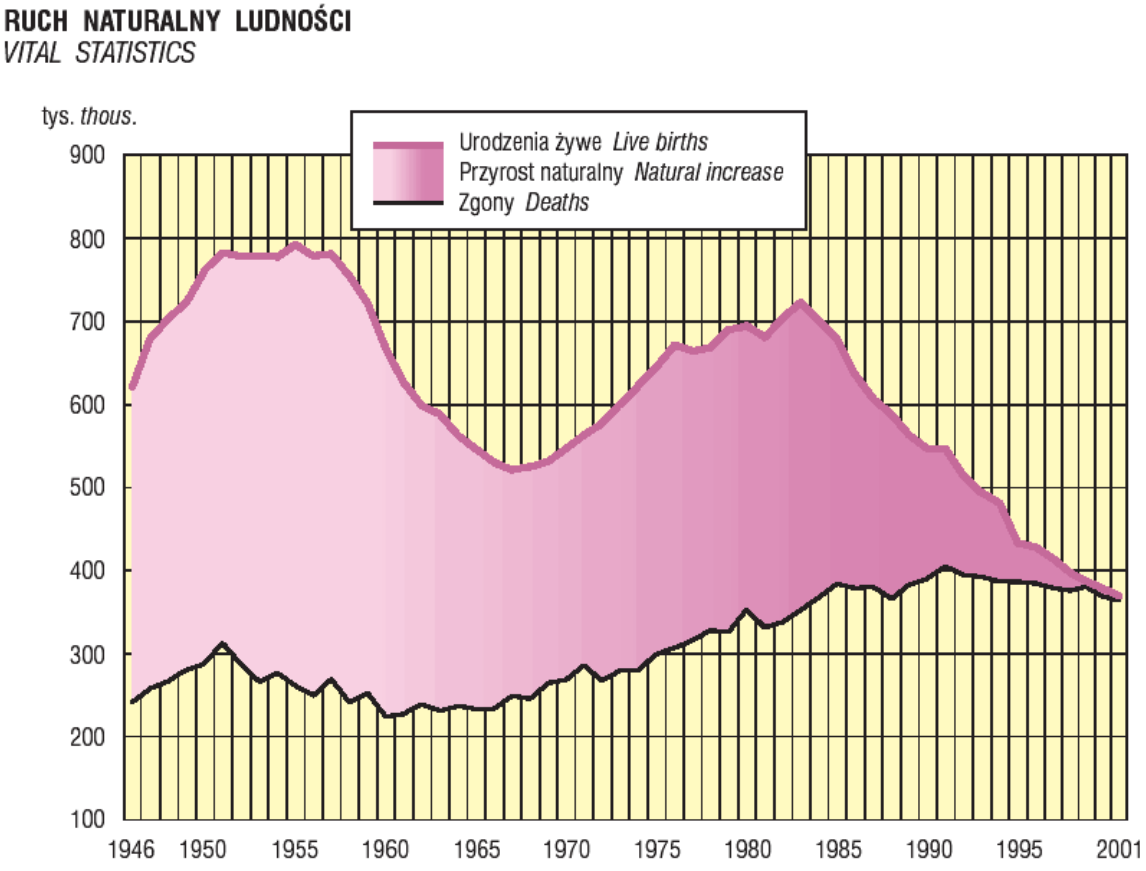
H. NATIONAL AND REGIONAL DEMOGRAPHIC DATA AND PROSPECTIVE TRENDS

H.1. Current state and trends

H.1.1 Population and the fertility rate

Poland's population of 38 644 thousand people (2001) is the largest among the new EU accession countries. The population grew from 23 930 thousand in 1945. Natural increase slowed down significantly after 1989. In 1998 the balance between live births and deaths came down to zero and since 2000 has become negative (Graph H1). As a result of low natural increase stemming from a change in lifestyles and the additional burdens of the transition decade and large emigration (negative balance of 190 thousand people between 1990-2000), population growth has stagnated (Table H1, H2).

Graph H1. Natural increase, live births, deaths in Poland 1946-2001



Source: Polish Statistical Office (2002)

Table H1. Population dynamics in the years 1950 – 2001, in thousands

Year	Population
1946	23 930
1950	25 008
1960	29 776
1970	32 642
1978	35 061
1988	37 879
1990	38 119
1995	38 620
2001	38 644

Source: Polish Statistical Office (2002)

Table H2. Dynamics of the population growth (10 year periods)

Time span	Population growth (%)
1950-1960	19
1960-1970	10
1978-1988	8
1990-2000	1
1998-2001	0

Source: Own estimates based on the data provided by the Polish Statistical Office (2002)

The post-war demographic boom resulted in a significant increase of the population in the 1950's. The boom had its echo effects in the late seventies and early eighties, when people born during the demographic boom entered the reproduction age. Current large influx of youth to the labour force is one of the causes of high unemployment.

Similarly to most developed societies in Europe, fertility rates in Poland have been steadily decreasing in response to higher participation of women in the labour force, the growing wage premium for education, overall harder economic conditions, and a change in the ideal family model. In 2001 the fertility rate amounted to only 1.29, which is below the level of generational reproduction (Table H3).

Table H3. Fertility rate (average number of children per women aged 19-45)

Year	Total fertility
1970	2 200
1975	2 270
1980	2 276
1985	2 329
1990	2 039
1995	1 611
1996	1 580
1997	1 508
1998	1 431
1999	1 366
2000	1 337
2001	1 288

Source: Polish Statistical Office (2002)

Poland will face similar problems to those of the countries of Western Europe. Decreasing fertility rate and longer life expectancy (discussed later) will result in increased burden on those, who are in the productive age. It also might be an obstacle for sustaining high economic growth. In the long term the labour force might need to be subsidised by the immigration.

H.1.2 Population – regional analysis

Regional distribution of population: traditionally the central and southern parts of Poland - Mazowieckie, Malopolskie voivodships and eastern Silesia – are the most populous and most densely populated regions of Poland. Agriculture-based western and north-eastern and western regions are more sparsely inhabited.

Table H4. Population and density of population according to voivodships

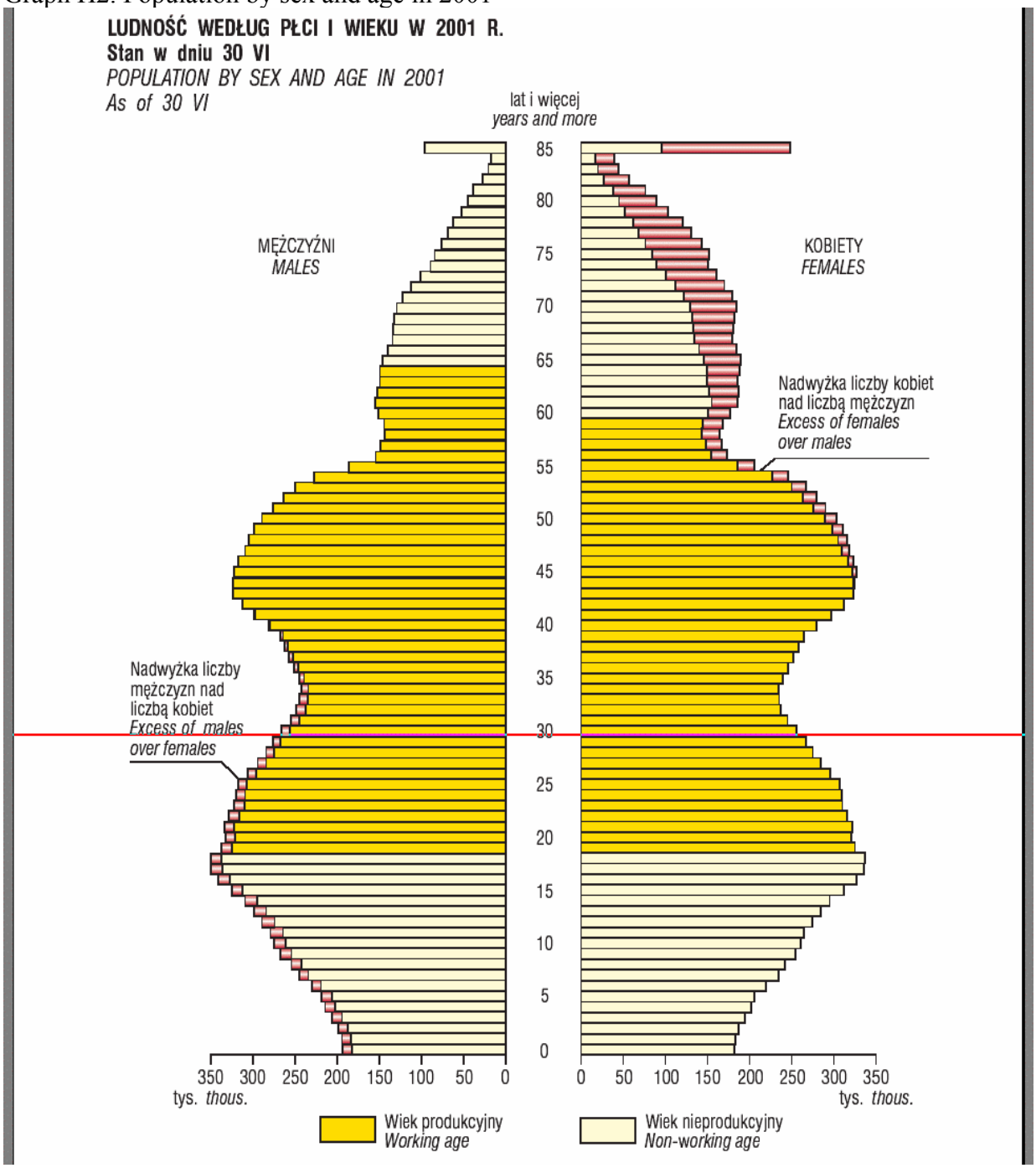
Voivodship	**Population**	
	in thousands	**Per km2**
Dolnoslaskie	2 978	149
Kujawsko-Pomorskie	2 101	117
Lubelskie	2 235	89
Lubuskie	1 023	73
Lodzkie	2 653	143
Malopolskie	3 223	213
Mazowieckie	5 067	142
Opolskie	1 088	116
Podkarpackie	2 126	119
Podlaskie	1 223	61
Pomorskie	2 192	120
Slaskie	4 866	396
Swietokrzyskie	1 325	113
Warminsko-Mazurskie	1 466	6
Wielkopolskie	3 355	112
Zachodniopomorskie	1 733	76

Source: Polish Statistical Office (2002)

H.1.3. Women's economic activity and a new family model

The women-to-men ratio remains constant at 106 and is comparable to those in other EU countries. More males than females are born, but the overall number of women is greater due to their longer life expectancy (Graph H2).

Graph H2. Population by sex and age in 2001

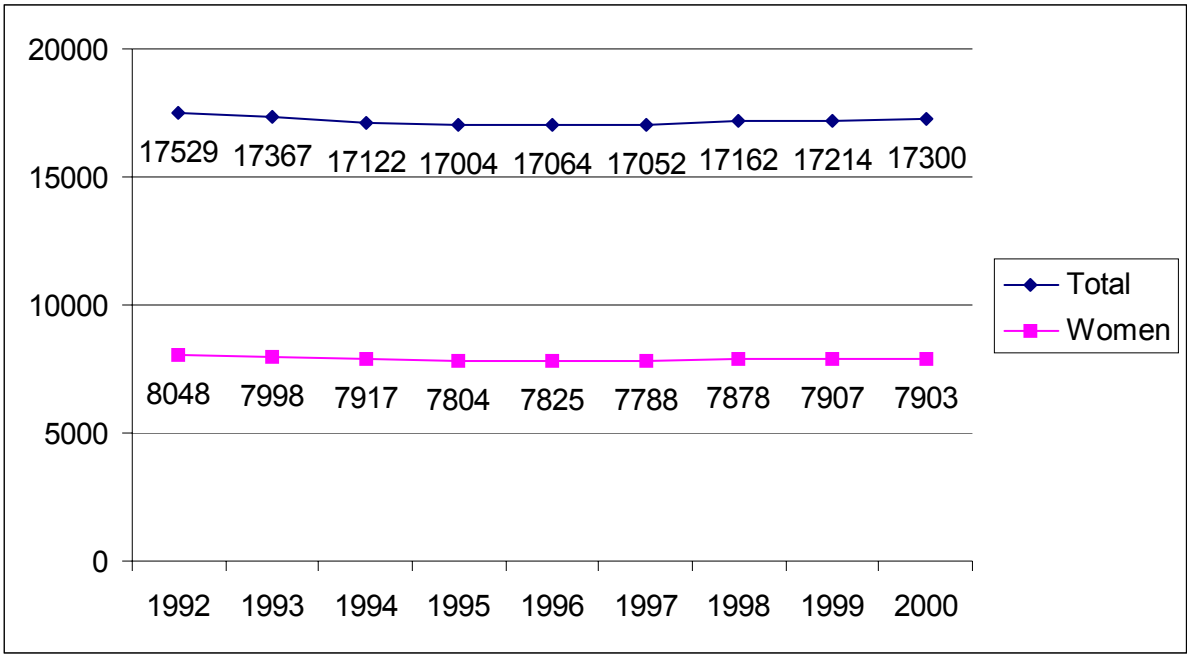


Source: Polish Statistical Office (2002)

The women participation in the labour market increased in the beginning of the transformation. Throughout the 1990's there were some eight million women employed (Graph H3). The Participation Rate[68] was estimated at 50% (Graph H4). The relatively high level of professional activity was caused not only by an economic hardship, but also by the changing social relations.

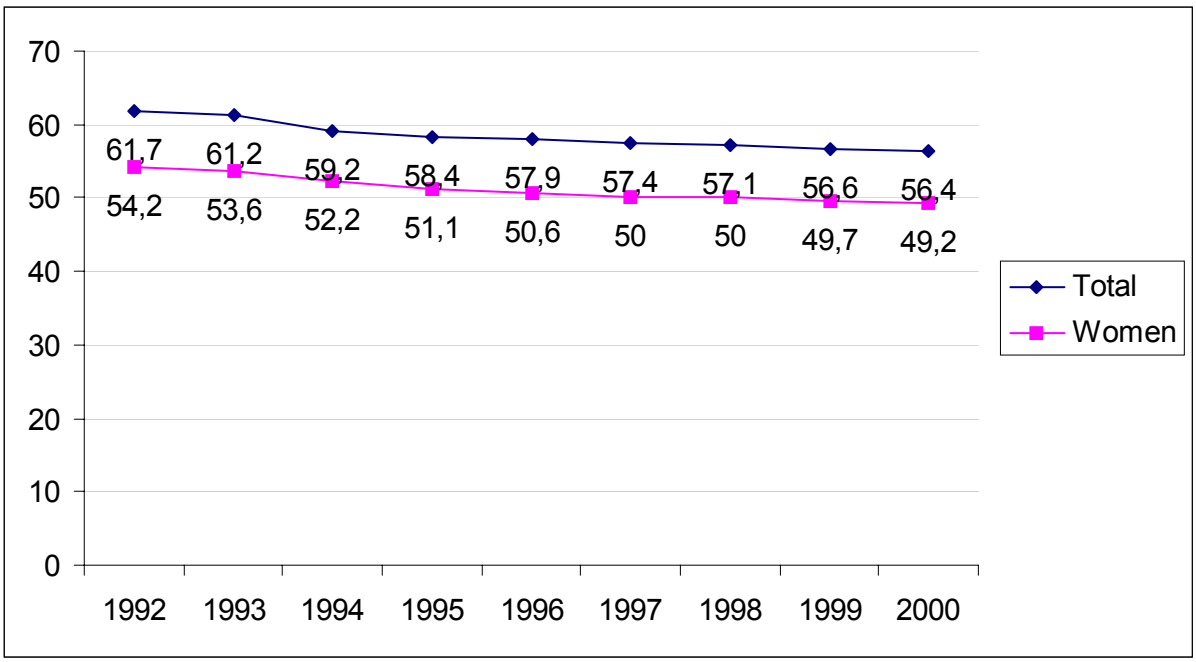
[68] Participation Rate is the ratio of the professionally active persons to the entire population of a designated group.

Graph H3. Persons professionally active 1990-2000 (in thousands)



Source: Twarowska, M. (2000), „Wielkość, struktura i dynamika podaży pracy w Polsce w latach dziewięćdziesiątych", Academy of Economics in Poznan.

Graph H4. Participation Rate 1990-2000 (%)



Source: Twarowska, M. (2000), ibid.

Poland is perceived as a catholic country. Indeed the share of Catholics in total population amounts to 95%. Therefore it is assumed that the society, and consequently the family model, must be in line with the widely known catholic doctrine. Nevertheless, religion does not seem to have an impact on the family model. The trend from a 2+3 and 2+2 model has changed into 2+2 and 2+1. More and more families, especially where both spouses are professionally active, decide to have just one child.

The change in the family structure and women's economic activity has a significant influence on the economy and public finances. Women to a large extent accept jobs traditionally conducted by men therefore putting stronger pressure on the job market. At the same time there is a greater demand on childcare facilities as well as ready-made food products, cosmetics, telecommunication devises, etc.

Fewer and fewer people live in households of more than two generations. Care facilities for the elderly are then in increasing demand. Consequently, public finances are affected by the additional expenditure on providing necessary services.

As for the divorces, its number fell in the first years in transition from 49 095 in 1985 to 38 115 in 1995, and picked up again reaching 45 308 in 2001. Yet, as a proportion to all marriages, the divorce rate in Poland is still one of the lowest in Europe. Since 1995 the number of marriages in the society has remained stable at around 9 million. The proportion of births outside marriages have steadily risen from 7.8% in 1990 to 15.9% in 2001 of total births.

An average Polish family is composed of 2.84 persons (2002) - a decrease in comparison with 3.55 (1988). In total there were 3307 thousand single households, 3097 thousand households with two members, 2654 thousand of three, 2405 thousand of four in 2002, and 1874 thousand of 5 and more members. Although specific data is not available, there is a growing number of single and monoparental households. This will have some impact on the consumption patterns, yet its influence on the development of IS in uncertain.

H.1.4. Life expectancy

Life expectancy in Poland has been on the rise since 1990 owing to a better access and quality of health services, healthier diets, and a change in a lifestyle. Males in 2001 lived on average 70.2 years compared to 66,5 years in 1990. Women's life expectancy lengthened from 75.5 years in 1990 to 78.4 years in 2001. However, Poland still lags behind the EU states. Poles live on average shorter than the inhabitants of the western part of the continent, as long as citizens of the Czech Republic and Hungary, and longer than citizens of the former soviet republics (in Russia, life expectancy in 2000 was at 59 and 73 years for men and women, respectively).

Poland's population, again in line with European trends, is also gradually aging. As shown in Table H5, the ratio of old people to young people is systematically increasing due to – on the one hand – longer life expectancy and – on the other hand – lower birth rates. In 1970 the ratio of 65 years olds and more in the total population amounted to 8.4%. By 2001 it increased to 12.5%. This ratio is set to gradually increase.

Table H5. Population development and changes in age structure in 1970-2001

Years	Population at specific age		
	Under 20		65 years and more
	total	Of which 0-14	
	In % of total		
1970	37,2	26,5	8,4
1975	33,7	23,9	9,7
1980	32,0	24,4	10,0
1985	32,3	25,6	9,4
1990	32,5	24,9	10,2
1995	30,9	22,5	11,2
2000	27,5	18,8	12,3
2001	26,8	18,2	12,5

Source: Central Statistical Office (2002)

Nonetheless, Polish society is still on average younger than in the EU countries: people aged 65 and over represented 12.0% of population in 2000, while the average for the EU oscillated around 16.1%. The share of people aged up to 15 years amounted to 19.6% of total population versus the EU average of 16.9%.[69]

H.2. Current population trends - advantages and disadvantages

Poland's population is relatively young compared to the EU countries. This fact is not likely to materially change at least until 2010. Hence, Polish economy will for long maintain an advantage over the EU as the pensions burden will be smaller than in the EU (even more so because of a successful implementation of a private-run pension system, which by 2020 will encompass all citizens, thus shifting a large part of the pension burden away from the state). At the same time a larger part of the society is in the productivity age, which can be quite positive in terms of a potential for dynamic economic development. Moreover, younger populations on average tend to espouse new technologies faster than older societies. Poland may thus have an advantage, *ceteris paribus*, in absorption of modern technologies.

However, current large influx of people born during the 1980's demographic boom to the labour market can be seen as a threat. The new job seekers will cause even greater pressure on the already very limited number of available employment opportunities, and many of them will join the unemployed, estimated at 17.8% of the labour force as of July 2003. Consequently, new labour market entrants will increase tensions and frustration within the society. Government, therefore, must develop a strategy not only for reducing current unemployment, but also for facilitating the new entries. Otherwise the problem of unemployment among the young will increase during the next few years. Accelerating economic growth will solve part of the problem. But unemployment in Poland is not likely to decrease below 15% by 2006 if the labour market does not become more flexible.

[69] „Key data on the Candidate Countries", No 129/2001, 13.12.2001, Eurostat. From „National Development Plan 2004-06" available at http://www.lpk.uz.zgora.pl/pl/strukturalne/npr.pdf, p. 22.

H.3. Prospective trends

Although it is unlikely that the fertility rate will increase in the near future, Central Statistical Office estimates that Poland's population will be slowly growing until 2015 and reach its peak of 39.005 million in 2015. After that the population will be marginally decreasing up until 2030 (Table H6).

Table H6. Projections on dynamics of Poland's population 2005-2030

Year	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**
Population (in thousands)	38 643	38 788	39 005	39 003	38 657	38 025

Source: Polish Statistical Office (2003)

The expected increase in population will most likely stem from an inflow of immigrants, both Poles and foreigners. Foreigners - mainly from Asia and the Middle East - will be looking for a better standard of living, as Poland's accession to the European Union will accelerate economic growth and standards of living. Likewise, many Poles living abroad might also be tempted by the prospects of fast development of Poland. Already the inflow of Poles is being observed, although no data on it is available. At the same time, a stream of permanent emigrants will most probably slowly dry out (it does not however apply to short-term job emigration, which is likely to amount to some 500 thousand to one million Poles).

The aging of the population will continue and reach the current western level within the next 20 years. It will require an effort on the government side in facilitating this change. The pension reform implemented in 1999 will however to a large extent ease the issues of state pension financing.

It is extremely difficult to judge the time span for the family model. Even though, one may insist that lower fertility rates represent a permanent change, in some developed countries (such as the UK) the trend seem to have been averted, as more and more families decide to have more children. There is very little doubt, however, that as a consequence of deep sociological changes in society women's professional activity level will keep increasing.

H.4. Summary and conclusions

The aging of the population, increasing life expectancy and low fertility rates - all of these facts are common for most of the EU and candidate countries. Poland is no exception, although regional disparities exist. In terms of the development of the information society, since younger people on average tend to espouse and adjust to new technologies faster and better, thanks to a still relatively young population Poland maintains a competitive advantage over the EU countries.

Nonetheless, the aging of the population may result in a shift of financial resources from IS development to health protection. An already large number of retired people in Poland (9.2 million together with recipients of disability allowances) represents a large voting power, which encourages the policymakers to compromise IST development-oriented investments in favour of policies beneficial to older people. This dilemma could be resolved if there is enough financial resources for financing both purposes. This in turn is mostly dependent on the pace of economic growth, which is one of the main drivers of tax revenues. An increase in taxes would also go a long way towards alleviating the aging problem, yet given the current

level of international tax competition, any increase in taxes would be much harder to implement than a cut in public investments.

Strengths	**Weaknesses**
1. Relatively young society as compared to the EU countries 2. Reformed pension systems, based on privately managed pension funds, which lessens the impact of the "retirement bomb" on public finances 3. Growing life expectancy	1. Low fertility rates 2. Deteriorating demographic age structure
Opportunities	**Threats**
1. Inflow into the labour market of a generation of a demographic boom of the early 1980's, which can be productively utilized	1. Faster than expected aging of the population 2. Shift of financial resources from IS development to health protection for the aging population

I. CULTURAL AND SOCIOLOGICAL DATA

I.1. Changes in employment structures – the new forms of employment and their link to IST

Poland since 1989 has witnessed a gradual shift of employment from manufacturing to services (more on it in Chapter A). This trend is conducive to the growth in IST-related forms of employment like flexible schemes, part time jobs, distance work etc.

The impact of IST on employment in general and on various forms of employment is still quite negligible owing to often poor communication infrastructure and relatively high costs to telecommunication services, which limits the potential for distance work, relatively inflexible labour code discouraging short-term employment contracts (although the labour market flexibility has been recently improved upon an adoption of the new Labour Code) and a lack of mentality of flexible work versus traditional on-site employment.

It can be roughly estimated that presently some 50.000 people can be considered as "distant workers". These are journalists, accountants, tax advisors, language translators, researchers, scientists etc.). This number, although still negligible when compared to the total employment of almost 15 million people, is steadily rising. There are also roughly 10 000 workers employed in 190 call centres all over Poland, delivering nation-wide services. Employment in call centres is quickly rising in step with a continued progress in outsourcing of client services.

I.2. Migration

I.2.1. Emigration

Throughout the XX century Poland has traditionally been an "exporter" of people, particularly to the US, Canada and Western Europe (Germany, UK, France). Emigration had its ebbs and flows. Former emigration waves coincided with notable historical events: the end of the II World War, 1968 riots, martial law (1982). From the 1960s onwards there has been a steady stream of emigrants. During the communist times there was a significant stream of political migrants escaping persecutions and economic emigrants (more often than not illegal) looking for higher standards of living.

Within the last decade (1991-2001) almost 250 thousand people emigrated from Poland (Table I2). In the same period, 79.5 thousand people settled in Poland (Table I2). The net balance of emigration was strongly negative and amounted to almost 170 thousand people.

Table I2. International migration of population for permanent residence by sex of migrants

Specification		**Immigration**				**Emigration**			
o – total *m – males* *f – females*		1991 - 1995	1996 – 2000	2000	2001	1991 - 1995	1996 - 2000	2000	2001
Total	**o**	32 504	40 348	7 331	6 625	112 716	112 231	26 999	23 368
	m	17 121	20 554	3 893	3 505	56 686	57 443	13 740	12 251
	f	15 383	19 794	3 438	3 120	56 030	54 788	13 259	11 117

Source: Polish Statistical Office (2002)

Germany, USA and Canada were the main destinations of Polish emigration throughout most of the 1990's (Table I3 for 1997)

Table I3. Direction of immigration of citizens of Poland in 1997

Country	Share in total in %
Germany	70
USA	11
Canada	7
Austria	3
Sweden	2
Australia	1
France	1
Other countries	5
Total	**100**

Source: Polish Statistical Office (2002)

Official data however do not take into account illegal short- and long-term emigration. It is estimated that some two million Poles work and live abroad on an illegal basis (of which some one million reside in the US). Accession to the EU, which will provide legal employment opportunities, is likely to result in a significant increase in temporary emigration from Poland. The high rate of unemployment in Poland (17.8% as of July 2003) and large disparities in wages (as of July 2003 an average monthly gross salary in Poland amounted to some EUR 525) will be the main drivers of emigration. Based on the current pattern of emigration and various surveys of would-be emigrants, it can be argued that the majority of Poles, who will work abroad, are very likely to come back to Poland after they will have reached an expected income and wealth status.

In terms of the educational structure of those emigrating from Poland, available data does not confirm that Poland could be considered a source of a "brain drain". Emigrants with basic and secondary education constitute the predominant part of the emigration flows. These are mostly economic emigrants looking for better-paid jobs and higher standards of living. As regards the highly educated, anecdotal evidence suggests that they leave for abroad for only temporary stays. A large majority of them returns back to Poland. Overall the emigration flow of educated Poles is should not be seen as a threat. It is rather an opportunity for bringing back to Poland skills acquired abroad. Ideally though, there should be enough employment opportunities in Poland. This seems to be largely the case for ICT employees. For example, within the recent German program of 20 000 visas for IT workers, fewer than 200 Poles applied.

I.2.2. Immigration

Due to an increased influx of migrants, who travel to Poland in transit to the EU countries, and in order to comply with the EU regulations, Poland introduced laws aimed at preventing illegal immigrants from entering and staying in the country (i.e. readmission agreements with the neighbouring states based on the concept of safe third countries, asylum and deportation procedures), as well as facilitating return of those who have already arrived. As of October 1, 2003, Poland instituted visas for all eastern neighbours (except for the EU accession countries – Lithuania, Latvia, Estonia). A new infrastructure has been built aimed at tightening border controls and eliminating illegal immigration through the eastern border – soon to be a border of the EU. The inflow of immigrants intent on staying in Poland has so far been minimal.

Hence, inward migration is not an issue yet, although with the rising level of prosperity, one should expect that the number of people who would wish to stay permanently is likely to keep on increasing.

Due to the rise in the standard of living and near completion of the democratic reforms (resulting in securing all aspects of personal freedoms and human rights characteristic for developed liberal democratic states), it seems very likely that the number of asylum seekers among the migrants will increase. Nonetheless, their number so far has been insignificant - in the 1992-2000 period only 1 061 refugees statuses were granted of which only 78 received the refugee status in 2000 (UNHCR Poland 2003). Russians and Romanians filed the largest number of refugee applications.

Citizens of developed countries such as Germany, USA and Canada represent the majority of immigration into Poland (Table I4). This fact may point to the first symptoms of likely returns of Poles living abroad. Citizens of the former Soviet Union already contribute the largest number of foreigners entering Poland for settling purposes. In addition to official numbers, there is also some illegal immigration. It is estimated that there are, however, no more than 20 000 permanent illegal immigrants. The new "Act on Foreigners", which entered into force on 1 September, 2003, provides for a possibility to legalize illegal residence in Poland. In addition to permanent illegal residents, some 100 to 200 thousand immigrants work illegally on a short-term, often seasonal basis (employed in construction, au pair, and prostitution). These immigrants mostly hail from the eastern neighbouring countries of Ukraine and Belarus.

In line with the rising economic prosperity and political stability of Poland, many Poles living abroad may decide to come back home. The current annual number of immigrants of 6-7 thousand can soon exceed 10 thousand a year. Nonetheless, at least until 2010 the impact of immigration on the Polish economy and society is likely to be negligible.

Table I4. Immigration to Poland in 1997 according to citizenship of the immigrants (in % of total)

Country	**Share in total in %**
Germany	25
Former Soviet Union	23
USA	15
Canada	5
France	4
UK	3
Austria	2
Australia	2
Other countries	21
Total	**100**

Source: Polish Statistical Office (2002)

I.2.3. Consequences of international migration

It is extremely difficult to judge the economic and political impact of outward emigration. On the one hand, emigration costs Poland in terms of money invested in education and upbringing of the emigrating citizens (although, as said, most of the emigrated have only basic or secondary education). On the other hand, however, emigration helps in lessening the

issue of unemployment. Moreover, a large diaspora abroad can deliver substantial benefits in terms of business and political contacts with the home country (the case of the Polish diaspora in the US, which through intensive links with Poland contributed to the success of transformation). Finally, some share of emigrants may decide to move back to Poland, bringing with them newly acquired skills, contacts and knowledge.

Inward migration also has its ebbs and flows. From the socio-cultural perspective, immigrants' social habits and traditions, enrich national culture and possess unquestionable educational virtues. The "differentness" can, nevertheless, cause tension, especially if politically manipulated. From the economic point of view, immigrants contribute a very important element of the labour market, as they very often perform jobs, which the "locals" would not want to do. However, new immigrants cause bigger pressure on the local labour market, by competing for work with the local population.

I.2.4. Internal migration

Internal migration in Poland has never played a significant role in the entire migration structure except in communist times, when internal migration was stimulated by the state authorities to provide labour supply in the process of industrialization of the country.

At the moment economic incentives are mostly responsible for internal migration. Nevertheless its size is relatively low. There seem to be several reasons for it:

- underdeveloped labour market, with difficult access to information on employment opportunities in other parts of Poland,
- mismatch of skills between potential internal migrants and demand (mostly concerns farmers),
- relatively high prices of real estate rentals in larger cities,
- lack of a culture of social mobility.

Large regional disparities in unemployment rates (less than 15% in Mazowieckie, more than 30% in Warminsko-Mazurskie voivodship) illustrate the low mobility of population: if the mobility was higher, they would be moving to other parts of the country in search of employment. This would lead to a reduction in differences in unemployment rates. The Polish Statistical Office (2002) estimates that between 1991 and 2001 677 thousand people moved from rural areas to other rural areas, 1.271 thousand moved from urban areas to other urban areas, 853 thousand moved from urban to rural areas, and 1033 thousand moved from rural to urban areas.

Box I1.

A good illustration of the low mobility of the population and lack of culture of moving in quest of employment is the recent bankruptcy of a telephone and power cable manufacturer in Ozarow, a city near Warsaw. The factory in Ozarow, together with two other cable factories located in other regions of Poland, was bought in 2001 by a private entrepreneur. The new owner decided to close the factory in Ozarow and move the whole production to two other, more efficient factories. A large proportion of the Ozarow workforce was offered to relocate to Szczecin, a large city at the Baltic Coast, in the north east of Poland. Yet, only a very small group of people decided to move. All the others mentioned various reasons for not moving: „family roots are here, children are at school, all our friends and family are here, we own a house here, while over there we would have to rent an apartment, we like this place etc.". In the end, the remaining part of the workforce, who did not accept offers to relocate, put up a strike and a blockade of the factory, which lasted for more than a year. Still, as of August 2003, the conflict is not entirely resolved. The Ministry of the Economy is now involved in finding a solution.

I.3. Income distribution

The decade of the 1990's saw a gradual increase in dispersion of income distribution. The inequality as measured by a Gini coefficient (on a scale from 0 to 1, the larger number the higher the income inequality) increased from 0.28 in 1990 to 0.33 in 1999. The income structure of the society based on tax returns reveals that 95% of the employed records annual income of less than PLN 37 000 (some EUR 8 500), which puts them in the first personal tax bracket of 19%. Annual incomes of roughly 4% of the employed range from PLN 37 000 to 74 000, which puts them in the second tax bracket of 30% (calculated above the 19% bracket). Annual reported income of the remaining 1% exceeds PLN 74 000.

While there are no studies on the subject, one can safely assume that a part of the increase in the inequality was driven by an increase in wage premium related to education, skills and experience, which is clearly a healthy trend. Education-intensive occupations are remunerated much above the national average (Table I5).

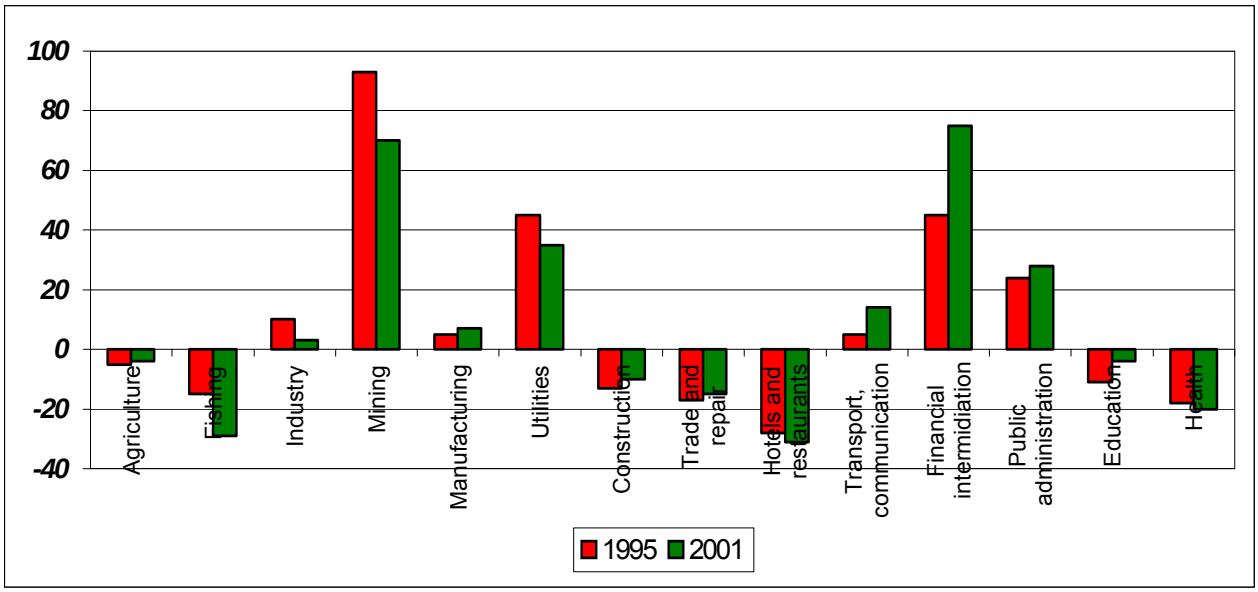
Table I5. Full time paid employment and average gross monthly wages by occupational groups in October 2001

Specification	**Full time paid employees in percent**	**Average gross wages in PLN**
Total	**100.0**	**2 217**
Legislators, senior officials and managers	5.1	4 898
Professionals	18.5	2 869
Technicians and associate professionals	15.9	2 246
Clerks	11.6	1 987
Service workers and shop and market sales workers	7.5	1 476
Skilled agricultural and fishery workers	0.4	1 446
Craft and related workers	19.1	1 895
Plant and machine operators	12.3	1 982
Elementary occupations	9.6	1 310

Source: Polish Statistical Office (2002)

The rising wage premium to education is illustrated by Graph I1, where between 1995 and 2001 the relative deviation of wages in financial intermediation, utilities, public administration, and transport and communication increased relative to other, less human-capital intensive occupations. Political strength and lobbying on the part of the mining industry was responsible for a difference between salaries in the mining industry and the national average (this is in spite of the fact that the mining industry is in perennial deficit, which has to be covered by state subsidies).

Graph I1. Relative deviations of average monthly gross wages and salaries from the average wages and salaries in the national economy, 1995 and 2001 (in %)



Source: Polish Statistical Office (2002)

A dynamic rise in the wage premium to education attracts new skilled labour and consequently serves as an incentive for upgrading the population's education level (see chapter G 1.2).

I.4. Consumption and cultural patterns

There has been a gradual change in consumption patterns of the Polish society, driven by a gradual increase in incomes, from basic towards more advanced needs. As shown in the below table, between 1995 and 2000 a proportion of total income spent on food, alcohol, and clothing fell while, spending on household maintenance, health, transport, and communication increased.

Table I6. Individual consumption expenditure of households sector in 1995 and 2000

	1995	2000
Total	100.0	100.0
Food and non-alcoholic beverages	29.2	21.6
Alcoholic beverages, tobacco	8.9	7.2
Clothing and footwear	5.9	4.7
Housing, utilities, other fuels	19.6	23.9
Furnishings, household equipment, maintenance	4.8	4.7
Health	3.3	4.3
Transport	11.1	13.3
Communication	0.8	1.4
Recreation and culture	6.5	6.6
Education	1.0	1.4
Restaurants and hotels	3.3	3.2
Misc. goods and services	5.6	7.7

Source: Polish Statistical Office (2002)

The most significant changes in consumption patterns concern the middle and upper classes of the society, which – in line with increasing incomes – could afford to increasingly adopt Western standards and patterns of consumption. The current trends in consumption patterns are very likely to be sustained in the future, as it has been the case with less affluent countries within the EU (Spain, Portugal, and Greece).

The cultural patterns during the transition have also been changing. Faced with more stringent requirements of work, less time, and fear of unemployment, people spent less leisure time, lead more healthy lives (*vide* a decreasing consumption of alcohol, a decrease in consumption of pork versus other, more healthy meats, an increase in consumption of vegetables, fruits), practice more sports, and adopt highly-valued Western lifestyles and role models. Again, however, most changes apply to the "new generation": people with more-than-average incomes, mostly young and urban. A growing number of Poles travels abroad for either vacation or work.

One of the obvious consequences of the accession to the EU will be a further opening of the Polish society to the outside world, increasing homogenization of tastes and lifestyles, although without doubt local ways of living will for long, if not necessarily forever, remain the mainstay.

I.5. The role of NGOs

Non-governmental organisations (NGOs) play an increasingly important role in the Polish society. From negligible numbers at the beginning of the 1990s, the number of currently operating NGOs, usually established by individuals (91% of cases), reached 36 500. However

only 58% of registered NGOs can be considered actively engaged in work of any kind. Most of NGOs are concerned with sport, education, health care, rehabilitation, and culture and art. They are mainly funded from public resources of local authorities (19.6%), the central government (13.5%), individual and firm's donations (10.4%), EU funds and foreign assistance programs (5.7%).

I.6. Religion and cultural links in the region

Poland is predominantly a catholic country, and is very often perceived as one of the European strongholds of this confession. Indeed religion, being a part of tradition, still plays an important role in social relations and conduct. The Catholic Church maintains an influential political position and opinions of the clergy are widely respected in the society, particularly among those of lower social standing. Political parties are being built around religious doctrine and gain electoral support (staunch Catholic parties received some 10% of the vote during the last parliamentary elections in 2001). Many state regulations mirror the traditional views derived from the religious doctrine, such as restrictive abortion law or offence of the religious feelings act.

However, the western pattern regarding the style of living and conduct tend to gain more influence than the traditional way of life and Poles become westernised in every aspect of their existence. The evident presence of the religious power does not affect in any significant way the drive towards building and maintaining a secular state. The traditional behaviour patterns were eliminated a long time ago and the society in every respect resembles western nations, although some elements of conservatism still remain, especially in the villages (focus on family values and religiosity, etc.)

During Poland's turbulent history, strong cultural and social links were developed with her eastern neighbours. A large part of today's Belarus, Ukraine and Lithuania were part of Poland up until 1939. Slavic language has also played a facilitating role in interaction. In spite of strong historical links, Polish society now seems to be entirely oriented towards the west. It reflects the national mantra of "going back to Europe, to where Poles have always belonged". There is relatively little coverage of various events taking place beyond the eastern border. Travel and tourism patterns were entirely shifted towards the west. It is now quite uncommon to travel to anywhere east of Poland (for instance, anecdotal evidence suggests that there may be more Poles vacationing in Greece than visiting Russia). Cultural affinity with the eastern neighbours could be seen as an advantage particularly in terms of the development of economic relations. So far however the progress has been quite slow (in 2002 exports to Eastern Europe represented less than 10% of the total).

Two most influential neighbours – Russia and Germany, had always been seen as a threat, although currently this view has changed dramatically. In the light of EU enlargement, Germans are now mostly seen as partners. Traditional sympathy to the Baltic nations and southern neighbours, Czechs, Slovaks and especially Hungarians remains strong. Some still, however, are very anxious about Germans buying out the western part of Poland.

I.7. Standard of living and the level of development

Poland's standard of living is similar to the standard of living of the other central and eastern European countries scheduled to join the European Union in May 2004. According to the

World Bank, Poland belongs to the upper-middle-income economies[70] group. UNDP Human Development Index (HDI) 2001 ranked Poland in 35th place. In Poland had 52nd place in the ranking according to GDP per capita (PPP US$). Higher value of the HDI suggests that the standard of living in Poland is higher than what GDP per capita would suggest. The value of the HDI has been steadily growing from 0.794 in 1990 to 0.841 in 2001. Gender-Related Development Index[71] of 0.839 gave Poland the 35th position. In 2001, less than 2% of the population lived on less than a US dollar a day.[72]

I.8. Summary and conclusions

Since 1989 Poland has witnessed a gradual shift of employment from manufacturing to services, which bears testimony to positive changes in the structure of the economy, which increasingly resembles that of the EU countries. In the near future, the shift towards services should continue. It would bode well for the IST-related forms of employment (distance work, flexible schemes, part-time jobs). Quite importantly, the accession to the EU should contribute to decreasing employment in agriculture as farmers would be more likely to find employment in agriculture-related services as has been earlier the case in the other EU countries (Ireland, Spain, and Portugal). As farmers are the least intensive users of IST, any decrease in employment in agriculture would be positive for the progress in the IS.

Poland has traditionally been an „exporter" of people. In the recent decade, according to the official sources, roughly 250 thousand people left Poland, mostly for economic reasons. In addition, almost one million people seem to have temporarily left Poland to work and live abroad on an illegal basis.

Accession to the EU is very likely to increase temporary employment emigration to the EU countries. According to various estimates, within some years after the accession, approximately 500 thousand to one million Poles are likely to move to Western Europe in search of employment. Yet, according to the same surveys, most Poles would emigrate only temporarily and in time return back to the home country (the specific timing depending on employment opportunities in Poland). Anecdotal evidence suggests that the risk of a „brain drain" is not significant as most of the emigrants have only basic and secondary education. Temporary emigration may quite positively contribute to local development as it will lessen pressures on the labour market. Furthermore, returning emigrants will bring back skills, qualifications and knowledge, which is locally often in short supply. Since 1990 the annual outward emigration flows have been steadily decreasing, reflecting higher incomes and standards of living in Poland. At the same time, approximately 80 thousand people returned to Poland in the last decade.

Internal mobility in Poland is low. It reflects risk aversion of the population, high value placed on stability, few employment opportunities, a lack of information of existing employment opportunities in various parts of Poland, and relatively high prices of real estate rentals in large cities. It is hard to expect that this pattern would quickly change. Low mobility is negative for the development of the IS, as internal migration from lower developed regions to higher developed regions with better IST infrastructure would likely result in an increase in

[70] World Bank Data http://www.worldbank.org/data/countryclass/classgroups.htm#Upper_middle_income
[71] Gender-related development index (GDI) rank is a composite index measuring average achievement in the three basic dimensions captured in the human development index—a long and healthy life, knowledge and a decent standard of living—adjusted to account for inequalities between men and women.
[72] UNDP Data http://www.undp.org/hdr2003/indicator/cty_f_POL.html

IST penetration ratio as the newcomers would seize the opportunities to use new technologies not available back home. Internal migration would also lead to an increase in disposable income of the migrating population, which would also be positive for the IS.

In line with the increasing openness of Poland and rising incomes of citizens, domestic consumption and cultural patterns have converged with those of the EU countries. This trend should continue.

Strenghts	**Weaknesses**
1. Positive trends in shift of employment from manufacturing to services 2. Changing trends in consumption and cultural patterns 3. Large international diaspora, which facilitates international links	1. Large proportion of the labour force employed in agriculture 2. Low internal mobility
Opportunities	**Threats**
1. Temporary emigration to Western Europe, which should facilitate transfer of knowledge and skills. 2. Accelerating economic growth, which will create new employment opportunities	1. Growing social exclusion related to high unemployment, particularly the long-term 2. Growing digital divide between urban and rural areas

DIAGNOSIS: IST-RELATED DYNAMICS AND THEIR POTENTIAL

1. Macro-economic background

Poland's economy has made significant progress in socio-economic development in the last fourteen years. The transition process is by now virtually complete, and will be finalised by the end of 2006 with the planned further privatization of that far state-owned "strategic" sectors. Accession to the EU will mark the final end of the postsocialist period. Poland has a stable economy, which over the whole transition period recorded relatively high GDP growth rates (average GDP growth of roughly 4% between 1992 and 2003). The level of Polish GDP in 2002 amounted to more than 130% of the GDP level in 1989. The ratio is one of the highest among all the transition economies.

Fast economic growth is the key to the development of the information society in Poland. During the recent decade the rate of economic growth was closely correlated with both public and private investment in IST, R&D and innovation. During the period of high growth (1994-98) investments in new technologies were growing at a very fast rate driven by a large demand for IST products and services. High economic growth has also proved to substantially enhance attractiveness of Poland for foreign investors, prevent large emigration, including IT specialists, and increase state spending on education, infrastructure, and modernization of public administration. Despite the recent 2001-02 slowdown in economic growth, the GDP growth rate is likely to increase to 3.5% in 2003 and 5% and more in 2004 and onwards.

High economic growth is also a prerequisite to resolving current problems of a large budget deficit and a relatively high debt to GDP ratio, which by 2006 will approach the constitutional limit of 60% of GDP. Faster GDP growth will result in higher tax revenues, which will facilitate a gradual decrease in budget deficit and improve the debt to GDP ratio. High economic growth will also facilitate the reform of the ailing industrial sectors (mining, railways) and the inefficient agriculture by creating employment opportunities for workers leaving these sectors. It is being estimated that, given labour market inelasticity, only GDP growth exceeding 3% per year will create new jobs. Hence, faster economic growth of some 5%, as projected for 2004 and onwards, will contribute to a decrease in **unemployment**, which as of the end of 2003 was the highest in the CEE region (17.5%). The decrease in unemployment is particularly important for the young, which represented 85% of the total unemployed as of the end of 2001. Productive utilization of the large pool of people aged 15-24, who are the most intensive users of IST, would bode well for the acceleration in the overall absorption of IST. Similarly, larger employment opportunities would also be a chance for the older population, aged 50 and above, which has so far been significantly lagging behind the younger population in terms of IST adoption, to enhance their work and IST skills and thus join the IS.

Since 1990, Poland's economy experienced a gradual shift from agriculture and manufacturing to services. The latter now represent more than 60% of GDP. Since the service sector is much more absorptive to the IST than agriculture, the shift has had a positive impact on the penetration of IST in the economy. In the last 14 years, the growth in **labour productivity** was very high: between 1993 and 2002 it averaged more than 5% per annum. The growth was driven by higher managerial skills, better quality of human capital, privatization, labour shedding and growing FDI, whose stock exceeded USD 65 billion as of the end of 2002. High growth in labour productivity was also stimulated by the technological progress, which was mostly dependent on imports of technology embodied in investment

goods, including ICT (computers, telecommunications equipment etc.). The high growth rates in productivity are likely to be sustained in the near future as the local economy will continue to import technology from abroad and close the currently existing productivity gap (the level of Poland's labour productivity amounts to some 40% of the EU average).

Poland's public finance system throughout the whole transition period has on the whole failed to sufficiently finance the development of IS. Social transfers and subsidies for ailing industries have represented a large share in total public expenditure in the last ten years and have proved to "crowd out" investment in infrastructure, education, and IST. For instance, during the whole transition period the state owned coal mining industry racked up debts of some PLN 20 billion, while between 1998 and 2003 the whole amount of the state spending on software and hardware in schools amounted to paltry PLN 393 million.

Strong industrial (mining, railways, steel industry, shipyards) and social vested interests (pensioners, disabled, and other welfare recipients) and a relative lack of strong political resolve have led to a situation where throughout the last 14 years social rather than development spending has been given the priority. Hence, in spite of the growing public spending and ever increasing budget deficits, growth in financing for IS-related policies has been compromised in favour of social spending. Thus, **a reform of public finances**, which would re-allocate public resources from social to investment spending, is needed if public investments into the IS are to increase. A lack of a public finance reform might lead to a crisis-scenario as Poland exceeds the constitutional limit of public debt to GDP. This could undermine confidence of financial markets and lead to a significant increase in the cost of public debt, problems with an access to financing of both the public and private sector, large depreciation of the local currency and social disorder. A failure to reform public finances would also preclude Poland from entering into the euro zone (according to the Maastricht criteria, budget deficit can not exceed 3% of GDP: in 2004 Poland's deficit will however exceed 5% of GDP). The adoption of the euro would substantially add to the long-term stability of the economy and consequently improve prospects for overall development, including the IS. The government plans to replace zloty with euro in 2008, but most economists agree that 2010 is a more realistic date. Finally, insufficient public resources have also led to a significant backlog in infrastructural investments, particularly in roads and railways. Consequently, Poland's highway network is now shorter than in Slovenia, a country less than 16 times its size and 18 times its population. The prospects for the overall fast economic development, which is closely related to the prospects of the IS, would be quite limited without a substantial improvement in the so-called "hard" infrastructure. In this context, the accession to the EU, thanks to the funding from the Structural Funds, is likely to significantly increase infrastructural spending.

The transition decade has led to a **growing regional divergence** in economic and social indicators. Highest increases in GDP per capita, thanks to existing complementarities – highly educated labour force, high level of urbanization and industrialization, better developed infrastructure, proximity to western markets - were mainly reported in big cities and in the central-western parts of Poland. Eastern, some parts of east-southern and central Poland, whose economies are mostly based on agriculture, have lagged behind other regions in terms of the GDP growth. Consequently, the historical divide in development, which could be traced back to the legacy of the partition of the Poland's territory among the Russian, Austrian and German empires from before 1918 and then to the so-called "Poland A" and "Poland B" existing in the intra-war period (1918-1939), quite strangely still seems to be present. The dividing line between both Poland "A" and "B" could roughly be traced along the Vistula

river, which cuts Poland into two parts, roughly in the center. Poland "B" would be on the eastern side, which back in 1918 was part of the Russian Empire. The geographical divide is also almost equally the urban-rural divide: western Poland is on average much more urbanized than eastern Poland. The share of agricultural employment in total employment in eastern Poland is also much higher than in western part of the country. The two over-lapping divides remain a challenge for a cohesive and sustainable growth of the economy, including the prospects for the IS development. A failure to prevent further increases in economic and social divergence could preclude large parts of the country from participating in the development of the IS.

The "National Development Plan 2004-06", a strategic government document aimed at utilizing the EU funds, has set an objective of increasing regional cohesion. This can be achieved through increased investments in the poorer regions financed by the EU Structural funds. Yet, the availability of the EU funding will depend on the administrative capacity, quality of projects and availability of co-financing. The ability of the poorer parts of Poland to utilize EU funds remains unknown. It is likely that in the short-term the accession to the EU will contribute to widening regional disparities as richer, better-endowed regions will be better prepared and hence more successful in taking advantage of the accession. In the longer-term, however, beyond 2006, thanks to positive effects of "learning-by-doing", poorer regions should overcome early handicaps and start to slowly catch-up with the rest of the country.

The accession to the EU is certain to become an engine of faster economic and social development. Between 2004 and 2006 Poland could receive up to EUR 11.4 billion in EU structural and cohesion funds. It is being estimated that the accession bring approx. 0.8% of additional GDP growth annually between 2004 and 2006 (with the largest impact in 2006). Along with the accelerating economic growth, the accession should also contribute to a fast increase in private investment in IST as corporations are likely to increasingly resort to ICT, R&D and business process innovation in order to withstand increased competitive pressure. This positive trend should be further strengthened by the expected increase in FDI. The complete opening of the EU market for Polish products should also contribute to faster growth in exports. Opening of the markets will lead to increased competition in products and services, which is likely to induce corporations to adopt business-related IS applications aimed at improving competitiveness.

2. Public IST policies

In spite of the overall positive economic prospects, the growth of the economy on its own does not guarantee a fast development of the information society in Poland. Inadequate policies may stifle IS development in spite of a growing economy.

Since 2002, after a decade of stagnation, there has been a **substantial increase in the quantity and quality of the IS policies**. By the end of 2003, most of the EU legislation on the IS has been already adopted. On top of that, in 2001 Poland adopted a strategic document on "ePoland – Plan of Actions for Development of the Information Society in Poland 2001-06" and – in March 2003 – "The Strategy for Informatization of Poland 2001-06". Moreover, in April 2003 a new ministry – the Ministry for Scientific Research and Information Technology (MSRIT) - was established with an aim to coordinate and stimulate national IS policies. The new Ministry is poised to substantially improve effectiveness of state policies on IS development, whose quality, comprehensiveness and coherence so far has been quite low as evidenced by low informatization of the public administration, low availability of online

public services, and lack of inter-operability of existing IT systems in administration. The new Act on Informatization of Public Administration, likely to be finally passed by the Parliament in the fall of 2003, will further strengthen the role of MSRIT. It will be empowered to coordinate all IT public projects and audit their viability *ex ante.*

Yet, while the **establishment of the MSRIT** can be interpreted as a very positive sign, alas its role in promotion of various IS initiatives is likely to be significantly constrained – as it has already been the case so far – by insufficient financing. The whole budget of the Ministry for IS policies amounted in 2003 to PLN 29.6 million (approx. EUR 6.3 million), that is some 0.018% of total expenditure of the central budget. MSRIT employs some 180 people, of which some 20 are directly dealing with the IS policies. This should be compared to the overall number of 330 000 civil servants in Poland. Quite clearly, one can hardly expect a major breakthrough in IS development with only some 20 civil servants directly involved.

Apart from low financing, the progress in development and implementation of IS policies in the recent years have been constrained by **inefficient public administration**. Bureaucratic inertia driven by low level of skills, lack of motivation for implementation of innovation, low wages and unclear incentive systems has compromised the speed and quality of IS initiatives. The inefficient administration, in spite of the likely gradual progress in enhancing quality of administration as old employees are replaced with a new, better educated lot, and as the remaining ones are gradually trained, , will in all likelihood remain one of the major bottlenecks in the development of IS.

Low political support has also slowed the development and implementation of IS policies as evidenced by low financial and human resources earmarked for the IS from the public sources. It is due to low awareness of the benefits of the IS among the policy-makers (ministers, public officials, members of the parliament) and a priority placed on more politically and socially sensitive issues (unemployment, restructuring of the ailing industrial sectors, agriculture). In the recent years, the central government has been preoccupied with resolving immediate social and economic problems. Development of the IS has been very low on the political agenda as it has not been seen as a tool for resolving currently outstanding issues. Moreover, a strong opposition from various interest groups (coal miners, nurses, steel workers, railways' employees), which would lose state subsidies and various privileges if a re-allocation of financial resources towards the IS development was proposed, further negatively affects the resolve of the policy makers to re-allocate funding.

There does not seem to be a clear vision of the IS being the cornerstone of the future long-term economic and social development. This is not likely to materially change at least until the next parliamentary elections in 2005. Yet, since the winner of the future elections is not known, it is too early to say what would be the impact of the elections on the IS policies.

The recent spurt in the development of the IS policies has been mostly driven by the EU accession and prospects for utilization of the EU financing. It was also partly driven by a rapidly growing pressure from the private sector: IT corporations, IT business alliances, NGOs, and mass media. Although their impact on the development of the IS is likely to gradually increase, a lack of an established framework for public-private sector dialogue aimed at enhancing IS development is limiting the pace of progress.

The EU accession will strongly strengthen the development of IS policies. It will bring a completion of the legislative framework for the IS. It will also contribute to a significant

increase in funding for the IS investments (estimated at some EUR 1 billion between 2004 and 2006), well beyond the domestic resources, which are likely to increase only marginally. The accession to the EU will also drive – through peer pressure (such as the EU benchmarking exercise) and EU initiatives – the much needed political interest and awareness. The accession will also strengthen – through establishment of pan-European networks - local IST-oriented NGOs.

The accession will also play a significant role in stimulating progress in the IS through exerting pressure on the Polish public administration, which seems to work best when it is confronted with deadlines and constant pressure. Introduction of the EU project procedures (follow-up, auditing, monitoring etc.) will strengthen the efficiency of implementation of local IT projects. New regulations are also likely to increase transparency of public projects. Lastly, EU-driven initiatives seem to be politically much less controversial than domestic issues. Quite often EU regulations have been swiftly legislated into the Polish legal framework on account of the fact that "it just has to be done because otherwise we are not going to get to the EU". After accession, it may well be that EU legislation will maintain that favourable position on account of "we need to approve it because this is what we need to do because of the EU". Hence, the role of the EU in promotion of an IS may be much larger than what stems from their formal authority.

On the whole, the IS policies are gaining momentum and are bound to – sooner or later – be fully implemented. It is however very likely that due to low political support and insufficient funding, a number of important IS initiatives (eGovernment, complete internetization of schools etc.) may experience delays.

3. Industrial development, ICT production and use, and impact on competitiveness

Since 1990 the share of the service sector in the total output was quickly increasing. By 2003, the structure of the Polish economy, where services represent more than 60% of GDP, has become comparable with the EU average.

In manufacturing, since 1995 the share of old, inefficient, industries (mining, steel, shipyards, and heavy chemical sector) have substantially decreased in favour of high-value added, more competitive, and more technologically advanced sectors (motor vehicle industry, metal products industry, publishing and printing, rubber and plastic products, furniture). Between 1995 and 2002 the highest rates of growth in manufacturing were recorded in medical and precision instruments industry, radio, TV, and communication equipment (ICT industry), and office machinery and computers (ICT industry). The growth in these and other modern industries was mostly driven by FDI, which have overall averaged USD 6-8 billion a year since 1995. As shown by preliminary results of a study by van Ark (2003), the ICT producing (as above) and IST-using manufacturing sectors (printing and publishing, mechanical engineering, electrical machinery and apparatus, precision and optical instruments etc.), the sectors that seem to have most intensively invested in ICT and which - not coincidentally – have also absorbed largest amounts of FDI, report higher growth rates in labour productivity between 1992-2001 than non ICT manufacturing industries (not producing and not using ICT).

Similarly, in the service sector the most intensive FDI and ICT sectors (financial intermediation, wholesale and retail trade, transport, storage and communication, mass media

and entertainment), have significantly increased both their output and labour productivity between 1995 and 2002. This seems to be a very potent evidence of the benefits of the ICT use. Foreign investment in services went hand in hand with an increase in ICT use in services. The increase in competition driven by foreign investment and the use of ICT has also made an impact on domestic firms, which to a large extent had to "adapt or die". In the ICT intensive sectors, ICT has become "a must". Domestic companies increasingly adopted (through imitation and competitive hiring) management techniques and ICT technologies, which allowed them to survive in the market. Although hardly quantifiable, FDI thus had some spillover effects on the domestic economy.

The FDI and ICT driven industries, both in manufacturing and services, are likely to further increase their share in total national output to the detriment of the old, non-ICT using industries. This trend will also contribute to an increase in the overall competitiveness of the Polish economy.

Polish agriculture is well known for its inefficiency and technological backwardness. Almost 20% of the labour force employed in agriculture produced only 4% of GDP in 2002. The accession to the EU will however accelerate the gradual reform of agriculture. Poland is likely to follow Ireland in a slow process of agricultural reform. Within the next 25 years the share of employment in agriculture in the total is likely to gradually decrease to some 5%. A decrease in employment in agriculture, which is by far the least ICT intensive sector of the economy, may have an indirect positive impact on the development of the IS. In addition, while agriculture does not have a direct impact on IST, the political clout wielded by farmers' lobby helps to sustain state policies, which favour the agricultural sector over other sectors and development priorities, including the IS. Hence, the decrease in agricultural employment would also be likely to free additional financial resources, which could be used for funding development-oriented policies, including the IS.

The ICT producing sector has rapidly grown since the early 1990's on the back of a substantial pent-demand for ICT infrastructure (its poor state being a legacy of technological backwardness and low investments under socialism before 1989). Yet, despite the fast growth, the size of the ICT sector in terms of both contribution to GDP (some 1 to 2% of GDP) and a share in total employment is still small (0.1% as of the end of 2001). Hence, any potential spillover effects of ICT production, even if existing, are not likely to be large. Nonetheless, local ICT industry is very important for absorption and diffusion of ICT in the rest of the economy as the industry helps other sectors to recognize the potential benefits of ICT, implement new ICT solutions and effectively use them. Knowledge of the Polish language and business environment is a substantial asset for the local ICT industry. Most of the global ICT companies have for long been doing business in Poland. The position of Polish IT companies is relatively strong, as among the fifteen largest IT companies in Poland, eight are Polish.

Not surprisingly, since 1989 Poland has been an importer of ICT products. This is not likely to change in the near future as local businesses will continue to import ICT products and services from abroad in order to increase their competitiveness. The negative trade balance in ICT should not be viewed in a negative light: the ICT imports allow for modernization and technological catching-up of the economy.

The ICT sector is poised to quickly grow on the back of the projected faster economic growth, which will increase demand for ICT products, of the complete opening of the EU market,

which will increase competition and subsequently urge local companies to increasingly resort to ICT solutions as a source of competitive advantage, and of the growing demand from the public sector. The ICT sector, which has so far been mostly operating in the local market, is also likely to venture abroad and thus increase its sales. Recent examples of first major exports contracts for Polish ICT software show that the local ICT sector may successfully compete in the global markets, particularly in the niche markets. In the industry driven by increasing returns to scale and spillover effects (as is the case of ICT clusters worldwide - Silicon Valley, Route 66 and others), development of ICT industry would have to rely on the existing ICT clusters (like the Krakow-Katowice-Wroclaw highway IT cluster). Yet, their competitive advantage over ICT industries in other countries is unclear. While FDI is important for the development of the domestic economy, it seems unlikely that Poland could witness a large influx of ICT oriented investments. Given similar competitive positions of the CEE countries, one would be hard pressed to confidently project the direction of foreign investments in ICT production facilities in the region. Poland has an advantage over other EU accession countries in terms of the size of the domestic market, yet it does not matter for export-oriented ICT industry (*vide* the case of Ireland with a small size of the local market). In order to tip the balance of luck in its favor, Poland would need to enhance incentives for global ICT firms. The strategy for development of ICT industry prepared by the Polish Agency for Foreign Investment (PAIZ) is a step in the right direction, yet it has not ever been implemented. Expansion of Polish ICT exports will then mostly need to rely on development of highly specialized, niche market software applications, where economies of scale matter less.

The growth of the ICT sector is also limited by **low availability of start-up, venture capital** financing. According to PriceWaterhouseCoopers, a consulting company, in 2002 private equity funds in Poland invested only some EUR 13 million in high-technology companies versus EUR 31 million invested a year earlier. Evidently, the role of VC funds in financing innovative companies, although growing, is not significant. Accession to the EU is very likely to increase flows of VC money to the Polish economy. Nonetheless, for long venture capital financing will only marginally support innovative firms, which will mostly have to rely of their own sources of financing, at least in very early stage of their development.

Irrelevant of the prospects of the ICT industry, its share in GDP and employment in the near future will not materially change. Hence, an **effective absorption and use of ICT** will be the key to realizing the benefits of the technological revolution. The strong correlation between ICT investments and growth rates in labour productivity, as is the case for a number of ICT intensive sectors in Poland presented above, shows the significant potential of the absorption and diffusion of ICT for the long-term growth rates in output and productivity.

Aside from the impact on the industry-level productivity, ICT investments have also had a relatively large contribution to the aggregate GDP and labour productivity growth between 1995 and 2000. According to Piatkowski (2003), the average contribution of ICT capital to economic growth in Poland between 1995-2000 amounted to 0.47 percentage points of the average output growth of 5.31% in that period (8.9%). ICT capital also contributed 0.65 percentage point to the growth in labour productivity in the same period (12.7% of the total average growth). In international comparisons, the contribution of ICT capital to growth in Poland was much higher than one would expect based on the level of the Polish GDP per capita. This high result is mostly due to an extraordinary increase in ICT spending in the 1990's, which – as a ratio to GDP - has been steadily increasing from 2.06% in 1993 to 5.95%

in 2001. The ICT spending was driven by (i) rapidly decreasing prices of ICT equipment, which made investments in ICT assets more attractive (in terms of the return on investment – ROI) than investments in alternative assets (other machinery and equipment etc.) and (ii) substantial pent-up demand for ICT products and services, due to an underinvestment in ICT infrastructure dating back to the socialist period.

The ICT spending seems to have also been correlated with a number of economic and institutional factors (macroeconomic stability, depth of the financial market, quality of human capital, effectiveness of law enforcement, which – as argued by Piatkowski (2002) – are all important for absorption and diffusion of ICT), which have all reported improvements in the 1995-2000 period.

While correlation between ICT investment and innovativeness is not known, it could be safely argued that innovativeness of the economy – which in Poland is largely driven by foreign owned companies - is one of the major determinants of the absorption of ICT. Alas, **the innovativeness of the Polish economy is low.** It is evidenced by a low ratio of innovative companies in the total number of enterprises in Poland (the ratio went down from 37.6% in 1994-96 to 28.9% in 1997-98 and 16.9% in 1998-2000), low number of domestic and international patents, and low share of innovative products in the total exports.

The low innovativeness is due to a number of factors. First of all, it is due to a low level of spending on R&D: in between 1995 and 2002 it amounted to some 0.5% to 0.7% of GDP (0.66% in 2002). It is one of the lowest levels among all the EU accession countries.

Secondly, not only that the R&D spending is low, it also seems not to be utilized productively. Most of the public spending on R&D, which represents some two-thirds of total spending on R&D (the share of the business sector amounts to only some one third of total R&D spending; in the EU countries, the share of the public and private spending are reversed.) is being earmarked for basic, not applied science, which has proved not to be commercially attractive. Since there is no proper incentive framework for collaboration between the science and business community, public R&D spending hardly translates into any commercial projects. In addition, the outdated structure of the public R&D sector, which – despite relatively large human capital and infrastructure - has not been adjusted to the market economy yet, also limits the potential of R&D spillover effects of the public spending.

Thirdly, the private sector on its own has proved slow to focus on R&D as a source of a long-term competitive advantage. Low spending on R&D seems to have been due to a lack of market incentives to innovate (until recently the growth in production was driven by a large pent-up demand for consumer products and services, which were scarce under socialism), insufficient public financing for innovation activity, particularly as concerns co-financing for innovative projects developed by the industry, poor access to financing for innovation projects, a lack of long-term strategic vision in management of enterprises, and a lack of history of innovation (under socialism, there were hardly any incentives to innovate). Hence, in the majority of the private business sector, **innovation is not seen as a key to long-term growth.**

Owing to low R&D spending, innovation in Poland is mostly driven by an adoption of technology from abroad through imports and to a large extent by FDI. In 1999 foreign firms were responsible for 40% of total business R&D spending, up from 6% in 1995. Foreign capital has brought in new technologies, management techniques and human skills. Large FDI

have allowed a number of services (banking, insurance, telecommunications) and industrial sectors (automobile manufacturing, electronics) to largely catch up with productivity rates in developed countries. Innovation in foreign owned companies spurred competitive imitation among local corporations. Foreign investment has thus played a very positive role in innovation.

The government has recently been working on a project of a reform of financing of science and R&D. The new law is likely to come into force in mid-2004. It would be a welcome step towards enhancing the effectiveness of public R&D spending. Low interest of the private sector in innovation may slowly change due to an increase of a competitive pressure (a result of the EU accession) and larger FDI investments in R&D capabilities. Poland is certain not to meet the Lisbon target of R&D spending on the level of 3% of GDP by 2010. Poland would need to increase state funding by three times, while business would need to invest in R&D almost seven times more. This seems to be very unlikely, particularly because given the current situation of the state budget any substantial increase in R&D financing is not possible. Realistically speaking, Poland is likely to increase R&D spending to more some 1%-1.5% of GDP by 2010 from current 0.66% of GDP as of 2002. This would still be a substantial improvement.

Overall, the innovativeness of the Polish economy will be gradually increasing on the back of larger R&D spending, higher efficiency of the public R&D spending, growing competitive pressure, and additional financing from the EU Structural Funds, which will make available some EUR 1.25 billion for the increase in competitiveness of the local economy, also through higher outlays in innovation. Stringent conditions of the EU funding (monitoring, follow-up, focus on results) may lead to an improvement in the overall quality of R&D projects, even those not funded by the EU (spillover effects of the EU-style project management).

The increase in innovativeness of the Polish economy from a current very low level is poised to significantly contribute to a growth in ICT absorption and diffusion capacity of the local economy. This will have very positive implications for the development of the IS in Poland.

There are large **regional differences** in distribution of industrial production, ICT sectors and R&D capabilities between the western and eastern Poland. The value of industrial production in Mazowieckie voivodship, which includes Warsaw, represented in 2001 approximately 20% of the total industrial production of Poland. Slaskie (southern Poland) followed with 17% and Wielkopolskie (western Poland) with another 10%. In eastern Poland, the Podlaskie voivodship, whose economy is mostly based on agriculture, contributed meager 2% of the total industrial production. The ICT sector is concentrated in and around large cities in Poland (Warsaw with the majority of ICT companies, Poznan, Rzeszow) and along the so-called "highway cluster" between Krakow, Katowice and Wroclaw and adjacent areas (Bielsko-Biala, Nowy Sacz), cities in southern Poland linked with A4 motorway. Similarly, the R&D centers are located in big cities and in western and southern Poland. With few exceptions, eastern Poland is on average much less endowed with R&D capabilities than the rest of the country. These large differences, particularly in the distribution of the industrial and the ICT sector, epitomize relative technological backwardness of the eastern and some central regions of Poland. When not remedied, these large differences may lead to a further relative technological retardation of the lagging regions in comparison to other parts of the country. This could lead to a growing regional divide in the prospects of the IS development.

4. IST penetration

High IST penetration in the household, government and business sector is a condition *sine qua non* for the development of the IS. Alas, Poland's IST penetration rates as of the end of 2003 are still considerably lower than the EU average. It is also often lower than the average for the acceding countries. Low penetration of IST networks is due to a legacy of infrastructural underinvestment dating back to the 1980's (in 1989 Poland had one of the lowest telephone penetration rates - 11-12 main lines per 100 inhabitants - among all socialist countries). After the beginning of the transition, penetration rates started to quickly grow, yet given relatively low average disposable incomes, large size of the country and a large proportion of rural population, where returns on investments in infrastructure are much lower than in urban areas, the achieved level of IST penetration is still low.

Nevertheless, substantial progress in increasing IST penetration has being achieved during the last decade. Between 2000 and 2003, penetration of mobile phones increased to almost 45%, percentage of Internet users reached 25%, penetration of computers exceeded 10%. It is expected that these trends will continue on the account of increasing disposable income of the society, lower costs of access to ICT networks, and growing overall interest in the use of ICT.

It is being projected that the mobile penetration rate will reach 50% by the end of 2005 and 70% by 2007-08. At the same, fixed penetration will increase marginally to some 37% as new and old users will switch to mobile telephony. As regards computer penetration in households, assuming that a current growth rate of more than 15% annually will be sustained until at least 2006, computer penetration rate would reach 16,3% by the end of 2006. The Internet penetration in households is projected to reach 27.6% by the end of 2003, 54% by 2006 and 73% by 2013. The broadband penetration rate, which as of the end of November 2003 approached 1% of population, is projected to increase to more than 5% by the end of 2005.

The large increase in Internet penetration are based on an assumption that the older part of the population (aged 50 and more) will start using the Internet. However, so far it has not been the case as the predominant majority of the Internet users are aged 24 and less. The inclusion of the older population in the Internet network, through increase in attractiveness and usefulness of the Internet content and training, will be imperative to building the inclusive IS. Should it not happen, the growth rate of the Internet penetration rate could soon markedly slow down as penetration rates among younger population reach the point of saturation.

In the business sector, all large companies (employing at least 50 people) as of the end of 2003 had access to the Internet. Yet, smaller companies had much scarcer access to the Internet: as of the end of 2002 only 33% of companies employing fewer than 10 people reported access to the Internet. In the last twelve months, the percentage is likely to have risen to close to 50%, yet still some half of all small enterprises do not have access to the Internet (mostly the self-employed). It seems to be due to relatively low penetration of PCs, high costs of Internet access, and – perhaps above all – insufficient understanding of the benefits of the Internet for small business.

As for the penetration of IT hardware and software, the results of the recent surveys are quite ambiguous. One survey reports that almost all of the surveyed SME companies had computers and an access to the Internet. The other survey, however, reports that some one million small firms do not use computers at all in their operations. These contrasting results are likely to be

due to the fact that a large number of small companies are in effect founded by the self-employed, which buy IT hardware for personal rather than business use. According to IDC Poland, more than 40% of large enterprises in Poland (annual revenue of at least PLN 50 million or EUR 11 million) do not use management software systems. Irrelevant of the true penetration numbers, both surveys as well as anecdotal evidence suggests that both SMEs and large corporations use ICT (hardware, software and the Internet) for the most basic uses (accounting, sales and inventory). Consequently, the impact of the productivity is not likely to be large. The relative lack of sophistication of the utilized applications is mostly due to insufficient managerial skills and lack of understanding of the potential uses of ICT.

As for the penetration of ICT in the **manufacturing sector**, it seems to be dependent on the share of foreign ownership of the sector (the higher, the better), the level of a market competitive pressure (the higher, the better) and the financial situation of a particular industry (the better, the higher penetration). While there is not sufficient data on the level of ICT investments in particular industries, anecdotal evidence suggests that transport equipment, radio, TV and communication equipment, office machinery and computers, printing and publishing, medical and precision equipment, metal products, pharmaceuticals and power generation industries are the most intensive users of ICT. Again, not by coincidence, foreign capital has a large share of ownership in all of these industries. There is clearly a strong correlation between the foreign ownership and investments in ICT. Other industries, as remarked above, seem to be using mostly either basic software applications or – even if advanced systems are implemented – only some functions. Apart from the ownership structure, the ICT penetration in manufacturing seems to be also driven by the level of business competence of the management, ability to re-organize business around new IT systems, and quality of human capital, which is indispensable to implementation and productive use of IT.

Although no detailed data is available, the **service sector** seems to be the most intensive user of ICT. Available evidence suggests that IST are used most intensively – similarly to developed countries – in wholesale and retail trade, banking, insurance and financial services, telecommunications, mass media and entertainment and transport. According to DiS (2003) telecommunications sector spends 4.54% of its total revenue on IT investments, followed by banking (3.31%), media and entertainment (1.86%), insurance (1.34%), and transport (1.05%). Similarly to the manufacturing industry, there is a strong positive correlation between the share of foreign ownership in a specific industry and the intensity of ICT investment.

Banking industry, largely owing to a large FDI in the sector (80% of the banking sector equity is foreign owned), has been using the ICT quite intensively. As a result, productivity of the whole industry has been quickly increasing in the last decade. Large investments in ICT have also led to a robust growth in e-banking from virtually zero in 1999 to almost 2,5 million customers as of November 2003 as well as a tangible increase in the quality and scope of offered banking products and services.

In spite of fast growth in ICT investments, **eCommerce** in Poland is still in its infancy. The vale of the B2C commerce in 2003 is likely to hover around PLN 50 million (some EUR 11 million). B2B market in 2002 was worth some EUR 25 million. The eCommerce market is certain to rapidly grow, yet in the near future its share in total sales in the Polish market will remain marginal.

In spite of a recent rapid progress in adopting IST, **public services** still lag behind other countries in the EU. According to a recent study of Cap Gemini Ernst and Young, a consulting company, Poland's online public services was found to be quite undeveloped. In the survey, Poland's war ranked next-to-the-last place among the surveyed countries. The slow progress in informatization of public services seems to be due to a lack of a clear and comprehensive plan for internetization of public services, low level of human skills in administration, lack of clear incentives to implement new, electronic-based services, insufficient political support (lack of clear leadership), and low level of available financing for both coordination of IT policies (MSRIT) and development and implementation of electronic services.

In order to increase the level of access to Internet-based public services, in early 2003 the government has adopted the "Strategy for Informatization of Poland". It envisages that by the end of 2005, 26 key public services will be migrated to the electronic platform. The successful implementation of the "Strategy" would significantly enhance the level of availability of online public services.

Similarly, the "Strategy" also aims at accelerating the development of the use of IST in **public administration,** which – as with the public services – as of the end of 2003 was quite underdeveloped. The poor state of informatization of the public administration is due to the same factors, which have limited the development of online public services (see above). Insufficient financing has been particularly acute: in 2001 the annual spending on IT in public administration per capita in Poland was one of the lowest in Europe and amounted to some EUR 2.4, versus EUR 5 in France and EUR 15.1 in the US. Lack of a coordination mechanism for IST investments in public administration also weighed heavily on the overall effectiveness of informatization (most of the recently completed IT projects in the public administration were built with no regard to intra-system compatibility). The establishment of the Ministry of Scientific Research and Information Technology (MSRIT) in April 2003 as a coordinating ministry for all public administration ICT projects has finally brought some order. Yet, its powers of coordination still need to be strengthened. The bill on the "Informatization of Public Administration", set to be adopted in 2004, will finally empower the MSRIT to develop, implement, monitor and coordinate public ICT projects.

Funding from the EU (estimated at some EUR 200 million for informatization of public administration between 2004 and 2006) is very likely to substantially speed up the progress in informatization of the public administration. By 2006, the IT projects are likely to be completed. This would surely bode well for the development of the IS, as the public "push-strategy", i.e. increasing availability of online public services, is needed to stimulate the use of Internet by individuals and corporations alike.

IST penetration in the **health sector** is low as evidenced by a lack of electronic patient cards, online health services and low efficiency of the sector, which ICT would have otherwise improved. Relatively low penetration is predominantly due to insufficient financing and a lack of an incentive framework, which would encourage health administration to increase efficiency, also through the use of ICT. As the public health sector currently grapples with a dire financial situation, further progress in ICT penetration is uncertain. The "Strategy of Informatization of Poland" has set out an ambitious agenda for informatization of the health sector, yet again access to financing will be the key factor. The offset contract signed between Poland and Lockheed Martin, a manufacturer of fighter aircraft F-16, comprises the project to

build a health sector IT system (RUM – Rejestr Uslug Medycznych), based on which electronic patient cards would be issued. Implementation of RUM would be likely to result in significant increases in efficiency of the whole sector. Yet, as of now, the realization of the project has not been confirmed. In the meantime, the rapidly growing private health sector has quite intensively used the ICT systems. Again, foreign ownership was closely correlated with an increase in ICT investments. Yet, since the size of the private sector is still marginal relative to the public sector, its impact on the overall penetration of ICT is small.

Since 2000 Poland has made a substantial progress in increasing penetration of ICT in **education.** It is estimated that as of the end of 2002 the overall average of Internet penetration increased to 60% of all primary and secondary schools. Almost 80% of secondary schools had access to the Internet. As of the beginning of 2003, there were 1.3 computers per 100 pupils in elementary schools and 2,5 computers per 100 pupils in secondary schools (Polskie Forum Strategii Lizbońskiej 2003). All tertiary educational establishments had access to the Internet. The above ratios, although still lower than the EU average (almost universal penetration of ICT at all levels of education), are likely to rapidly increase in the next two years. The government plans to provide universal access to the Internet in all schools by the end of 2005.

As with other social and economic indicators, there is a large **regional divide** in ICT penetration in Poland. It is evidenced by large disparities in the number of registered ICT firms in 326 poviats (NUTS 4, middle-level entities of local government), the number of cash machines per poviat (ATMs), the number of web sites in poviat-level public administration, and penetration of fixed and mobile telephony. Eastern and central southern Poland substantially lags behind other parts of the country. The large divide in IST penetration mostly reflects the urban-rural divide: most urbanized regions report higher penetration rates and vice versa. The divide is also a result of large disparities in GDP per capita, which is closely correlated with ICT penetration, poor "hard" infrastructure in the lagging regions, and large agricultural employment, which limits interest in the uptake of IST.

The existing regional digital divide in IST penetration may contribute to a further widening of regional differences to the detriment of the overall prospects of the national economy and cohesive development of the IS. The government, within its "Gateway to Poland" project, had put emphasis on the development of IST in the eastern parts of Poland. Yet, no tangible results have yet been achieved. The biggest opportunity for a closing of the digital divide will be related to the impact of the EU structural funds (EUR 4.36 billion between 2004 and 2006), which will be mostly available for the poorest, rural regions of Poland. These investments, if effective, should stimulate adoption of IST both through better access to infrastructure and higher disposable incomes of the local population.

5. Impact of the education system on the IS

An information society can not flourish without a sufficient level of human capital. Poland's quality of human capital is quite high relative to the level of GDP per capita (according to the UNDP's Human Development Index, the 17-places difference of Poland's position between the HDI and GDP per capita index in favour of the HDI is mostly due to high value of the index of educational achievement). Literacy is practically universal.

In the recent decade, due to the phenomenal eruption in private tertiary and secondary education as well as an increase in enrolment in public establishments, the improvement of

human capital has even accelerated. Between 1990 and 2002 the number of students at the tertiary level increased more than fourfold from 400 thousand in 1990 to almost 1,800 thousand as of the end of 2002. As a result, the tertiary **scholarization ratio** in Poland reached some 43%, which puts Poland on par with most of the EU countries. Such a strong growth in student participation is due to a substantial increase in the wage premium to education, the large demand of the labour market for highly educated graduates and a growing awareness among the population of the value of education.

As a result of the educational boom, the share of population with tertiary education increased from 7% in the early 1990's to 12% in 2001 and approximately 14% as of the end of 2003 (aged 25-64). This ratio is comparable to Hungary (14%), the OECD average of 15%, and even slightly higher than Slovakia (11%) and the Czech Republic (11%).[73] The ratio is bound to further increase in line with the natural replacement of an old generation with a new, better-educated generation. The rising educational achievement is undoubtedly very positive for the development of the IS, as the level of education is closely correlated with absorption of IST

At a secondary level, in 2001 for the first time ever the share of pupils enrolled in secondary level education leading to a baccalaureate (the so called "maturity exam") exceeded the share of pupils enrolled in basic vocational schools. This is a very positive trend given the low quality of education at the basic vocational level. Higher enrolment in secondary schools will result in overall higher educational achievement at the secondary level.

The phenomenal growth in tertiary scholarization ratios have not been unfortunately supported by equivalent growth in resources. While student enrollment more than quadrupled between 1990 and 2002, the number of university teachers less than doubled. Hence, the ratio of teachers per students increased to 1/12 in 2001. This is a worse ratio than in the Czech Republic, Slovakia and Hungary. It is likely to have a negative impact on the overall quality of education. The quality of education may also be compromised due to sometimes low quality of teaching in some private educational institutions, where most often the quality is lower than in corresponding public institutions. The Ministry of Education and Sports has implemented an accreditation system, which aims to eliminate the weakest institutions.

The education system at a secondary level has throughout the whole transition period produced graduates with a high level of encyclopedic knowledge, but **a low level of functional literacy** as evidenced by OECD PISA studies. Poland ranks behind developed countries in reading literacy, mathematical literacy and scientific literacy. For instance, 8.7% of pupils aged 15 in Poland have a very low reading proficiency ("functional illiteracy") versus 6.1% in the Czech Republic, 6.9% in Hungary, and 6.2% for the OECD average.

In spite of a change in curricula towards more functional knowledge and away from encyclopedic facts, instituted by the 1999 educational reform, insufficient training of teachers, weak incentives and often teachers' opposition towards a change in *status quo*, still stymies progress. The educational reform of 1999 has contributed to an extension of the length of education and modernized the whole system, particularly at the secondary level, towards higher flexibility. Since then the government has been working on a change of curricula aimed at giving more choice to both teachers and students in terms of the educational program. Yet, further measures on the part of national administration need to be taken to

[73] OECD "Education at a Glance 2002" available at http://www.oecd.org/document/42/0,2340,en_2825_495609_1939690_1_1_1_1,00.html

stimulate flexible and independent problem-solving thinking and skills, which nurture creativity, the ability to work in teams and to innovate. Particularly strong emphasis should be put on the basic vocational schools, whose pupils have recorded by far the lowest scores in functional knowledge tests (it is their low test scores that have dragged down the national average). Failure to increase functional literacy would greatly limit the impact of the educational system on the development of the IS.

The reforms of the educational system have not yet contributed to substantial closing of a **mismatch of skills** between the young graduates and the demand of the labour market. Mismatch of skills - next to the economic slowdown, demographic peak, low mobility, relative inflexibility of the labour market, and a decline in "on the job training" – led to an increase in unemployment among the young as their skills did not match market demand. As of mid-2002, people aged 15 - 34 years represented more than 67,7% of the total number of the unemployed in Poland. According to data from the Polish Statistical Office (2002), graduates with lowest educational achievement represented the largest share of the unemployed among the young. Graduates of basic vocational schools have proved to be particularly prone to be unemployed. The existing mismatch of skills is also due to **low level of cooperation** between the educational and business sector aimed, particularly at the local level, at developing curricula compatible with the demands of the labour market.

The current educational system has also not coped well enough with **lifelong learning**. Adult enrollment, although constantly growing, is still at a very low level. According to the OECD, lifelong learning in Poland at all levels of education is lower than in both the Czech Republic and Hungary. Aside from an apparent lack of attractive educational offerings, a lack of culture of lifelong learning has been mostly responsible for the slow progress. It is not common to see older people enrolled in courses. A certain feeling of "it is not for me, I am too old" seems to pervade the society. In response to the challenge of lifelong learning, the Ministry of Education and Sports formed an "Inter-Ministerial Committee on Lifelong Learning", which is making progress in developing a flexible policy, incentive and regulatory framework. These efforts, however, has so far brought no tangible results.

The Ministry of Education, in collaboration with MSRIT, has also been working on promoting the **use of IST in teaching**. The results of this initiative have so far been small, mostly because of the relatively low computer and Internet penetration in schools and lack of a sufficient number of IST trained teachers. At a tertiary level, a number of distance learning initiatives were inaugurated ("Virtual University" idea promoted by a group of universities), yet they have not yet proven to be successful.

IST-related education is relatively well developed. The educational system provides almost 6,000 graduates a year, who specialize in IT and telecommunications. In 2002 there were more than 38,000 ICT students. In response to the demand of the labour market for ICT skills, a large number of non-ICT students have also taken up ICT training during or immediately after the studies. While the exact numbers for those ICT-trained students are not known, anecdotal evidence suggests that it is a significant number. The large supply of ICT-trained people coupled with a recent slowdown in economic growth, which decreased the growth rate of demand for ICT-skills, led to an apparent emergence of equilibrium between demand and supply. In the near future, it seems that the supply of IST graduates will be sufficient for the needs of the domestic economy. In addition, potential corporate initiatives in ICT education would also result in an increase in supply of IST graduates.

There are **large regional disparities** in access to education in Poland, both on a NUTS 4 level for 326 poviats and NUTS 2 level for 16 voivodships for all levels of education. Spatial accessibility of secondary schools to local inhabitants as measured by the space serviced by local secondary education establishment shows that the northern and south eastern Poland have much harder access to secondary education. While the access to tertiary education is quite equally distributed, eastern and central Poland seems to slightly lag behind other regions of Poland. Poor access to education is mostly correlated with the urban-rural divide: access to good quality education is much more difficult in rural voivodships. Quite interestingly, accessibility of the basic vocational schools is highest in western Poland, from south to the north, while it is lowest in eastern Poland. Hence, the accessibility of the vocational schools seems to be mostly related to the level of industrialization. Yet, since basic vocational schools on average tend to produce graduates with lowest functional knowledge, contrary to the eastern-western divide present in most social and economic indicators, some parts of western part Poland, in terms of functional knowledge, may be less prepared for the development of the IS than eastern Poland. The results of the entrance tests to gymnasiums (lower secondary level) show that north western Poland lags behind other parts of the country. This "intellectual divide" would limit the progress in the IS.

On the whole, regions with the lowest educational attainment also report lower than average GDP per capita and lower IST penetration rates. Hence, there is a risk of a development of a **vicious cycle of poverty**: less education, lower GDP, higher unemployment, lower access to the information society. Development of the IS in rural areas will remain a significant challenge for Poland in the years to come.

The relatively **low level of funding** for education, although constantly growing in both nominal and real terms, is constraining the quality of education. For instance, due to lack of funding, the extension of primary education to 6-year-olds has been postponed until at least 2005. The accession to the EU is, however, likely to help in terms of providing technical and financial support for necessary educational reforms (i.e. the Bologna process). It will also help in bridging the educational, income and digital divide in Poland. The least developed regions of Poland are likely, provided they are able to prepare good projects, to benefit from the EU structural funds.

The accession to the EU, through various exchange programs (Socrates, Erasmus, Marie Curie) will also increase **international mobility** of pupils, students, graduates, and scientists. This can be only positive for the development of the IS, as the brain circulation is bound to increase the level of overall skills, including the IST skills.

6. Privatization, institutional reforms and its impact on the IS

The **privatization** process in Poland is almost complete. More than 80% of state-owned enterprises have been privatized by September 2003. The remaining state-owned companies, including the so-called "strategic" sectors, are slated for privatization by the end of 2006. By then the Polish economy will have an ownership structure similar to that of the EU countries, where the public sector generates from 10% to 20% of GDP. Privatization in Poland has resulted in large increases in productivity, as evidenced by industry-level and aggregate data. It has also led to higher ICT absorption, particularly when companies were privatized through a sale to foreign investors. Hence, the completion of privatization will stimulate the absorption of ICT in the economy.

The **liberalization process** of the service, industrial and infrastructure sectors has made a large progress since the beginning of the transformation and is by now almost complete. Most of the product and service markets, including financial intermediation, transport, and trade, have been largely but not completely opened to market competition. The level of competition in most sectors of the economy is comparable to that of the EU average.

Most of the EU legislation is already in place. However, most of the national legislation has been "cut and paste" from the EU *acquis*. This approach has often led to misunderstandings as to the intentions of the EU regulations. Consequently, the existing laws will still have to be amended before the accession.

Even where regulations and institutions are in place, **execution and enforcement of the law is poor**. It is due to inefficient public administration, lack of political support for swift law enforcement and low respect for law. The inability of URTiP, the national telecom regulator, to enforce telecom market legislation is a case in point. In spite of the *de iure* liberalization of the local, inter-city and international telephone services, the market is *de facto* still largely monopolized by the incumbent TPSA, which still controls more than 90% of the market in fixed line telephony and data transmission (including access to the Internet). The mobile market is by far the most competitive, with three competing operators. TPSA, through its subsidiary, controls some 30% of the mobile market.

Various efforts of URTiP to increase competition in this market have so far been quite ineffective when faced with staunch resistance from the TPSA, the incumbent operator, and apparent lack of political will to force TPSA to fully comply with the law. URTiP's failure to sufficiently stimulate the **liberalization of the telecommunication market**, which is of a predominant importance to the development of the IS both in terms of IST penetration and costs of access to IST networks, has led to high market prices for telecommunication services. Telecommunication prices in Poland, next to Hungary, Czech Republic and Slovakia, are among the highest in the OECD countries. URTiP's low effectiveness seems to be due to a lack of experience and adequate knowledge and skills of the employees, low level of financing, insufficient number of employees, high people turnover and strong opposition from interest groups (including TPSA). Half-hearted political support for enforcement of law and promotion of competition has also had its negative impact on the pace of market liberalization and deregulation.

In spite of all the shortcomings, accession to the EU will bring additional stimulus for the increase in market competition. The liberalization of the telecommunication market will further proceed. Both processes will hopefully result in a further decrease in telecommunication prices, higher scope and quality of offered products and services, and an increase in access to IST networks. This will directly contribute to the development of the IS.

7. Demography and social changes

Demographic changes in Poland, characterized by low fertility rates, increasing life expectancy, and fast aging of society, are common to most countries in Europe. Yet, in comparison to the EU countries, Poland's **population is still relatively young**, with a large share of the young in the total population. This can be considered a strength, particularly in respect to the IS development prospect since – generally speaking – the younger the society, the faster the absorption of IST.

Nonetheless, the aging of the population may result in a shift of financial resources from IS development to health protection. The reformed pension systems, based on privately managed pension funds, will however substantially lessen the future impact of the "retirement bomb" on public finances. An already large number of retired people in Poland (9,2 million together with recipients of disability allowances) represent a large voting power, which has encouraged the policymakers to compromise future development-oriented investments in favor of policies beneficial to older people.

Poland currently experiences a large influx of people born during the 1980's **demographic boom**. The demographic peak has contributed to the increase in unemployment to 17.6% as of the end of 2003. It will be extremely important for the Polish economy to productively utilize these large inflows of the young labour force. Should it succeed, it would give a large boost to the domestic economy. A failure to benefit from the increased labour supply would result in sustained high unemployment, which would prevent a sizable part of the society from an active participation in the economy, as in its contribution to the balance of public budgets.

Poland since 1989 has witnessed a gradual shift of employment from manufacturing to services. This trend is conducive to the growth in IST-related forms of employment like flexible schemes, part time jobs, distance work etc. Yet, large employment in agriculture (some 18% of the total labour force as of 2002), the sector which is the least absorptive to IST, limits the potential for the IS development.

The impact of IST on **employment** in general and on various forms of employment is still quite negligible. It is due to relatively poor communication infrastructure and high costs of telecommunication services, which limits the potential for distance work. It also reflects relatively inflexible labour code discouraging short-term employment contracts and a lack of mentality of flexible work versus traditional on-site employment. It can be roughly estimated that presently some 50 000 people can be considered as "distance workers". This number, although still negligible when compared to the total employment of almost 15 million people, is steadily rising.

While Poland has traditionally been a source of large **emigration**, recent data shows that the emigration flows have substantially decreased. It seems that the accession to the EU, given high unemployment in Poland, might stimulate quite a large number of Poles (estimates differ substantially – from some 300 thousand to one million) to emigrate to the EU in search of employment. However, anecdotal evidence suggests that the predominant part of them will return to the home country and bring back skills acquired while working abroad, including ICT skills. There has not been much of an IT brain drain: in 2000 fewer than 200 Poles responded to the German IT visa program. If there are enough of available employment opportunities in Poland, it is likely that IT specialists would continue to work Poland.

The **international mobility** of the population is quite high if looked from a point of view of a large international emigration. The same, however, does not apply to internal mobility: a lack of information about employment opportunities in various regions of Poland, mismatch of skills, insufficient availability of affordable rental housing and – above all – cultural aversion to moving due to strong family ties and the importance of local networks, particularly among older people, contributes to a very low rate of domestic mobility. Low mobility is evidenced by large disparities in regional unemployment rates (less than 15% in Mazowieckie voivodship and less than 10% in Warsaw versus more than 30% rate in Warminsko-Mazurskie in north-eastern Poland): higher mobility would have contributed to a smaller

divergence in unemployment rates as the unemployed would move to regions with relatively more abundant employment opportunities.

There has been a gradual change in **consumption patterns** of the Polish society, driven by a gradual increase in incomes, from basic towards more advanced needs. Between 1995 and 2000 a proportion of total income spent on food, alcohol, and clothing fell, while spending on household maintenance, health, transport, and communication increased. The most significant changes in consumption patterns concern the middle and upper classes of the society, which increasingly adopted Western standards and patterns of consumption. This included higher spending on IST. Yet, spending on IST of the lower income households (farmers, blue collar workers, unemployed) has increased only marginally. Hence, increasing disposable incomes and lower unemployment will also be the key to increasing IST penetration among the lower income population.

The **cultural patterns** during the transition have also been changing. Faced with more stringent requirements of work, less time, and fear of unemployment, people spent less leisure time, lead more healthy lives, practice more sports, and adopt Western lifestyles and role models. However, most changes apply to the "new generation": people with more-than-average incomes, mostly young and urban. A growing number of Poles travels abroad for either vacation or work.

One of the consequences of the accession to the EU will be further opening of the Polish society to the outside world and in increasing homogenization of tastes and lifestyles. Since consumption of ICT products and services in the EU countries is higher than in Poland, convergence of lifestyles and patters of spending should be positive to the IS development.

8. SWOT

The following SWOT table highlights the main points of the Diagnos-IS:

Strengths	**Weaknesses**
1. Macroeconomic stability and accelerating economic growth 2. Almost completed process of adoption of the EU legislation and institutional framework, including the IS. 3. Single coordinating institution for IS policies with comprehensive and coherent strategy for development of eGovernment 4. Fast growth of the ICT sector 5. Steadily increasing public and private interest in the use of the Internet 6. Advanced stage of privatization 7. High quality of human capital 8. Relatively young society as compared to the EU countries and reformed pension system 9. Positive trends in consumption and cultural patterns	1. Low efficiency of the public administration in implementing and executing IS policies 2. Legacy of old, non-competitive and ailing "old economy" sectors of the economy, which put a burden on more competitive sectors of the economy 3. Insufficient coordination and low political support for IS policies 4. Low level of financing and low efficiency of R&D spending 5. Relatively low ICT penetration rates 6. Large regional differences in IST penetration 7. Insufficient level of development of eGovernment 8. Insufficient ICT skills of population 9. Low functional literacy of pupils and students and lack of culture of lifelong learning 10. Significant long-term unemployment, which leads to social exclusion
Opportunities	**Threats**
1. Completion of institutional and regulatory compliance with *acquis communautaire* upon accession to the EU 2. Acceleration of GDP growth to 5% and more 3. EU financial support for IS development (infrastructure, R&D, regional development etc.) 4. EU-accession driven larger FDI investments and increased competition 5. Development of ICT applications for global niche markets 6. Successful implementation of eGovernment ("Strategy for Informatization of Poland") 7. Growing role of the private sector in the promotion of the IS 8. Growth in ICT penetration rates in the household and the business sector 9. Completion of the restructuring of old, ailing, non-competitive industries 10. Progress in the change of curricula in direction of higher functionality of knowledge 11. Temporary emigration to Western Europe, which should facilitate transfer of knowledge and skills.	1. Failure to absorb UE funds and lack of financial resources for investment in IS 2. Delays in implementation of IS due to opposition from various interest groups and low quality of public administration 3. Growing social exclusion related to high unemployment, particularly the long-term unemployment 4. Failure of the state-driven development of eGovernment 5. Increased competition from the EU countries 6. Widening regional divide in ICT production and use, education, GDP per capita, etc. 7. Lack of progress in enhancing business applicability of state-sponsored R&D 8. Lack of interest in the Internet use of the growing older part of the population (aged 50 and more) 9. Strong opposition of interest groups against changes in the educational system 10. Shift of financial resources from the IS development to health protection for the aging population

SCENARIO OF DEVELOPMENT OF THE INFORMATION SOCIETY IN POLAND

In the **baseline scenario**, the information society in Poland will not become the first priority of development, but will nonetheless progress at a steady rate until 2010. Due to the small size of the ICT sector, the development of the IS will not be driven by ICT production, but by the ICT use. The table below presents a projection of changes in ten factors deemed to be the most important for the development of the information society in Poland, as assessed by the author in this report.

Table K1. Assessment of factors fundamental to the development of the information society in Poland: potential for positive change in the years 2004-2010

	High	Medium	Low
Real GDP growth	X		
State of public finances		X	
Absorption of EU funds		X	
Benefiting from the EU market opportunities		X	
Inflows of FDI		X	
Quality of political leadership and IS policies			X
Reform of education		X	
Digital divide			X
Improvement in R&D and innovation culture			X
IST penetration rates		X	
Overall assessment		**X**	

Real **GDP growth** between 2004 and 2010 period is likely to be high (5% a year until 2006 and 4% until 2010) on account of the ongoing convergence with the EU income levels driven by adoption of technologies and FDI, inflows of the EU funds, complete opening of the EU markets, high macroeconomic and regulatory stability, low interest rates, growing managerial and human skills. High economic growth will stimulate private investments, of which ICT will have an increasing part. Higher investments in ICT will be due to constantly decreasing price of computing power, which will make investments in ICT more attractive than alternatives, increasing awareness of the benefits of the Internet networks, and substantial backlog of ICT investments (relatively low penetration of ICT in the private sector relative to the EU average). Since ICT investment by the private sector represents some 85% of the total investment, high demand of the private sector for the ICT products will stimulate overall high growth in ICT spending. It can be projected, given the scenario of high economic growth, that ICT investments are likely to grow at least 10% a year.

The lack of **reform of public finance** represents a major risk to the above high growth scenario. Without a reform, high budget deficits will continue to crowd out private investments. Growing public debt will increase the cost of servicing the public debt, and enhance the risk of turbulence in the financial markets (foreign exchange and interest rates market) should the debt exceed the constitutional limit of 60% of GDP. A lack of reform would also result in not sufficient financing for the IS. It is however projected that the government in 2004 will be able to implement a reform of public finances, which will prevent further fast growth in budget deficit and public debt. In all likelihood, Poland will be able to comply with the Maastricht criteria (inter alia, budget deficit not higher than 3% of GDP and public debt not higher than 60% of GDP) and enter the euro zone by 2010. However, due to

the partial nature of the reform, public funding for IS policies and projects will not tangibly increase.

Given budgetary constraints, the **absorption of the EU funds** will be instrumental in financing sorely needed investments in IST. Based on the historical experience with utilization of the pre-accession funds, Poland should be able to absorb some 60% of the available EU financing between 2004 and 2006. Since, according to various estimates Poland needs to utilize only 48% of available EU money to break even, it will not be a net payer to the EU budget. Yet, utilization of the EU funds is not automatic: Poland will need to come up with well-prepared projects and organize co-financing. A lot will then depend on the project management skills of eligible applicants and on the availability of domestic finances. Given the overall low efficiency of the public administration and overall lack of experience in applying for the EU funding, Poland is not likely to utilize more than 70% of the available EU funds.

A number of sectors of the Polish economy, particularly those with large share of foreign ownership, will prove to be able to take advantage of the **additional EU market opportunities**. The most competitive sectors of the economy, which have throughout the last couple of years substantially increased exports and have also intensively used ICT (motor vehicles, furniture, electronics, metal products, pulp and paper, rubber and plastics) are likely to expand their EU market shares. ICT is likely to be one of the major factors driving increases in labour productivity and thus also in international competitiveness. Other industries, particularly based on the domestic capital and know-how, will however struggle to survive in the face of intense competition from both the old and new EU countries. On the whole, the structure of the economy will continue its evolution towards modern, high-valued added industries. However, by 2010 Poland is likely to still grapple with a number of less competitive sectors (coal mines, steel industry, heavy chemical industry), which will not be intensive users of ICT.

Accession to the EU is bound to **increase FDI investments**. The Polish Agency for Foreign Investment estimates that upon accession FDI inflows will increase to some USD 8-10 billion annually between 2004-06 from USD 5-6 billion in 2003. The potential for even larger FDI inflows will be however hamstrung by relatively slow improvements in infrastructure and intense competition for foreign investment among the new EU Member States.

The potential for the IS to become a "hot" topic on the political agenda is very low. It is very likely that for years to come the political class will remain preoccupied with issues like high unemployment, ailing industries (coal mines, railways, and shipyards), foreign policy within and outside of the EU and run-of-the-mill politics. The IS policies will be gradually adopted and implemented. However, due to a **lack of strong and unequivocal political support**, driven by a lack of vision, low awareness of the benefits of the IS, insufficient critical mass, and continued weak implementation capabilities of the public administration, the progress in IS policies will be erratic. The EU is likely to play an important role in promoting progress, yet it will not be sufficient for a change of the domestic political agenda.

The **reform of the education system** will progress, yet its results will take a long time to impact the development of the IS. Low level of financing, teacher's opposition to changes in the status quo, and inefficient execution of the adopted reforms will stifle faster progress in reforming education. By 2006 all educational establishments at all levels will have access to the Internet. Yet, due to shortcomings in training of teachers and often not sufficient

infrastructure, the impact of the use of IST on education in the near future will not be significant.

The **digital divide** between urban and rural Poland will slowly increase at least until 2010, as rural populations, particularly people aged 50 and more, will not be able to catch up with fast progress in IST use among the urban, young and richer population. Urban areas in Poland will be quicker to benefit from the EU accession, thus increasing their distance from the rural areas. However, by 2020 a generational change in rural population (a significant decline of the number of the elders, who never used IST) and a tangible change in the rural economy (agricultural employment will decrease in favour of employment in rural services, which are much more likely to use IST) will allow faster catching-up and a gradual closing of the divide. The EU funds will be important in supporting IST developments in the lagging regions of the country, particularly in eastern Poland. Yet, poorer regions – at least at the beginning – due to lower quality of human skills may prove less successful in utilizing the EU funds than the richer regions. By 2010, when the process of "learning by doing" will start to bear fruits, poorer regions will steadily increase their ability to benefit from the EU financing. Nonetheless, its impact will not be large enough to offset the disparities in development.

Accession to the EU is likely to stimulate **improvements in R&D policy and innovation culture.** Yet, since the government will continue to place low priority on spending on R&D and due to a difficult budgetary situation, public financing for R&D will not grow sufficiently enough to come closer to the Lisbon objective of 3% of GDP. Private sector financing for R&D will substantially increase, yet – due to the very low initial level of some 0.25% -0.3% of GDP in 2003 – business spending on R&D by 2010 will not exceed 0.6%-0.7% of GDP. Since Poland does not seem to offer any clear competitive advantage in terms of attractiveness for localization of R&D facilities, the share of FDI in R&D is not likely to substantially increase from the 2% share in the overall spending reported in 2002. Combined with the state financing, by 2010 R&D spending is not likely to exceed 1.5% of GDP. While this would be still significantly short from the Lisbon objective, it would still however be a major improvement. At the same time, the effectiveness of the state spending on R&D and innovation will also increase in line with projected reforms in financing for R&D and innovation and the impact of the EU policies.

Despite various improvements, due to low financing and a lack of history of innovation in the private sector, any progress in innovation will be slow. The predominant part of the technological progress will be achieved through imports of technology of abroad and its domestic implementation. Foreign owned companies will be particularly prone to importing technology from abroad. The society's propensity for innovation will only gradually increase. Since it takes a long time to change the mindset of scientists and businessmen, the government's efforts to promote stronger links between the science and business communities will not be sufficiently successful to dramatically change the current weak cooperation. There is however some likelihood that a number of the sectors of the economy, mostly those most open to international competition and FDI, will be able to engage in productive cooperation with the local R&D sector. Nevertheless, the overall impact will not be significant.

The development of infrastructure in Poland will proceed at a medium rate. **IST penetration rates** will be increasing, particularly in the business sector. Nonetheless, IST penetration rates by 2010 in households will still be one of the lowest among the EU countries as the rural population will be slow in obtaining access to infrastructure. Low disposable incomes and a large share of rural and old population, which will prove unable to use IST (this particularly

applies to eastern and central Poland), will limit the growth in penetration rates. Penetration rates in urban areas are likely, however, to reach the EU average.

The ICT sector in Poland, even if it rapidly developed in the near future, due to its current small size (1%-2% share in GDP) its contribution to GDP growth and to the development of the IS by 2010 are not likely to significant. Hence, the **use of IST technologies** in Poland will be the key to faster GDP growth, higher productivity and faster development of the IS. Piatkowski (2003) has shown that ICT investments have had a relatively large contribution to GDP growth between 1995 and 2000. Since ICT investments in the business sector is likely to substantially increase on the back of continued modernization of the economy driven by increasing EU and global competition and decreasing prices of ICT products, the contribution of the ICT capital to GDP growth is likely to gradually increase. Van Ark (2003) showed that ICT intensive industries in Poland reported higher labour productivity growth rates between 1992-2001 than the non-ICT intensive industries. Hence, the projected increase in the use of ICT technologies in the growing sectors of the economy are likely to substantially contribute to faster growth in the aggregate nation-wide productivity. Thus, ICT can play a substantial part in the faster GDP and labour productivity growth of the business sector.

The IST usage in the public sector will tangibly improve, mostly thanks to the EU funding on informatization of the public administration and on rendering of online public services (some EUR 200 million available between 2004 and 2006). By 2006 most of the major public informatization projects should be completed. Yet, their full capabilities will only be utilized by 2010. At the same time, less efficient parts of the public administration, due to lack of financing and – above all – lack of sufficient human skills- will continue to use old technologies.

The base line scenario shows that the impact of IS developments, both in ICT production and IST use, on meeting the Lisbon objectives by 2010 is not likely to be significant (Table K2).

Table K2. Base line scenario – impact of ICT on meeting the Lisbon objectives

	High	**Medium**	**Low**
GDP per person (PPS)		X	
Productivity per person		X	
Employment rate (objective: 70%)			X
Employment rate of older (55-64) workers (objective: 50%)			X
Business investment (measure of changes in the physical capital stock)			X
Public expenditures on Education			X
R&D expenditure (objective: 3% of GDP)			X
Business demography (rate of created/destroyed companies per year)			X
Long-term unemployment			X
Regional cohesion (measure of coefficient of variation of employment rates across regions within one country)			X
Overall assessment			**X**

Source: Based on an internal note of DG EcFin (17.07.2003) and author's own

The development of the IS in Poland by 2010 could however be different than outlined in the base line scenario.

In the **"public 'push' scenario"**, Poland's government would make the IS the development priority, particularly after the next parliamentary elections in spring 2005. This would lead to much higher financing for the IS-related developments (informatization, R&D, innovation), focus on development and effective implementation of IS policies, liberalization of the telecommunication market, increased outlays on IST-related teachers' training, support for IST infrastructural investments in rural regions (including new technologies: satellite, WiFi, radio etc.), support for online content (health services, employment opportunities) and lifelong learning for people aged 50 and above, development of a broadband access to all schools at all educational levels and implementation of a "computer literacy exam" for all pupils and students, focus on the informatization of the public administration and online availability of public services.

This "push" strategy would be likely to substantially increase the penetration and use of ICT technologies (reach the EU average level by 2010), and substantially contribute to an increase in GDP growth, labour productivity and competitiveness. Specifically:

a) Availability of online public services would:
   - Encourage the household and the business sector to use IST in order to save time and money,
   - Have large spillover effects on the whole private sector (particularly when it would be mandatory to use of electronic transmission channels for some type of contacts with the public administration) – companies, which would invest in ICT capabilities (infrastructure and human skills), would be very likely to increasingly resort to electronic channels in business-to-business transactions and to absorb ICT into their internal operations (software, hardware). This would be very likely to lead to an overall increase in the competitiveness of the whole economy through a decrease in costs and increase in labour productivity.
   - Contribute to a substantial increase in effectiveness of the public administration, which would have positive implications for the productivity of the whole economy, and cut costs of operations and public procurement (e-procurement)
b) Focus on ICT education would prepare all graduates from all levels of education to productively use ICT
c) Support for the lagging regions in terms of ICT infrastructure would be likely to substantially close the divide in the access to the ICT, create new employment opportunities and thus contribute to a higher regional cohesion
d) Increased financing for R&D and innovation would drive uptake of ICT products and services and increase competitiveness of the whole economy.
e) Richer online content and support for lifelong learning for people aged 50 and above could substantially increase the penetration of the Internet and increase generational cohesion
f) Full and effective liberalization of the telecommunications market would be likely to result in a decrease in prices and concomitant increase in availability and quality of telecom services. This would lead to an increase in Internet penetration.

As a result, Poland would be likely to catch-up with the EU average of IST penetration by 2010. The likelihood of this scenario is however quite low (20% probability).

In the **"crisis scenario"**, Poland's public debt would by 2006 exceed the constitutional limit of 60% of GDP (the government projects that the public debt will amount to 59,4% of GDP in 2006, up from approximately 51% as of the end of 2003). In the following year, the budget would have to be balanced (unless the constitution is changed, which is very unlikely), i.e. there could be no budget deficit. This would mean that public spending would have to decrease year by year by some 30%. This might lead to social unrest and high turbulence in the financial markets. Public spending on IST would have to be drastically cut (even deeper than outlays on other, more socially sensitive objectives). Spending on R&D, innovation, and education would also substantially decrease. Financial markets turbulence would result in a deep depreciation of the zloty, which could have extremely negative effects for a large part of the business and the household sector. Financial crisis would also be poised to substantially increase the cost of the public and private debt. Higher costs of debt and uncertain political, economic and social situation would discourage investments in the private sector, including those on ICT. Similarly, FDI inflows would drastically decline. Lack of an ability to co-finance EU funds would lead to a very low utilization of the EU funds, including those related to IST. Public IST policies would be even further pushed aside. Socially sensitive issues (unemployment, social protests, ailing industries) would dominate the political agenda. Brain drain would significantly intensify. Political and social upheaval would be likely to increase support for populist political forces, which would be negative for overall economic policies, including the IS.

As a result, by 2010 Poland would become a clear laggard in terms of the economic, social, and IS development in the enlarged EU. The likelihood of this scenario is however very low unless the currently debated reform of the public finances (the so-called "Hausner plan") is not implemented and parliamentary elections in the spring of 2005 result in a government formed by a coalition of populist political forces.

POLICY RECOMMENDATIONS

The report recommends the following:

1) Prioritize the development of the information society in the political agenda
2) Establish a non-partisan political message that "Poland will be the leader in developing information society"
3) Proritize spending on IS development (increase spending or shift resources from other, less productive purposes)
4) Reform public finances so as to maintain macroeconomic stability and increase public resources available for development spending, including IST
5) Strenghten – through training and close oversight of progress – administrative capacity of local governments to utilize EU funding
6) Strenghten the administrative and coordinating role of the IS policies of the Ministry of Information Technology and Scientific Research
7) Continue reforms in the educational system aimed at reducing functional illiteracy, increasing opportunities for lifelong-learning and prioritizing IST-related education of teachers and students
8) Shift public R&D spending from non-applied to applied research. and stimulate - through financial incentives - cooperation between public R&D and research institutions and the business sector.
9) Stimulate increase in IST penetration, particularly in the rural areas, through provision of competitive financial incentives – for instance through public tenders for rendering of services - to the private sector.
10) Stimulate competition in the telecommunication market through complete adoption of the EU legislation and efficient enforcement of the existing law

It also specifically recommends to:

11) Promote competition in the product markets in order to stimulate ICT investments of the private sector
12) Increase public oversight of the timely progress in informatization of public administration and public services.
13) Strengthen the role of URTiP - the national telecommunication market regulator.
14) Following up on electronic filing of social security payments, introduce mandatory filing of on-line tax reports for all large and medium size companies by the end of 2006.
15) Stimulate development of public e-procurement (increase treshold for public e-auctions from current EUR 60 000).
16) Promote micro-scale venture capital investments into start-up companies through public grants based on competitive tenders.

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ANNEX - TABLE OF CONTENTS

A. NATIONAL AND REGIONAL ECONOMY

Graph A1. GDP – rates of growth 1990-2004 in Poland and in EU.

	1990	1991	1992	1993	1994	1995	1996
Poland	-7.5	-7.0	2.6	3.8	5.2	7.0	6.0
EU-15	3.2	1.8	1.1	-0.3	2.8	2.4	1.6

	1997	1998	1999	2000	2001	2002	2003
Poland	6.8	4.8	4.1	4.0	1.0	1.4	3.5
EU-15	2.5	2.9	2.8	3.4	1.6	1.1	1.3

Source: EBRD (2002)

Graph A2. Inflation rates 1990-2006 (year average)

	1990	1991	1992	1993	1994	1995	1996	1997	1998
Inflation	585.8	70.3	43.0	35.3	32.2	27.8	19.9	14.9	11.8

	1999	2000	2001	2002	2003	2004	2005	2006
Inflation	7.3	10.1	5.5	1.9	1.1	2.2	2.8	2.9

Source: EBRD (2002) and government's projections.

Graph A3. Real GDP (year 1989 = 100)

	1990	1991	1992	1993	1994	1995	1996
Poland	88.4	82.2	84.3	87.6	92.1	98.6	104.5
Czech Rep.	98.8	87.3	86.9	87.0	88.9	94.1	98.2
Hungary	96.5	85.0	82.4	81.9	84.3	85.5	86.6
CEE&Baltic States	93.4	83.8	81.9	82.2	85.4	90.0	94.2

	1997	1998	1999	2000	2001	2002
Poland	111.6	116.9	121.7	126.6	127.9	129.1
Czech Rep.	97.4	96.4	96.9	100.1	103.4	106.0
Hungary	90.6	95.1	99.1	104.2	108.2	112.5
CEE&Baltic States	98.9	102.5	105.4	109.6	112.3	114.9

Source: EBRD (2002)
CEE – Central and Eastern Europe (Poland. Czech Rep.. Slovakia. Hungary)

Graph A4. Polish GDP (per capita PPP) as % of the EU average

1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
37.63	33.55	30.64	31.11	32.23	33.00	34.00	36.00	38.00	38.00	39.00	40.50	41.20

Source: author's calculations based on Eurostat Yearbook 2003 and World Economic Outlook (IMF 2003)

Graph A5. Changes in composition of GDP, 1992-2002

Years	1990	1991	1992	1993	1994	1995	1996
Composition of GDP (%)							
Agriculture	7.4	6.8	6.7	6.6	6.2	6.4	6.0
Industry	44.9	40.2	34	32.9	32.2	29.2	27.1
Services	47.7	53.0	59.3	60.5	61.6	64.4	66.9

Years	1997	1998	1999	2000	2001	2002
Composition of GDP (%)						
Agriculture	5.7	5.5	5.2	5.0	5.0	5.1
Industry	28.1	28.1	28.2	29.0	28.6	28.8
Services	66.2	66.4	66.6	66.0	66.4	66.1

Source: EBRD (1992 and 2002)

Graph A6. Dynamics of consumption and investment (y-o-y in %)

Years	1990	1991	1992	1993	1994	1995
Private consumption	-15.3	6.3	2.3	5.5	4.3	3.2
Public consumption	0.5	10.2	6.4	4.0	2.8	2.9
Gross fixed investment	-10.6	-4.4	2.3	2.9	9.2	16.5
Export	15.1	-1.7	10.8	3.2	13.1	23.6

Years	1996	1997	1998	1999	2000
Private consumption	8.7	6.9	4.8	5.2	2.7
Public consumption	2.0	3.1	1.4	1.0	1.1
Gross fixed investment	19.7	21.7	14.2	6.8	2.7
Export	12.5	9.9	11.0	1.0	17.5

Source: EBRD (2002)

Graph A7. Rate of unemployment (% of labor force)

Years	1990	1991	1992	1993	1994	1995	1996	1997	1998
Unemployment (rate of labor force)	6.3	11.8	13.6	16.4	16.0	14.9	13.2	8.6	10.4

Years	1999	2000	2001	2002	2003	2004	2005	2006
Unemployment (rate of labor force)	13.0	15.1	17.3	18.1	18.0	17.2	15.6	13.9

Source: Polish Statistical Office (2002) and government's projections for 2003-06

Graph A9. Size of the labor force (in thousand) and labor force participation rate (activity rate in percent)

Years	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Labor force	17529	17367	17122	17004	17064	17052	17162	17214	17300	17229
Activity rate	61.7	61.2	59.2	58.4	57.9	57.4	57.1	56.6	56.4	55.8

Source: Polish Statistical Office – various years. Note: Participation rate (activity rate) – employed share of the total population.

Table A11. Structure of employment in Poland in 1995 and 2001. by sectors

	1995		2001	
	In thousand	**%**	**In thousand**	**%**
Total employment	15 129.1		14 963.1	
Manufacturing	3 728.8	24.6%	3 008.1	20.1%
Agriculture	4 125.3	27.3%	4 238.2	28.3%
Construction	827.4	5.5%	772.0	5.2%
Trade and repair	1 903.1	12.6%	2 096.2	14.0%
Hotels and restaurants	185.9	1.2%	231.5	1.5%
Transport. storage and communication	838.1	5.5%	733.9	4.9%
Financial intermediation	268.2	1.8%	285.9	1.9%
Real estate	554.3	3.7%	841.3	5.6%
Public administration	381.3	2.5%	526.6	3.5%
Education	896.4	5.9%	915.6	6.1%
Health and social work	1 003.4	6.6%	865.0	5.8%

Source: Polish Statistical Office (2002)

Graph A12. Unemployment rate in Poland in urban and rural areas. 1992-2001 (in %)

Rate of unemployment (% of labor force)	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**
Rural areas	10.3	12.0	12.4	12.2	12.0	9.3	9.9	14.5	14.3	16.7
Urban areas	15.8	16.9	14.8	13.7	10.7	10.7	11.1	15.9	16.9	19.6

Source: Polish Statistical Office (2002)

Graph A13. Annual changes in labor productivity in Poland

Years	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**
Sold industry production per employed person (% y-o-y)	9.7	13.0	6.3	9.1	11.2	4.7	11.8	13.6	4.2

Source: Polish Statistical Office (2002)

Graph A15. FDI inflows in Poland. 1990-2004 (in EUR million)

Years	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**
FDI inflow (million USD)	0	117	284	580	542	1134	2 741	3 041

Years	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**
FDI inflow (million USD)	4 966	6 348	8 171	6 502	7 000	6 000	7 000

Source: EBRD (2002) and government projections for 2003-04

Graph A16. FDI inflows (USD million) and privatization revenues (% of GDP)

Years	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**
FDI inflow (mln USD)	0	117	284	580	542	1134
Privatization revenues (% of GDP)				0.9	0.6	0.9

Years	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**
FDI inflow (mln USD)	2 741	3 041	4 966	6 348	8 171	6 502
Privatization revenues (% of GDP)	1,0	1.5	1.3	1.3	3.9	0.8

Source: EBRD 2002 and 2001

Table A2. FDI stock in Poland by sectors as of the end of 2002.

No	ECA (EKD)	**Capital invested (USD million)**	**Investment plans (USD million)**
1.	**I Manufacturing:**	**24 753.7**	**5 475.3**
2.	Transport equipment	6 219.4	927.3
3.	Food, drinks and tobacco products	5 984.0	417.5
4.	Other non-metal goods	3 383.4	950.2
5.	Chemicals and chemical products	1 ,925.0	796.4
6.	Pulp and paper, publishing and printing	1 728.1	287.4
7.	Electrical machinery and apparatus	1 678.1	279.9
8.	Wood and wooden products	1 339.6	203.2
9.	Rubber and plastics	647.9	408.8
10.	Metals and metal products	548.1	787.1
11.	Machinery and equipment	524.4	86.4
12.	Furniture and consumer goods	452.3	284.5
13.	Fabrics and textiles	308.8	46.1
14.	Leather and leather products	14.6	0.5
15.	**II Financial intermediation**	**13 393.2**	**197.4**
16.	**III Trade and repairs**	**7 586.3**	**908.5**
17.	**IV Transport, storage and communication**	**6 251.4**	**625.9**
18.	**V Construction**	**3 274.8**	**1 225.7**
19.	**VI Power, gas and water supply**	**2 272.2**	**1 306.1**
20.	**VII Community, social and personal services**	**1 825.7**	**535.9**
21.	**VIII Real estate and business activities**	**1 174.2**	**2 261.2**
22.	**IX Hotels and restaurants**	**652.6**	**301.2**
23.	**X Quarrying and mining**	**218.5**	**13.0**
24.	**XI Agriculture**	**44.8**	**16.3**
	Investments over USD 1 million	***61 447.4***	***12 866.4***
	Estimated investment below USD 1 million	***3 667.2***	
	TOTAL	**65 114.6**	

Source: Polish Information and Foreign Investment Agency (PAIIZ) web site (www.paiz.gov.pl)

Graph A17. Cumulative FDI inflows in selected CEE countries 1989-2002 as a share of total FDI in the region.

Country	**Poland**	**Czech Republic**	**Hungary**	**Slovak Republic**	**Croatia**	**Other CEE**
	38 552	35 186	22 534	9 636	6 956	12 552

Source: PAIIZ web site (www.paiz.gov.pl)

Graph A18. Cumulative FDI per capita in selected CEE countries 1989-2001 (in million EUR)

FDI per capita	**EUR**
Czech Republic	2 868.00
Estonia	1 826.80
Hungary	2 429.40
Latvia	1 339.10
Lithuania	860.40
Poland	993.19
Slovak Republic	1 171.70
Slovenia	1 032.30

Source: International Monetary Fund (2002) and EBRD 2002

Graph A19. Trade openness of selected economies (share of exports and imports in GDP) in 2001

Ukraine	**Poland**	**Czech Rep.**	**Hungary**	**Romania**
0.9	0.4	1.2	1.2	0.7

Source: author's calculations based on EBRD (2002) and Polish Statistical Office (2002)

Graph A20. Evolution of Poland's exports and imports (1989 = 100)

Years	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**2002**
Export (y-o-y)	15.1	-1.7	10.8	3.2	13.1	23.6	5
Import (y-o-y)	-10.2	29.6	1.7	13.2	11.3	24.3	3
Export (100)	115.1000	113.1400	125.3628	129.3740	146.3220	180.8545	334.0200
Import (100)	89.8000	116.3800	118.3593	133.9830	149.1230	185.3596	413.0000

Years	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**
Export (y-o-y)	12.5	9.9	11.0	1.0	17.5	8.0
Import (y-o-y)	28.0	16.7	14.0	6.0	12.0	7.0
Export (100)	203.4613	223.6000	248.2000	250.6820	294.5519	318.1200
Import (100)	237.2602	276.8800	315.6460	334.5850	374.7353	400.9700

Source: author's calculations based on EBRD (2002) and Central Statistical Office (2002)

Table A3. Structure of the Polish exports in 2001

	in PLN million	in EUR million	% of total
Agriculture products	12 454	3 395	8.6%
Mineral products	8 957	2 442	6.2%
Chemical industry	7 302	1 990	5.1%
Plastic and rubber	6 971	1 900	4.8%
Wood products	9 633	2 626	6.7%
Textiles and footwear	12 417	3 385	8.6%
Products of stone and glass	3 316	904	2.3%
Metals	17 356	4 731	12.0%
Machinery	31 056	8 465	21.5%
Transport equipment	22 932	6 251	15.9%
Other	11 843	3 228	8.2%
Total	**144 234**	**39 317**	**100.0%**

Source: Polish Statistical Office (2002)

Table A4. Dynamics of Polish exports 1998-2001 (y-o-y % change), by sectors

	1998	1999	2000	2001
Agriculture products	-6.4	-18.0	1.6	12.9
Crude materials	-0.9	4.4	6.6	2.4
Fuels & related products	-9.1	-11.9	18.2	26.6
Chemicals & related products	-5.6	-10.7	26.8	5.8
Intermediate manufacturing products	5.0	-1.9	12.5	9.6
Machinery & transport equipment	45.3	3.5	30.3	20.7
Misc. manufacturing articles	5.4	-2.0	1.1	9.5

Source: PlanEcon Report, June 2003

Table A5. Thirty largest Polish exporters in 2002

Company	**Industry**	**Exports (PLN million)**	**EUR million**	**% of total exports in 2002**
Volkswagen Motor Polska	Motor vehicles	3 988	849	2.6%
Weglokoks	Trade	3 306	703	2.1%
KGHM	Mining	3 035	646	2.0%
Fiat Auto Poland	Motor vehicles	2 531	539	1.6%
Thomson Multimedia Polska	Electronics	2 459	523	1.6%
PLL LOT	Airlines	2 310	491	1.5%
Izusu Motors Polska	Motor vehicles	2 150	457	1.4%
Philips CEI Poland	Electronics	2 141	456	1.4%
Gdynia Shipyard	Shipyards	2 055	437	1.3%
PKP Cargo	Railways	2 031	432	1.3%
PHS	Steel	1 788	380	1.2%
Philips Lightning Polska	Lightning	1 158	246	0.7%
Polski Koks	Trade	1 072	228	0.7%
International Paper Kwidzyn	Pulp and paper	1 007	214	0.6%
TRW Polska	Motor vehicles	972	207	0.6%
Swewood Poland	Furniture	937	199	0.6%
PKN Orlen	Oil	931	198	0.6%
EuRoPol Gaz	Gas	928	197	0.6%
Frantschach Swiecie	Pulp and paper	882	188	0.6%
Delphi Automotive Systems Poland	Motor vehicles	828	176	0.5%
Kronospan	Wood	754	160	0.5%
Firma Oponiarska Debica	Tires	697	148	0.4%
TP S.A.	Telecom	666	142	0.4%
Avon Operations Polska	Cosmetics	614	131	0.4%
Kronopol	Wood	558	119	0.4%
ZCh Police	Chemistry	524	111	0.3%
Ciech	Chemistry	463	99	0.3%
Alstom Power	Automation	455	97	0.3%
ZA Pulawy	Chemistry	415	88	0.3%
Anwil	Chemistry	376	80	0.2%

Source: based on "Rzeczpospolita", "Lista 500", 2002

Table A6. Regional contribution to national GDP in 2001 (in %)

Mazowieckie	21
Slaskie	14
Wielkopolskie	9
Dolnoslaskie	8
Malopolskie	7
Pomorskie	6
Lodzkie	6
Kujawsko-Pomorskie	5
Lubelskie	4
Podkarpackie	4
Zachodnio-Pomorskie	4
Swietokrzyskie	3
Warminsko-Mazurskie	3
Lubuskie	2
Podlaskie	2
Opolskie	2

Source: Polish Statistical Office (2002)

Table A7. GDP per capita in regions in 2001 (national average = 100)

Mazowieckie	164
Slaskie	119
Wielkopolskie	115
Dolnoslaskie	112
Zachodnio-Pomorskie	107
Pomorskie	109
Kujawsko-Pomorskie	97
Lubuskie	97
Malopolskie	97
Lodzkie	96
Opolskie	92
Swietokrzyskie	85
Warminsko-Mazurskie	81
Podlaskie	80
Podkarpackie	77
Lubelskie	74

Source: Polish Statistical Office (2002)

Box A1. The "National Development Plan 2004-06" has the following selected objectives in terms of an increase in regional cohesion by 2006 ("Integrated Operational Program of Regional Development")

Indices	**Current value (year)**	**Projected value in 2006**
Ratio of GDP per capita of the richest to the poorest voivodship	1:2,2 (2000)	<1:2,2
Differences in unemployment ratio on NUTS III level	1:7,1	Less than 1:6
GDP per capita NUTS II level to national and EU average (in %)	69,8>NUTSII<149,3 27,2>NUTSII<58,1 (1999)	To be monitored
Unemployment rate (in %, NUTS II)	14,1<NUTSII<23,7 (2000)	To be monitored
Urbanization ratio (NUTS II)	41,0<NUTSII<79,3 (2000)	To be monitored
Educational achievement (NUTS II) - elementary - middle - university	14,8<NUTSII<26,2 63,5<NUTSII<76,9 8,3<NUTSII<14,9 (2000)	To be monitored
Employment structure by sectors - agriculture - industry - services	4,3<NUTSII<40,2 20,0<NUTSII<47,4 39,8<NUTSII<61,2 (2000)	To be monitored

Source: "National Development Plan 2004-06", p. 133.

B. NATIONAL INFORMATION SOCIETY POLICIES

Table B1. Chronological description of the main state IS policy initiatives and their main objectives

Date	Development	Objectives
July 15, 2003	„Bill on informatization of public administration" - – draft project accepted by the government. Sent to the parliament. Expected to enter into force: January 2004	- To ensure compatibility of public IT systems and registries - To create legal framework for the development of e-government in Poland - To attain budgetary savings thanks to better coordinated spending on IT projects and shift of a number of public services to electronic platforms - To enhance efficacy of the public administration and increase the quality of its services
April 1, 2003	Creation of "Ministry for Science and Information Technology"	- To create single coordinating institution for all IS policies.
March 10, 2003	„Strategy for Informatization of Poland – ePoland" announced by the State Committee for Scientific Research	- To specify a role of specific ministries and public administration in implementing state IS policies.
January 2003	"Proclamation on the development of information society in Poland" adopted by the Senate	- To underscore the importance of the IS for the development of Poland
January 2003	"Strategy for Development of the ICT Industry in Poland until 2010" published by the Polish Agency for Foreign Invest	- To promote development of ICT industry in Poland
September 11, 2001	"ePoland – Plan of Actions for Development of the Information Society in Poland 2001-06" adopted by the government	- To create a strategy for development of IS in Poland
January 23, 2001	„Forum for Information Society" appointed by the Minister of Science	- To opine on strategies developed within the framework of „Aims and direction of development of information society in Poland" and executive acts to the Act on Telecommunication Law
November 28, 2000	„Aims and Directions of the Information Society Development in Poland" - adopted by the government.	- To establish state strategy for development of information society in Poland compatible with the "e-Europe 2000" objectives of the Lisbon summit.
July 14, 2000	"Proclamation on Information Society in Poland" - Sejm, lower chamber of the Parliament.	- To create legal and political basis for the government to coordinate all policies related to the information society.

Source: author's based on various sources

Table B2. Selected projects of informatization of public administration to be submitted for funding to the EU

No.	Project	Final beneficiary	Description
1.	eTaxes	Ministry of Finance	Services as VAT, PIT and CIT for enterprises and private persons which are operating business
2.	Modernization and development of interior teletransmision network for eGovernment	Ministry of Internal Affairs and Administration	Electronic interchange of data between administration, public registries and enterprises
3.	PESEL 2	Ministry of Internal Affairs and Administration	Project for enterprises. Integration of important registries as KRS, ZUS, KRUS, RUM, NIP, ZSK, CEPIK with PESEL register
4.	On-line availability of data from judicial registries	Ministry of Justice	On-line databases from judicial registries (Pledge Register, National Judicial Register - KRS, Perpetual Books)
5.	eNORM Portal	Polish Committee for Standardization	Norms (Polish, European and international) will be available on-line for all enterprises
6.	Electronic platform for personal data protection	The Inspector General for the Protection of Personal Data	Comprehensive electronic services for enterprises (registration of databases with personal data, electronic forms)
7.	GEONET	Central Office for Geodesy and Cartography	Interactive, multi-functional positioning system based on ground control station and Global Positioning System (GPS)
8.	GEOBASE	Central Office for Geodesy and Cartography	On-line geographic information for enterprises
9.	SDI POLAND	Central Office for Geodesy and Cartography	Infrastructure of spatial data for electronic services.
10	Real estate tax on-line	Central Office for Geodesy and Cartography	Information on estates and data from enterprises related to real estate tax. Project will be integrated with other projects and registries (KRS, REGON, perpetual books)

Source: MSRiT (2003)

C. INDUSTRIAL DEVELOPMENT AND COMPETITIVENESS, AND ITS GEOGRAPHY, 1990-2001

Graph C1. Dynamics of production sectors in Poland (year 1994=100) and changes in composition of investments

Dynamics	1995	1996	1997	1998	1999	2000	2001
Mining (y-o-y)	-0.6	2.5	0.5	-12.8	-2.6	-2.6	-5.0
Manufacturing (y-o-y)	11.6	9.8	13.4	5.3	3.6	7.3	-0.2
Electricity, gas, water supply (y-o-y)	0.9	0.3	3.4	-0.4	4.4	7.0	7.0
Mining (year 1994=100)	99.40	101.89	102.39	89.29	86.97	84.71	80.47
Manufacturing (year 1994=100)	111.60	122.54	138.96	146.32	151.59	162.66	162.33
Electricity, gas, water supply (year 1994=100)	100.90	101.20	104.64	104.23	108.81	116.43	124.58

Source: Polish Statistical Office (2002)

Table C1. Structure of industrial production by sections and divisions in selected years, in % of total industry production

	1995	2000	2001
Mining and quarrying	5.9	3.8	3.7
Food products and beverages	19.1	18.2	20.1
Wood and wood products	2.8	3.2	3.1
Publishing and printing	2.7	3.4	3.3
Coke and petroleum products	4.1	5.3	4.9
Chemicals and chemical products	6.8	5.7	5.6
Rubber and plastic products	3.2	3.8	4.0
Non-metallic mineral products	3.7	4.6	4.6
Basic metals	6.6	4.8	4.0
Metal products	3.8	4.8	5.0
Machinery and equipment	5.6	4.6	4.3
Office machinery and computers	0.2	0.3	0.3
Radio, TV, and communication equip.	1.4	1.9	1.9
Motor vehicles	3.6	6.3	5.4
Furniture	3.1	3.7	3.7
Electricity, gas, water supply	10.0	10.1	11.3
Other	17.4	15.5	14.8
Total	**100.0**	**100.0**	**100.0**

Source: Polish Statistical Office (2002)

Table C2. Rising and declining industrial sectors (previous year =100)

Sector	1999	2000	2001	2001 (1995=100)
Basic metals	93.4	109.4	82.2	88.2
Mining of coal and lignite	95.5	95.5	97.2	78.2
Textiles and clothing	92.7	104.8	91.2	103.5
Medical and precision instruments	111.1	98.9	109.9	172.3
Radio, TV and communication equipment	100.9	111.4	105.9	222.9
Office machinery and computers	140.5	93.1	116.7	342.9

Source: Polish Statistical Office (2002)

Table C3. Structure of services in 2001, in % of total services

Trade and repair	33.0
Hotels and restaurants	2.3
Transport, storage and communication	13.9
Real estate, renting and business act.	20.8
Public administration and defense	7.7
Education	5.4
Health and social work	5.2
Financial intermediation	6.8
Other	4.8

Source: Polish Statistical Office (2002)

Table C4. Output dynamics of the service sector, by sectors (year 1995 = 100) – data for year 2001

Trade and repair	137.0
Hotels and restaurants	178.0
Transport, storage and communication	138.0
Real estate, renting and business act.	109.6
Public administration and defense	137.0
Education	109.2
Health and social work	86.6
Financial intermediation	187.0
Other	104.4

Source: Polish Statistical Office (2002)

Table C5. Regional structure of total industrial production in Poland in 2001 (in %)

Mazowieckie	20
Slaskie	17
Wielkopolskie	10
Dolnoslaskie	7
Malopolskie	7
Pomorskie	6
Lodzkie	6
Kujawsko-Pomorskie	5
Lubelskie	3
Podkarpackie	4
Zachodnio-Pomorskie	3
Opolskie	3
Warminsko-Mazurskie	3
Lubuskie	2
Podlaskie	2
Swietokrzyskie	2

Source: Polish Statistical Office (2002)

Table C6. Regional and per sector distribution of labor force and unemployment rate

	Agriculture	**Industry**	**Trade and repair**	**Financial intermediation**	**Unemployment rate**
Dolnoslaskie	3.8	7.8	7.5	7.7	22.2
Kujawsko-Pomorskie	4.6	4.8	5.2	4.5	22.3
Lubelskie	11.8	3.9	4.3	4.4	15.3
Lubuskie	1.3	2.1	2.4	2.4	25.7
Lodzkie	8.0	5.1	6.6	5.8	18.3
Malopolskie	11.1	8.8	7.9	6.6	13.7
Mazowieckie	13.9	17.0	17.9	27.2	13.8
Opolskie	2.5	2.6	2.1	2.0	18.8
Podkarpackie	10.4	4.5	4.4	4.5	16.2
Podlaskie	5.4	2.1	2.6	2.6	14.5
Pomorskie	2.6	6.0	5.6	5.7	21.2
Slaskie	3.5	15.5	13.7	10.9	16.6
Swietokrzyskie	6.8	3.1	2.8	2.1	17.9
Warminsko-Mazurskie	2.8	2.8	2.9	2.7	27.9
Wielkopolskie	8.1	9.5	9.7	8.1	15.9
Zachodnio-Pomorskie	1.9	4.4	4.4	3.8	25.9

Source: Polish Statistical Office (2002)

Table C7. GDP composition in selected regions

Region	Agriculture	Industry	Services
Mazowieckie	3.2	27.4	69.4
Lubelskie	6.0	28.6	65.4
Lodzkie	4.0	32.8	63.2
Dolnoslaskie	3.8	33.7	62.5
Slaskie	1.7	40.9	57.4

Source: Polish Statistical Office (2002)

Table C8. Production, value added, employment, wages, number of business and investments in ICT sector in Poland 1995-2000

		1995	1996	1997	1998	1999	2000
Production (output)							
millions PLN							
ICT manufacturing[1]		4 036	5 162	6 847	9 042	10 426	11 408
of which office, accounting and computing machinery		*574*	*799*	*922*	*1 192*	*1 632*	*1 538*
Value added *(at basic prices)*							
ICT manufacturing[1]		1 314	1 604	2 040	2 483	3 299	2 770
of which office, accounting and computing machinery		*188*	*251*	*252*	*349*	*578*	*550*
Employment							
employees							
ICT manufacturing[1]		49 300	46 300	45 000	42 800	39 700	37 800
of which office, accounting and computing machinery		*4 200*	*4 100*	*4 500*	*4 700*	*5 000*	*5 000*
Computer and related activities		17 600	19 300	25 800	28 100	31 100	35 100
Wages and salaries, employees		1995	1996	1997	1998	1999	2000
millions PLN							
ICT manufacturing[1]		437	529	662	758	1 038	1 134
of which office, accounting and computing machinery		*38*	*49*	*77*	*94*	*172*	*178*
Computer and related activities		207	305	472	686	1 200	1 635
Number of businesses							
enterprises							
ICT manufacturing[1]		202	208	234	223	221	232
of which office, accounting and computing machinery		*13*	*14*	*15*	*15*	*19*	*21*
Telecommunications		..	..	834	1 005	1 137	1 446
Computer and related activities		..	..	21 485	25 084	27 660	31 427
of which software consultancy and supply		..	..	*10 779*	*12 041*	*12 911*	*14 168*
Other ICT services[2]		..	..	66	76	108	120
Total ICT sector[2]		..	..	**22 619**	**26 388**	**29 126**	**33 225**
GFCF							
ICT manufacturing[1]		168	344	356	530	574	393
of which office, accounting and computing machinery		*16*	*17*	*24*	*31*	*20*	*19*
Telecommunications		..	..	..	..	..	..
Computer and related activities		73	115	165	222	318	415

1. Excluding ISIC 3130 (Manufacture of insulated wire and cable), ISIC 3312 (Manufacture of instruments and appliances for measuring, checking, testing, navigating and other purposes, except industrial process control equipment) and ISIC 3313 (Manufacture of industrial process control equipment). 2. Excluding ICT wholesaling activities.

Source: OECD, Measuring the Information Economy 2002, based on Polish Central Statistical Office.

Graph C3. Structure of production of the electronic industry in Poland in 2001 (enterprises with more than 49 employees)

audio-video equipment	hardware and office equipment	telecommunications equipment	components
20%	17%	32%	31%

Source: Polish Statistical Office (2002), www.stat.gov.pl

Graph C4. Gross and net profitability of electronic industry in Poland, 1996-2000 (in %)

	1996	1997	1998	1999	2000
gross profitability	2.7	6.1	4.4	4.8	2.5
net profitability	1.5	4.2	2.6	2.9	1.3

Source: Polish Statistical Office (2002)

Graph C5. Computer and office equipment market in Poland in 1996-2001 (in USD million)

1996	1997	1998	1999	2000	2001
1260	1270	1490	1325	1240	1200

Source: Institute of the Electronic Markets, www.ire.com.pl

Graph C6. ICT sector trade balance, 2001 (in percent)

Ireland	11.0
Korea	6.0
Japan	6.1
Mexico (3)	0.7
Hungary (3)	0.6
Sweden	0.6
United Kingdom	-0.2
Italy	-2.0
United States	-2.1
Slovak Republic(3)	-2.8
Czech Republic (3)	-3.2
Poland	-4.2
Australia	-8.7

Source: OECD, International Trade in Commodity Statistics (ITCS) and Structural Analysis (STAN) databases, August 2002. Taken from: OECD (2002

Graph C7. ICT manufacturing trade as a share in total manufacturing trade, 2001 or latest year available*

Ireland	41
Korea	30
Hungary (3)	29
Mexico (3)	26
United Kingdom	21
United States	21
OECD 28 (3)	19
EU 12 (3)	17
Czech Republic (3)	12
Canada	11
Turkey (3)	11
Portugal (3)	10
Poland	10
Slovak Republic (3)	7
Iceland	5

Source: OECD, International Trade in Commodity Statistics (ITCS) and Structural Analysis (STAN) databases, August 2002.

Graph C8. Share of ICT sector exports in total merchandise exports, 1990-2001 (in %)

	1990	**2001**
Ireland	24.1	39.9
Korea (3)	25.8	31.0
Hungary (1)	4.2	29.3
Mexico (5)	3.2	24.8
United States	15.4	21.4
United Kingdom	12.4	20.0
OECD22 (5)	11.2	17.2
EU 12 (5)	8.4	14.3
Czech Republic (2,5)	3.3	8.5
Poland (1)	2.1	5.8
Italy	5.9	5.6
New Zealand (5)	0.7	1.6
Iceland	0.1	0.2

Source: OECD, International Trade in Commodity Statistics (ITCS) and Structural Analysis (STAN) databases, August 2002.

Table C8. The composition of ICT sector exports in selected countries, 2000

	ISIC 32 - Radio, TV & communication equipment	ISIC 30 - Office & computing machinery	ISIC 313 - Insulated wire and cable	ISIC 3312+3313 - ICT scientific instruments
Poland	**71**	**6**	**18**	**5**
Turkey	66	4	27	3
Czech Republic	58	21	14	7
Slovak Republic	56	23	12	9
Hungary	44	47	6	2

Source: OECD, International Trade in Commodity Statistics (ITCS) and Structural Analysis (STAN) databases, August 2002.

Table C9. Ten largest software exporters in Poland in 2002

Company	Revenue in thousand PLN	In thousand euro	Share in total software exports
Intel Technology Poland	50 456	10 851	12.6%
NTT System	48 300	10 387	12.1%
IMG IM Polska	27 060	5 819	6.8%
Bull Polska	16 952	3 646	4.2%
Altkom Akademia	15 490	3 331	3.9%
Optimus	15 293	3 289	3.8%
Logotec Engineering Group	12 000	2 581	3.0%
ARAM	11 445	2 461	2.9%
Softsystem	10 954	2 356	2.7%
Young Digital Poland	9 873	2 123	2.5%
Total exports	400 000	86 022	100.0%

Source: Computerworld TOP 200 List (2003), www.computerworld.pl

Box C1.

Comarch, a local IT company based in Krakow, has just signed - through its captive company Comarch Software AG based in Germany – a contract for sale of IT billing systems to Ukrainian Mobile Communications, a leading mobile telephony operator in Ukraine. The contract is worth some EUR 4.8 million. This is yet another foreign contract signed by Comarch this year. The company estimates that in 2003 the company's exports will amount to some 20% of the total annual revenue of roughly 40 million euro.

Source: www.comarch.pl

Table C10. IT spending in CEE countries in 2001, in EUR million

	IT spending	Share in total spending in %	IT/GDP in %	Per capita IT spending in EUR
Bulgaria	244	2.8	1.0	29
Czech Republic	1 894	21.9	3.8	183
Estonia	182	2.1	3.7	122
Hungary	1 441	16.7	3.0	141
Latvia	166	1.9	2.8	69
Lithuania	182	2.1	1.8	50
Poland	**3 188**	**36.9**	**2.1**	**83**
Romania	423	4.9	1.3	19
Slovakia	536	6.2	2.9	100
Slovenia	377	4.4	2.0	190
Total CEE	8 632	100.0	2.3	83
Total Western Europe	324 439	100.0	3.8	835

Source: EITO (2002)

Table C11. ICT spending as a share of total ICT spending in CEE countries in 2001,in EUR million

	ICT spending	Share in %
Bulgaria	1 300	4.3
Czech Republic	4 964	16.3
Estonia	644	2.1
Hungary	4 541	14.9
Latvia	679	2.2
Lithuania	806	2.6
Poland	**12 044**	**39.5**
Romania	2 626	8.6
Slovakia	1 640	5.4
Slovenia	1 266	4.1
Total	30 510	100.0

Source: EITO (2002)

Table C12. Fifteen largest IT companies in Poland in 2002

	Total revenue (in thousand PLN)		2002/2001 change	Revenue in thousand euro	Employment	
	2001	2002		2002	2001	2002
HP Polska	1 555 772	1 780 269	14.4%	414 016	393	550
Action	884 496	998 796	12.9%	232 278	189	238
ABC Data	85 831	942 919	998.6%	219 283	137	137
Prokom Software	841 077	891 930	6.0%	207 426	1475	1514
Tech Data Polska	802 200	788 880	-1.7%	183 460	120	112
IBM Polska	717 700	750 000	4.5%	174 419	460	700
Microsoft	550 000	620 000	12.7%	144 186	120	150
Incom Group	506 000	587 300	16.1%	136 581	97	100
LG Electronics Polska	347 170	518 723	49.4%	120 633	63	72
Techmex	565 188	518 518	-8.3%	120 586	166	246
ComputerLand	524 550	502 334	-4.2%	116 822	1035	1146
AB	461 497	485 528	5.2%	112 913	214	160
NTT System	291 565	345 000	18.3%	80 233		170
JTT Computer	403 178	432 874	7.4%	100 668	254	179
Intel Poland	282 555	324 938	15.0%	75 567		

Source: Computerworld TOP 200 List (2003), www.computerworld.pl

Table C13. Sales of computers (PCs, laptops, servers) and market shares after 3Q of 2003

	Sales (in thousand pieces)	Market share
NTT System	54.0	7.6%
HP	52.5	7.4%
Optimus	31.4	4.4%
Dell Computer	30.6	4.3%
Action	24.6	3.5%
ITT Computer	23.9	3.4%
Toshiba	20.0	2.8%
IBM	16.6	2.3%
Fujitsu	14.4	2.0%
Vobis	13.7	1.9%
Other	428.3	60.3%
Total	**710.0**	**100.0%**

Source: Rzeczpospolita, 1 December 2003.

Graph C10. Structure of the telecommunications equipment market in Poland in 2000, (in % of market share)

Siemens	Alcatel Polska	Tele-Fonika	Lucent Technologies	Elektrim Kable	Other
22.3	15.8	7.7	16.8	7.8	29.6

Source: Teleinfo, www.teleinfo.com.pl

Graph C11. Structure of the equipment market for mobile phones in Poland in 2000 (in % of market share)

Nokia	Siemens	Motorola	Ericsson	Alcatel	Panasonic	Mitsubishi	Other
0.4	0.2	0.1	0.1	0.1	0.0	3%	4%

Source: Institute of the Electronic Markets, www.ire.com.pl

Table C14. Ten largest companies selling their own software, 2002

	Revenue in thousand PLN	in thousand euro	market share
Microsoft	620 000	133 333	33.3%
Oracle Polska	229 500	49 355	12.3%
ComputerLand	111 477	23 974	6.0%
IBM Polska	90 000	19 355	4.8%
Prokom Software	69 090	14 858	3.7%
SAP Polska	58 000	12 473	3.1%
Novell Polska	52 000	11 183	2.8%
SAS Institute	30 664	6 594	1.6%
Wasko	29 771	6 402	1.6%
Softlab trade	27 710	5 959	1.5%
Total market	**1 860 000**	**400 000**	**100.0%**

Source: Computerworld TOP 200 List (2003), www.computerworld.pl

Table C15. Ten largest companies selling custom-made software, 2002

	Revenue in thousand PLN	In thousand euro	Market share
ComputerLand	71 000	15 269	15.3%
Prokom Software	69 090	14 858	14.9%
Altkom Akademia	31 328	6 737	6.7%
PKP Informatyka	30 465	6 552	6.6%
Intel Technology Poland	22 957	4 937	4.9%
DRQ	19 346	4 160	4.2%
Softbank	18 513	3 981	4.0%
Bazy i Systemy Bankowe	13 549	2 914	2.9%
Bull Polska	13 432	2 889	2.9%
Winuel	12 730	2 738	2.7%
Total market	**465 000**	**100 000**	**100.0%**

Source: Computerworld TOP 200 List (2003), www.computerworld.pl

D. PRESENCE OF MOST RELEVANT ECONOMIC ACTIVITIES FOR IST APPLICATIONS

Box D1. Definitions of ICT-using industries and services

ICT-using manufacturing		**ICT-using services**	
	ISIC Rev. 3		ISIC Rev. 3
Clothing	18	Wholesale trade and commission trade, except of motor vehicles and motorcycles	51
Printing & publishing	22	Retail trade, except of motor vehicles and motorcycles; repair of personal and household goods	52
Mechanical engineering	29	Financial intermediation, except insurance and pension funding	65
Electrical machinery and apparatus	31 (excl. 313)	Insurance and pension funding, except compulsory social security	66
Precision and optical instruments	33 (excl. 331)	Activities auxiliary to financial intermediation	67
Building and repairing of ships and boats	*351*	Real estate activities	70
Aircraft and spacecraft	*353*	Renting of machinery and equipment	71
Railroad equipment and transport equipment nec	*352+359*	Research and development	73
Furniture, miscellaneous manufacturing; recycling	36-37	*Legal, technical and advertising*	*741-3*

Source: van Ark and McGuckin (2002)

Graph D1: IT investments and labor productivity in the Polish banking sector 1997-2001

	IT investments	**Labor productivity**
1997	667.3	1.44
1998	1044.5	1.83
1999	1359.6	2.08
2000	1451.9	2.50
2001	1488.6	2.89

Note: Labor productivity measured as assets in PLN million per employee.

Source: author's calculations based on DiS (2002) for IT investments and NBP (2002) for other data.

Table D2. ICT spending in eight transition countries 1993-2001, as % of GDP

Country	1993	1994	1995	1996	1997	1998	1999	2000	2001	Avg.
Bulgaria	2.2	2.9	2.3	2.7	3.0	3.1	3.6	4.1	4.2	3.1
Czech Republic	5.5	5.3	5.9	5.8	6.4	6.6	7.8	9.1	8.7	6.8
Hungary	4.2	4.3	3.9	4.2	4.5	7.5	8.2	8.9	10.0	6.2
Poland	**2.1**	**2.1**	**2.2**	**2.3**	**2.6**	**4.6**	**5.4**	**6.1**	**5.9**	**3.7**
Romania	1.1	1.1	0.9	1.0	1.3	1.4	2.1	2.3	2.4	1.5
Russia	4.0	3.2	1.8	1.7	2.0	2.7	4.1	3.5	3.2	2.9
Slovak Republic	4.2	4.2	4.0	4.0	3.9	5.5	6.8	8.1	8.8	5.5
Slovenia	3.0	3.0	2.9	3.1	3.4	3.7	4.4	5.3	4.7	3.7
Average*	4.4	4.4	4.5	4.7	5.0	5.6	6.2	6.8	7.3	5.4

Source: WITSA (2002)

Table D3: ICT spending in Poland 1993-2001, in USD million

	1993	1994	1995	1996	1997	1998	1999	2000	2001	In total in 2001
IT Hardware	545	643	822	984	1 127	1 339	1 438	1 549	1 661	15.8%
Software	87	106	115	180	229	268	309	447	511	4.9%
IT Services	152	178	213	341	428	486	515	756	877	8.4%
Internal	334	402	458	502	528	702	705	778	867	8.3%
Other Office Equipment	67	52	59	70	77	92	98	106	114	1.1%
Total IT	*1 184*	*1 381*	*1 667*	*2 076*	*2 389*	*2 886*	*3 066*	*3 636*	*4 031*	*38.4%*
Telecommunications	587	667	1 079	1 201	1 317	4 384	5 364	5 935	6 458	61.6%
Total ICT	**1 772**	**2 048**	**2 745**	**3 277**	**3 706**	**7 270**	**8 430**	**9 570**	**10 489**	100.0%

Source: WITSA (2002)

Graph D2. Total ICT spending in transition economies in 1993 and 2001 (USD million

	1993	2001
Poland	1 772	10 489
Russia	7 375	9 908
Czech Republic	1 945	4 954
Hungary	1 624	4 646
Other EE*	759	2 965
Slovakia	509	1 751
Slovenia	383	996
Romania	283	956
Bulgaria	241	530

** Other EE – other Eastern European countries: Albania, Belarus, Bosnia and Herzegovina, Croatia, Estonia, Latvia, Lithuania, Macedonia, Moldova, Ukraine, Serbia and Montenegro.*

Source: WITSA (2002)

Graph D3: ICT spending in the EU, OECD, developing countries and Poland (as % of GDP)

	1993	1994	1995	1996	1997	1998	1999	2000	2001
Average 24 developing**	3.18%	3.17%	3.26%	3.57%	3.83%	4.34%	5.12%	5.41%	6.00%
Average EU*	5.25%	5.36%	5.42%	5.57%	5.82%	6.30%	6.56%	7.73%	8.11%
Poland	2.06%	2.08%	2.16%	2.28%	2.57%	4.59%	5.43%	6.06%	5.95%
Average OECD24	5.89%	5.90%	5.95%	6.18%	6.53%	7.21%	7.71%	8.48%	8.99%

** Excludes Luxembourg;*

*** Argentina, Brazil, Chile, China, Colombia, Egypt, Hong Kong, India, Indonesia, Malaysia, Mexico, Philippines, Saudi Arabia, South Africa, Taiwan, Thailand, Turkey, Venezuela, Vietnam. Note: non-weighted arithmetic averages.*

Source: own calculations based on WITSA (2002)

Graph D4. Structure of IT spending in Czech Republic, Hungary and Poland in 2001

(%)	CZ	HU	PL
Business	88.10%	84.40%	86.10%
Government	9.30%	13.70%	7.60%
Households	2.50%	1.90%	6.30%

Source: IDC (2002), unpublished document.

Table D2. Investments in ICT in Poland, 1992-2001 (current prices, USD million)

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
IT hardware	545.0	569.2	646.4	819.3	980.2	1119.7	1330.8	1428.5	1539.2	1650.8
Software	96.0	104.4	127.2	138.0	216.0	274.8	321.6	370.8	536.4	613.2
Telecom. equipment	155.1	176.1	200.1	323.7	360.3	395.1	1315.2	1609.2	1780.5	1937.4
Total ICT	796.1	849.7	973.7	1281.0	1556.5	1789.6	2967.6	3408.5	3856.1	4201.4
Share of ICT in total GFCF (in %)	5.5	6.2	6.6	6.5	6.4	6.5	9.2	10.8	12.4	14.2

Source: own estimates based on WITSA (2000, 2002)

Graph D6. Percentage share of ICT investment in total GFCF in Poland, in current prices, 1992-2001

1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
5.53%	6.19%	6.61%	6.52%	6.40%	6.53%	9.21%	10.82%	12.45%	14.19%

Source: Piatkowski (2003) based on WITSA (2000, 2002)

Table D3. Growth rates in real ICT investment in Poland and selected countries, arithmetic average for 1995-2000

	Poland	EU	USA
IT hardware	52.7%	31.6%	27.0%
Software	32.7%	12.3%	16.0%
Communication equipment	65.7%	11.9%	15.7%
Total ICT	50.9%	18.5%	19.3%

Source: Van Ark et al. (2002) for the EU and the US, and Piatkowski (2003) for Poland

Graph D7. Average annual growth rates in real mid-year ICT and non-ICT capital stock, 1995-2000 (in fixed prices 1995)

Buildings and structures	1.55%
Non-ICT equipment	3.56%
Transport equipment	-0.53%
Other	-5.30%
IT hardware	50.60%
Software	28.50%
Telecom. Equipment	46.20%

Source: Piatkowski (2003)

Graph D8. ICT real mid-year capital stock as a percentage of a total gross mid-year capital stock in Poland, 1995-2000 (in fixed prices 1995)

1995	1996	1997	1998	1999	2000
0.71%	0.95%	1.35%	2.09%	3.25%	4.72%

Source: Piatkowski (2003)

Graph D9. IT investments in selected industries in Poland in 2002, in PLN million and % of total revenue

	IT spending	IT spending to total revenue
Telecom	1 270.0	4.54%
Banking	1 274.0	3.31%
M & E	74.0	1.86%
Insurance	382.0	1.34%
Transport	239.0	1.05%
Average	4 449.8	1.28%

Source: DiS (2003). Note: data refers only to the 100 largest enterprises in Poland. "Average" – total IT investments and average share in total revenue.

Table D4. Contributions of ICT capital to real output growth in Poland 1995-2000 (in percentage points and in %)

		In percentage points	In %
ICT capital	IT hardware	0.33	6.23
	Software	0.04	0.74
	Telecommunication equipment	0.10	1.94
Total ICT capital		0.47	8.90
Non-ICT capital		0.66	12.40
Labor (employment)		0.26	4.82
TFP		3.67	69.09
Total output growth		5.31	100.00

Source: Piatkowski (2003)

Table D5. Percentage point contribution of ICT capital to real output growth in the EU countries and Poland, 1995-2000

	Van Ark et *al. 2002*	**Rank**	**Daveri 2002***	**Rank**
USA	0.86	1	1.45	1
Ireland	0.80	2	0.96	3
UK	0.69	3	1.17	2
Netherlands	0.68	4	0.72	6
Denmark	0.61	5	0.65	7
Sweden	0.53	6	0.85	4
Poland	**0.47**	**7**	**0.47**	**8**
Italy	0.41	8	0.35	13
Finland	0.37	9	0.74	5
Germany	0.37	10	0.45	10
Austria	0.36	11	0.43	12
France	0.35	12	0.44	11
Portugal	0.34	13	0.49	8
Spain	0.27	14	0.34	14

** 1996-99 only.*

Source: van Ark et al. (2002), Daveri (2002) and Piatkowski (2003) for Poland

Table D6. Sources of labor productivity growth in Poland, 1995-2000

	Labor productivity growth	**Capital deepening**						**TFP**
		Total capital	Total non-ICT	Total ICT	IT hardware	Software	Telecom. equipment	
1995	6.07	0.63	0.35	0.28	0.22	0.02	0.05	5.40
1996	1.11	-1.45	-0.76	0.31	0.24	0.02	0.05	2.54
1997	7.19	0.94	0.43	0.51	0.38	0.06	0.07	6.22
1998	2.68	0.52	-0.22	0.74	0.44	0.06	0.25	2.13
1999	7.00	3.26	2.20	1.06	0.52	0.07	0.47	3.78
2000	6.37	2.88	1.91	0.97	0.46	0.09	0.42	3.56
Average 1995-2000	**5.07**	**1.13**	**0.48**	**0.65**	**0.38**	**0.05**	**0.22**	**3.94**
In % of LP growth		22.29	9.55	12.74	7.42	1.05	4.27	77.71

Source: Piatkowski (2003)

Graph D10. R&D expenditure by source of financing in1999

	Business enterprises	Government	Other
Poland	38.10	58.50	3.40
Hungary	38.50	53.20	8.30
Slovak Republic	49.90	47.90	2.20
Czech Republic	52.60	42.60	4.80
EU	54.70	36.00	9.30
OECD	63.20	29.80	7.00

Source: OECD Science, Technology and Industry Scoreboard 2001

Graph D11: R&D spending as % of GDP in selected countries in 1999

Turkey	0.49
Hungary	0.68
Slovak Republic	0.68
Poland	0.75
Czech Republic	1.29
EU	1.85
OECD	2.21

Source: OECD Science, Technology and Industry Scoreboard 2001 available at http://www1.oecd.org/publications/e-book/92-2001-04-1-2987/

Graph D12. Evolution of gross domestic expenditure on R&D (average annual growth rate 1991-99)

Slovak Republic	-1.95
Hungary	-1.81
EU	1.62
OECD	2.78
Poland	5.22
Czech Republic	6.52

Note: Slovak Republic, Hungary, Poland (1994-99)
Source: OECD Science, Technology and Industry Scoreboard 2001

Table D7. Share of selected countries in total EPO patent applications, 1997

	1997	Average annual growth rate 1990-97
Slovak Republic	0.02	22.17
Poland	0.03	5.51
Czech Republic	0.05	9.99
Hungary	0.08	0.33
United States	28.54	4.78
EU	46.98	5.66

Source: OECD STI 2001

Table D8. Share of high-technology sectors in total venture capita,. 1995-99

	Communications	**Information technology**	**Health/ biotechnology**
Czech Republic (1998-99)	28.93	0.62	0.00
Poland (1998-99)	22.60	9.03	2.44
Hungary (1998-99)	4.48	11.42	72.78
EU	8.15	11.46	6.77

Source: OECD Science, Technology and Industry Scoreboard 2001

Table D9. Industry-level composition of the Polish economy in terms of growth prospects, ICT-use, and export intensity (ICT intensive sectors underlined, major exports sectors with an asterisk).*

	Smaller sectors of services or industry	**More important sectors of services or industry**
Growing sectors of the economy	*Emerging sectors: smaller but growing sectors of the economy:* ✓ Hotels and restaurants ✓ Medical & precision equipment* ✓ Radio, TV and communication equipment* ✓ Office machinery & computers* ✓ Printing and publishing ✓ Education ✓ Health and social work	*Dominating sectors: important sectors of the economy, showing further growth:* ✓ Transport, storage, communication ✓ Financial intermediation ✓ Transport equipment* ✓ Trade and repair
"Stable" sectors	*Modernising sectors: smaller sectors of the economy, that have to ensure their survival through modernisation* ✓ Mass Media ✓ Insurance ✓ Furniture* ✓ Metal products* ✓ Plastic and rubber ✓ Pulp and paper	*Challenging sectors: important sectors of the economy, that have to consolidate their position through modernisation* ✓ Public administration and defence ✓ Machinery* ✓ Food and beverage ✓ Chemicals ✓ Electricity, gas, water ✓ Real estate and renting
Declining sectors	*Disappearing sectors: smaller sectors of the economy, on the decline:* ✓ Textiles ✓ Agriculture ✓ Basic metals	*Losing sectors: important sectors of the economy, but on the decline:* ✓ Mining and quarring ✓ Steel industry* ✓ Shipyards*

Source: author's own

E. INFORMATION SOCIETY TECHNOLOGIES (IST) PENETRATION RATES

Table E1. Information society statistics for EU member and candidate countries (per 100 inhabitants) in 2001

Country	Personal computers	Internet users	Internet hosts	Mobile subscribers (in 2000)
EU15	**30.0**	**31.5**	**3.3**	**63.5**
Bulgaria	4.4	7.4	0.33	8.2
Czech Republic	12.1	13.6	2.09	29.2
Cyprus	25.1	19.7	0.30	26.2
Estonia	17.5	31.7	3.57	32.0
Hungary	10.0	14.5	1.68	29.7
Latvia	15.3	7.3	1.06	15.6
Lithuania	7.1	7.2	0.96	11.4
Malta	23.0	25.3	2.23	21.1
Poland	**8.5**	**9.8**	**1.27**	**15.0**
Romania	3.6	4.5	0.21	12.6
Slovak Republic	14.8	16.6	1.34	21.5
Slovenia	27.6	30.2	1.48	57.4
Turkey	4.1	3.8	0.16	19.3
CC13	**6.9**	**7.8**	**0.7**	**18.5**

Source: International Telecommunication Union (ITU). From: http://www.itu.int/ITU-D/ict/statistics/

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Cyprus	25.1	19.7	0.30	26.2
Estonia	17.5	31.7	3.57	32.0
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Latvia	15.3	7.3	1.06	15.6
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CC13	**6.9**	**7.8**	**0.7**	**18.5**

Source: International Telecommunication Union (ITU). From: http://www.itu.int/ITU-D/ict/statistics/

Graph E1. Fixed line (yellow) and mobile telephony (purple) penetration in Poland (as % of population, 1997 – 2002, end of the period)

	1997	1998	1999	2000	2001	2002
Stationary phones	19.7	22.8	26.1	28.0	29.5	30.1
obile phones	2.2	5.0	10.3	16.8	25.8	36.0

Source: Office of Telecommunications and Post Regulation (URTiP), www.urtip.gov.pl

Graph E3. Projected mobile telephone penetration in Poland, 2004-08, in million of subscribers.

	Deutsche Bank	Telekomunikacja Polska	CDM Pekao S.A.
2000	7	7	7
2001	10	10	10
2002	15	15	15
2003	18	17	17
2004	22	20	19
2005	24	22	21
2006	27	23	22
2007	29	24	23
2008	30	25	24

Note: Projections by Deutsche Bank, TP S.A. (Telekomunikacja Polska), national telecom operator, and Brokerage House of Pekao S.A., a local bank (CDM Pekao S.A.).
Source: Rzeczpospolita, 25 November 2003.

Table E2. Computer penetration in Poland, 1993-2001

PCs installed in:	1993	1994	1995	1996	1997
Education	44 816	55 544	68 840	100 178	123 994
Homes	55 145	76 401	105 850	146 651	200 591
Business & Gov.	49 901	618 502	766 561	935 203	1 157 531
Total PCs Installed	59 901	750 447	941 251	1 182 032	1 482 116
Growth rate of total PCs		25.28%	25.43%	25.58%	25.39%
PCs per 100 inhabitants	1.6	2.0	2.5	3.1	3.9

PCs installed in:	1998	1999	2000	2001
Education	150 477	180 179	219 416	252 713
Homes	260 781	3 348 78	414 152	492 218
Business & Gov.	1 404 761	1 682 034	2 042 606	2 352 578
Total PCs Installed	1 816 019	2 197 091	2 676 174	3 097 510
Growth rate of total PCs	22.53%	20.98%	21.81%	15.74%
PCs per 100 inhabitants	4.8	5.7	7.0	8.1

Source: author's calculations based on WITSA (2002)

Table E3. Computer penetration in selected CEE countries in 2001

Czech Republic	14.5%
Hungary	10.0%
Poland	8.1%
Romania	3.5%
Russia	4.9%
Slovakia	14.8%
Slovenia	27.5%

Source: WDI (2003)

Table E4. Internet penetration rates in selected countries in 2002

Low penetration (below 20%)	**Medium penetration (from 20% to 40%)**	**High penetration (above 40%)**
Argentina	Czech Republic	Australia
Bulgaria	Estonia	Belgium
Hungary	France	Denmark
India	United Kingdom	Finland
Indonesia	Italy	Germany
Latvia	Malaysia	Hong Kong
Lithuania	Slovak Republic	Ireland
Mexico	Spain	Israel
Poland	Turkey	South Korea
Romania		Netherlands
Serbia		Norway
Thailand		Singapore
Ukraine		Taiwan
		United States

Source: Taylor Nelson Sofres Interactive, Global eCommerce Report 2002, www.tnsofres.com

Graph E5. Internet users in selected European countries in 2002 (as % of population)

Hungary	**Poland**	**Czech Republic**	**Spain**	**Germany**	**Sweden**
10	18	28	29	41	65

Source: Taylor Nelson Sofres Interactive, Global eCommerce Report 2002, www.tnsofres.com

Graph E6. Internet users in Poland per age and sex in 2001

to 20	**20 to 29**	**30 to 39**	**40 to 59**	**60 and more**	**males**	**females**
54%	37%	12%	10%	9%	19%	16%

Source: Taylor Nelson Sofres Interactive, Global eCommerce Report 2002, www.tnsofres.com

Graph E7. Types of access to the Internet in Poland in 2001 (in %)

Dial-up TP S.A.	Dial-up, other operators	Local networks, access at work, at school	Cable TV	WAP	Others
65	9	33	4	2	5

Source: The ePoland: eCommerce & Technology Use Report, Polish Market Review, www.kbn.gov.pl

Graph E8. Costs of access to telecommunication services in selected European countries in 2001 - number of baskets of telecommunication services per annual income*

Poland	Czech Republic	Hungary	Spain	Germany
8.9	18.2	19.1	34.0	55.4

Source: Office of Telecommunications and Post Regulations (URTiP), www.urtip.gov.pl

Graph E9. Price of 40 hours of Internet use at peak times, August 2001, at PPP prices (OECD Internet access basket for 40 hours at peak times using discounted PSTN rates)

	Fixed telephone charge	Telephone usage charge
Hungary	23.9	96.1
Czech Rep	11.2	139.3
Poland	19.5	61.2
Portugal	18.4	57.4
OECD	14.1	40.0
EU	13.8	37.9
Greece	12.1	19.5
France	12.1	0.0
Norway	13.8	23.1
Denmark	11.8	0.0
New Zealand	23.1	0.0
Germany	11.7	0.0
United Kingdom	13.4	0.0
Turkey	7.0	21.1
Korea	4.0	0.0
United States	13.1	4.7

Source: OECD, Telecommunications Database, June 2002. Taken from OECD (2002), "Measuring the Information Economy 2002".

Graph E10. Broadband penetration rates in Poland and OECD countries, June 2001 (Number of DSL,[1] cable modem lines and other broadband[2] per 100 inhabitants)

Turkey	0.01
Poland	0.03
Hungary	0.09
Czech Republic	0.11
United Kingdom	0.27
Italy	0.44
Spain	0.46
Portugal	0.56
France	0.60
Norway	0.68
Germany	0.95
Iceland	1.96
United States	3.21
Sweden	4.07
Canada	6.17
Korea	13.78

Digital Subscriber Lines. 2. The other technologies that were deployed in 2001 to provide broadband services are fixed wireless broadband, direct satellite broadband and various forms of "fibre to the residence".
Source: S. Paltridge (2001), "The Development of Broadband Access in OECD Countries" OECD, Paris, October. From OECD (2002)

Table E5. Share of consumption of ICT goods and services in total household consumption in selected CEE countries, 1999

	Total ICT	**Telephone and telefax equipment and services**	**Audio-visual, photographic and information processing equipment**
Slovak Republic	3.0	1.9	1.1
Poland	**3.0**	**1.3**	**1.7**
Czech Republic	3.4	1.9	1.5
Hungary	5.8	4.3	1.5

Source: OECD, Purchasing Power Parities Database, www.oecd.org

Table E6. Regional fixed line penetration as of the end of 2002

	Fixed lines per 100 inhabitants
Dolnoslaskie	31.22
Kujawsko-Pomorskie	27.77
Lubelskie	25.34
Lubuskie	28.53
Lodzkie	28.95
Malopolskie	27.34
Mazowieckie	33.88
Opolskie	24.97
Podkarpackie	21.11
Podlaskie	31.96
Pomorskie	29.75
Slaskie	29.40
Swietokrzyskie	22.69
Warminsko-Mazurskie	28.57
Wielkopolskie	25.59
Zachodnio-Pomorskie	30.19

Source: Janiec (2003) based on the Ministry of Infrastructure.
From: http://www.instytut-rp.pl/content/attachments/MJprezkonf021203.pdf*, p. 3.*

Graph E13. Access to the Internet in enterprises in Poland (per level of employment in 2002, in per cent)

Self-employed	1-9 employees	10-49 employees	50-249 employees
26	33	79	95

Source: Ipsos-Demoskop, www.demoskop.pl

Graph E14. Access to the Internet in enterprises in Poland (per level of employment in 2002, in percent)

average	above 100 employees	21 to 100 employees	6 to 20 employees
57,8	81	70	50

Source: ARC Rynek i Opinia, www.arc.com.pl

Graph E15. Use of Internet in enterprises in Poland in 2002
Data in per cent, total answers „often" and „very often"

	Public adm.	E-mail	Information	Downloads	Internet telephony	Advertising
50-249 employees	77	68	59	30	15	47
10-49 employees	52	54	45	28	13	30
0-9 employees	15	59	63	24	10	18

	Purchases	E-banking	Software outsourcing	E-commerce	Inventory management
50-249 employees	5	27	2	5	10
10-49 employees	4	18	2	2	8
0-9 employees	2	7	2		

Source: Ipsos-Demoskop, www.demoskop.pl

Graph E16. Perceived benefits of the use of Internet in enterprises in Poland in 2002
In per cent of respondents

	Time saving	Convenience	Information	Easiness	Intl. transactions
50-249 employees	55	44	25	20	10
10-49 employees	55	40	21	18	9
0-9 employees	52	36	26	12	7

	Cost savings	Low prices	Simple accounting	Other	Do not know
50-249 employees	10	7	7	8	25
10-49 employees	9	7	2	5	28
0-9 employees	8	7	4	2	32

Source: Ipsos-Demoskop, www.demoskop.pl

Box E1. Success of a B2B e-commerce platform

Marketplanet, an electronic platform for B2B transactions owned by TPSA, the national telecom operator, since its inception in 2001 has traded goods of the total value of PLN 500 million (approx. EUR 110 million). The company handles some 14 thousand orders per month. TPSA estimates that thanks to electronic auctions handled by Marketplanet, it cut costs of procurement by 5-15%. Aside from TPSA, another 70 companies use the electronic platform, which have cut their procurement costs on the product ordered through the platform by on average 33%

Marketplanet is now gearing up for offering its services to the public administration, which – thanks to a new law on public procurement – in 2004 will be able to organize electronic auctions for all purchases of a maximum value of up to EUR 60 thousand.

Source: Rzeczpospolita, 21 November 2003.

Graph E17. Internet stores in Poland

1996	1997	1998	1999	2000	2001	03.2002
30	100	204	530	800	850	800

Source: Gartner Group Forecast Analysis, wws.gartner.com

Table E7. E-commerce: timetable of actions as per the "Strategy for Informatization of Poland".

Actions	Ministry Responsible	Timing
Launch a voluntary accreditation scheme to be open to operators of Web shops and marketplaces to enhance consumer confidence	Ministry of the Economy, Labour and Social Policy	mid 2004
Create an electronic register of business integrity for companies wishing to transact business with the administration: join public tenders, seek financial support for investments etc.	Ministry of the Economy, Labour and Social Policy	end 2004
Design procedure of awarding the status „Complies with Poland's Gateway Standards" to websites and promote the scheme and its logo.	Ministry of Scientific Research and Information Technology	end 2003

Source: "Strategy for Informatization of Poland".

Graph E18. Level of electronic public services in Poland and in the EU in 2002 (in per cent)

L	PL	B	NL	IS	I	EL	D	A
15	19	23	37	38	39	39	40	40

F	UK	E	P	DK	S	N	FIN	IRL
49	50	50	51	59	61	63	66	68

Source: Cap Gemini Ernst & Young Polska, www.pl.cgey.com

Graph E19. Level of development of electronic public services on the central and local level in 2002 – interaction with business and individuals.

Central administration business	39%
Local administration business	26%
Central administration individuals	15%
Local administration individuals	17%

Source: Cap Gemini Ernst & Young Polska, www.pl.cgey.com

*Graph E20. Users of electronic public services in 2002 in selected countries (as per cent of population)**

Hungary	Poland	Latvia	Lithuania	Malesia	Japan	United Kingdom
3	4	8	8	12	13	13

Turkey	Slovak Republic	Czech Republic	Italy	South Korea	Germany	France
13	14	18	20	23	24	25

Ireland	Spain	Tajwan	India	Estonia	Hong Kong	New Zealand
26	26	30	31	31	37	40

Netherlands	United States	Australia	Canada	Finland	Wyspy Owcze	Denmark
41	43	46	48	49	52	53

Norway	Sweden	Singapur
56	57	53

Source: Taylor Nelson Sofres, www.tnsofres.com

Box E2

Poznan, a large city in the Western part of Poland, has recently introduced an Internet based application for business registration. Soon more business services are to follow. Poznan authorities are now waiting for the new Act on Business Activity, which will allow for Internet-based application for a much larger number of business-oriented procedures.

From: http://www.city.poznan.pl/msp

Box E3. "Public Administration Online 2003" survey

According to a second edition of a survey "Administracja Publiczna w sieci 2003" (Public Administration Online 2003) of web sites of 66 public offices – 15 ministerial, 16 voivodship offices, 16 local government authorities, and 18 cities – done by a NGO "Internet Obywatelski" (Citizens Internet), still there is not a single public administration web site, which would be interactive, i.e. where it would be possible to download documents, fill them in, and re-send to the respective authorities. Only a few regional public administration web sites offer documents downloads. Most web sites do not offer search capabilities in foreign languages (English), although half of web sites surveyed had an English language version. None of the web sites offered enhanced access for disabled people (hearing and sight impaired). All in all, despite all the shortcomings, the authors conclude that some progress has been made since the first report from 2002. Nonetheless, the authors call the state of development of the public administration web sites as "embryonic".

Source: Citizens Internet web site http://www.egov.pl/_baza/waes2003/raport_summary.pdf

Table E7. Number of local authorities with web sites

	1998	**1999**	**2000**	**2001**	**2002**
Rural communes	183	275	455	583	618
Urban communes	320	440	631	637	664
Powiats		154	349	267	295
Total	503	869	1435	1487	1577

Source: From http://www.egov.pl/opracowania/statystyki.php

Table E8. Proportion of local authorities with web site in total as of the end of 2002

Leaders	**%**	**Laggards**	**%**
Opolskie	93,0%	**Podkarpackie**	36,2%
Małopolskie	72,6%	**Świętokrzyskie**	32,3%
Śląskie	66,1%	**Lubelskie**	28,2%
Dolnośląskie	58,6%	**Podlaskie**	28,0%
Lubuskie	57,8%	**Łódzkie**	26,5%

Source: from http://www.egov.pl/opracowania/statystyki.php

Table E9. Objectives and timetable for delivery of electronic public services – "Strategy for Informatization of Poland"

Poland's Gateway	The level of e-delivery of key public services reaches the average European standard.	end 2005
	Potential effectiveness of public administration improved by 40%	end 2005
	Procurement demands of central government agencies are „pooled" and orders are placed electronically.	end 2004

Source: "Strategy for Informatization of Poland"

Graph E22. Annual spending on IT in the public administration in selected European countries in 2001 (in EUR per capita)

Poland*	Germany	France	Italy	United Kingdom	USA	Spain	Singapore
2.4	4.0	5.0	8.3	9.2	15.1	17.8	77.5

Source: Gartner Group, www.gartner.com

Table E10. Agenda for informatization of the public administration - „Strategy for Informatization of Poland"

Action	Ministry Responsible	Deadline
Draft an action plan detailing measures connected with creation, integration and rationalization of databases kept for registers of population, vehicles etc.	Ministry of Internal Affairs and Administration in collaboration with the Ministry of Finance (POLTAX)	Q2/Q3 2003
Draft (update) the action plan connected with the Register of Medical Services	Ministry of Health	Q1/Q2 2003
Develop a nationwide data model	State Committee for Scientific Research in close collaboration with relevant ministries	end 2003
Upgrades to databases and realignment with uniform data models and communication standards	Ministries responsible for individual databases	2004-2005

Source: „Strategy for Informatization of Poland"

Table E11. Agenda for informatization of the public health sector – "Strategy for Informatization for Poland"

Actions	Ministry Responsible	Deadline
Evaluate legal environment for transfer of patent data and use of electronic communications in delivery of medical services	Ministry of Health	end 2003
Adjustments to Law	Ministry of Health	mid 2004
Draft recommendations for hospitals and outpatients wards on electronic patient-related data transfer	Ministry of Health	mid 2004
Launch a competition for best deployment of electronic communications in provisioning of e-health services	Ministry of Health, jointly with academics	mid 2004
Draft projects leading to implementation of the best ideas and secure funding to support them.	Ministry of Health	end 2004

Source: "Strategy for Informatization for Poland"

Graph E23. School access to the Internet in selected European countries
As percent of schools, 2000 - 2001

Poland			Czech Republic		Hungary	
Vocational	**Primary**	**Secondary**	**Primary**	**Secondary**	**Primary**	**Secondary**
20	50	70	20	95	77	95

EU	USA
80	95

Source: Ministry of Education in Poland, Czech Republic and Hungary, Eurobarometr 2001.
Note: for the EU and the US Internet penetration of primary and secondary schools combined.

Box E5. "The Strategy for Informatization of Poland" on distance learning (quoted):

"Distance learning offerings may broadly be divided into two types of packages – fully fledged tertiary level courses of study and shorter courses e.g. vocational or professional training. Tertiary level courses, and especially those involving award of professional degrees and titles are subject to regulation by the State and inclusion of distance learning studies among courses eligible for official recognition may trigger the need for legislative changes. It should be noted that the new proposed e-delivery is akin to the already known and officially recognized extramural courses and hence a legal analysis may as well prove that tertiary level courses of study delivered as e-learning packages will be defined as an additional mode of extramural studies.

From the standpoint of service providers – institutions of higher education – it is equally important to provide funding for such studies hence it is required to include "distance learning" students in the algorithm used to determine the "headcount" of students eligible for state subsidies. In addition, it is necessary to design mechanisms ensuring that adequate standards of teaching and conduct of examinations are met as well as tie such mechanism with funding levels.

In case of other types of distance learning courses the State's role should be limited to providing aid in promotion of such efforts. It is proposed that a one-off tender (competition) be opened to providers of such offerings to identify the best distance learning package, to be then promoted as a reference standard.

Promotional efforts focused at raising the profile of distance learning initiatives should not be limited to Internet-based e-learning schemes. Drawing on the heritage of the now defunct Radio and Television University and educational programming for schools developed for public television we should strive to establish contacts with public and private broadcasters. It is necessary to accommodate proven foreign examples such as the Open University (UK).

Source: "The Strategy for Informatization of Poland"

Table E12. Agenda for "distance learning" - "The Strategy for Informatization of Poland"

Actions	Ministry Responsible	Deadline
Official recognition of courses of study delivered as distance learning packages and specify detailed conditions of eligibility	Ministry of National Education and Sports	end 2003
Establish rules governing inclusion „distance students" in the amount of subsidies granted to institutions of higher education.	Ministry of National Education and Sports	end 2003

Source: "The Strategy for Informatization of Poland"

F. INSTITUTIONAL CAPACITIES AND REGULATORY BACKGROUND

Box F1. Privatization process in Poland

As shown in Graph F1, as of September 2002 almost two thousand companies were still in the hands of the state. The speed of the privatization process was quite steady during the last decade, although it was slowly losing steam towards the end of the 1990's and in 2000-03 since the remaining companies were either hard to sell because of their dire financial situation (a large number of the state-owned companies is now close to bankruptcy), strategic interest of the state (PKO BP – the largest retail bank, power, utilities, chemical sector) and often lack of political resolve (privatization of a Warsaw power distribution STOEN in 2002 resulted in large social protests).

Graph 1. Progress of privatization: number of state-owned companies, 1992-200202

XII 90	XII 91	XII 92	XII 93	XII 94	XII 96	XII 95
8 453	8 228	7 242	5 924	4 955	3 847	4 357

XII 97	XII 98	XII 99	XII 00	XII 01	IX 02
3 369	2 906	2 599	2 268	2 054	1 993

Source: Ministry of the Treasury, www.mst.gov.pl

Table F1. A list of major telecom market companies – 2003

Company	Founded in	Ownership
Telekomunikacja Polska S.A. www.tpsa.pl	December 1991	France Telecom (33,93%), Kulczyk Holding S.A. (13,57%), state (5,91%). The rest in free float on the Warsaw Stock Exchange
Telefonia Lokalna S.A. (Dialog) www.dialog.pl	August 1997	100% KGHM Polska Miedz S.A., controlling stake in the state hands
Netia S.A. www.netia.pl	October 1991	76,01% in free float on the Warsaw Stock Exchange, Montpelier Asset Management Ltd., 6,14%, SISU Capital Ltd., 6,89%, Griffin Capital Management Ltd. (5,94%), Pioneer Pekao Investment Management SA (5,01%)
El-Net S.A. www.elnet.pl	1996	100% by Elektrim Telekomunikacja Sp. z o.o., which in turn is owned by Elektrim S.A. (49%) and Vivendi (51%)
Energis Polska S.A. www.energis.pl	September 1999	National Grid UK and Energis plc, UK (51%) and Polish Railways S.A. (49%)
Tel-Energo S.A. www.telenergo.pl,	1992	
NOM S.A. (www.nom1044.pl)	November 1999	Controlling stake of Tel-Energo S.A.
BPT Telbank S.A. (www.telbank.pl)	September 1992	Controlling stake of Tel-Energo S.A.
Telenet Sp. z o.o., www.tnp.pl	1994	Private - not available
Tele2 S.A. www.tele2.pl	2000	100% Tele2 AB, Sweden

Source: based on information from the companies

Table F2. Structure of the local calls market, the end of the third quarter 2003

TPSA	90.40%
Telenet	1.20%
El-Net	0.70%
Dialog	3.10%
Netia	2.90%
Other	1.70%
Total	100.00%

Source: Janiec (2003) based on TP S.A.

Table F3. Structure of the inter-city calls market, the end of the third quarter 2003

TPSA	87.70%
NOM	2.40%
Tele2	2.20%
Energis	3.30%
Netia	4.40%
Total	100.00%

Source: Janiec (2003) based on TP S.A.

Table F4. Average unit price of selected international calls in Poland per various operators as of September 2003 (in PLN per minute)

Country	TP S.A.	Netia	NOM	Energis Polska	Dialog
Afghanistan	6.25	5.50	3.98	3.50	6.05
Australia	2.00	1.69	1.18	1.19	2.00
Croatia	1.69	1.53	0.94	1.14	1.64
Czech Republic	1.20	1.05	0.94	0.89	1.20
Ecuador	3.46	3.15	3.98	3.50	3.36
Germany	1.20	1.05	0.88	0.84	1.20
Ukraine	1.39	1.19	0.94	1.14	1.35
USA	2.00	1.69	1.18	1.19	2.00
UK	1.20	1.05	0.88	0.84	1.20
Venezuela	3.46	3.15	3.98	3.50	3.36

Source: Data from the operators and URTiP (2003)

Table F5. Three mobile market operators in Poland

Company	Founded in	Ownership
PTC Era Sp. Z o.o. (ERA) www.era.pl	1995	51% Elektrim and Vivendi, 49% Deutsche Telekom
Polkomtel Sp. z o.o. (PLUS) www.plusgsm.pl	1995	19.61% TeleDanmark, 19.61% Vodafone, 19.61% KGHM Polska Miedz S.A., 19.61% PKN Orlen S.A., 16.05% Polish Power Grid (PSE), 5.51% others
PTK Centertel Sp. Z o.o. (IDEA) www.idea.pl	December 1991	66% TPSA, 34% France Telecome

Source: companies' websites

Graph F2. Market shares of incumbent GSM operators as of the end of III quarter 2003
a) by share in total market revenue after three quarters

PTC	36.8%
Polkomtel	36.8%
PTK Centertel	29.1%

b) by share in total number of subscribers

PTC	35.8%
Polkomtel	31.3%
PTK Centertel	32.9%

Source: Rzeczpospolita, 3 December 2003

Box F1. Alternative broadband

MPEC, a heat distribution company based in Wroclaw in southern Poland, has recently expanded its broadband Internet access services to almost three thousand customers. The monthly service fee amounts to 58 PLN per month (approx. 15 EUR), which is by far the most attractive offer for broadband in Poland (TPSA offer costs some 150 PLN for a connection of a much lower speed). The company installed fiber optics network after 1997 floods, which destroyed the then existing infrastructure.

Source: "Parkiet" daily, August 13, 2003.

G. EDUCATIONAL SECTOR

Table G4. Students in tertiary education by area of training in 2001/02 academic year (in thousand)

Area of studies	Number of students	% of total
Education	198.5	11.5%
Arts	17.8	1.0%
Humanities	138.1	8.0%
Social science	237.7	13.8%
Journalism	10.0	0.6%
Business and administration	452.4	26.3%
Law	60.3	3.5%
Life science	23.3	1.4%
Physical science	19.1	1.1%
Mathematics and statistics	15.9	0.9%
Computing	38.9	2.3%
Engineering	171.2	10.0%
Manufacturing	25.7	1.5%
Architecture	49.6	2.9%
Agriculture, forestry, fishery	33.4	1.9%
Veterinary	3.8	0.2%
Health	43.9	2.6%
Personal services	20.6	1.2%
Transport services	16.3	0.9%
Environmental protection	39.8	2.3%
Security services	2.6	0.2%
Other	99.8	5.8%
Total	**1718.7**	**100.0%**

Source: Polish Statistical Office (2002)

Table G5. Reading proficiency of 15-year-olds (2000)
Percentage of 15-year-olds at each level of proficiency on the PISA reading literacy scale

	Proficiency levels											
	Below Level 1 *(less than 335 score points)*		**Level 1** *(from 335 to 407 score points)*		**Level 2** *(from 408 to 480 score points)*		**Level 3** *(from 481 to 552 score points)*		**Level 4** *(from 553 to 625 score points)*		**Level 5** *(above 625 score points)*	
	%	**S.E.**	**%**	**S.E.**	**%**	**S.E.**	**%**	**S.E.**	**%**	**S.E.**	**%**	**S.E.**
Czech Republic	6.1	(0.6)	11.4	(0.7)	24.8	(1.2)	30.9	(1.1)	19.8	(0.8)	7.0	(0.6)
Hungary	6.9	(0.7)	15.8	(1.2)	25.0	(1.1)	28.8	(1.3)	18.5	(1.1)	5.1	(0.8)
Poland	8.7	(1.0)	14.6	(1.0)	24.1	(1.4)	28.2	(1.3)	18.6	(1.3)	5.9	(1.0)
OECD	6.2	(0.4)	12.1	(0.4)	21.8	(0.4)	28.6	(0.4)	21.8	(0.4)	9.4	(0.4)
Latvia	12.7	(1.3)	17.9	(1.3)	26.3	(1.1)	25.2	(1.3)	13.8	(1.1)	4.1	(0.6)

*Source: OECD PISA database, 2001. See Annex 3 for notes on methodology (*www.oecd.org/els/education/eag2002*) and* www.pisa.oecd.org

Table G6. Ranking of the quality of human resources in selected countries in 2002 (almost 100 countries classified)

Estonia	26
Slovenia	28
Hungary	29
Lithuania	36
Czech Republic	40
Latvia	44
Slovak Republic	49
Poland	51
Bulgaria	62
Romania	66
Turkey	69

Source: Global Competitiveness Report 2002-2003, www.weforum.org

Table G7. Participation rate in continuing education and training during one year for 25 to 64-year-olds, by level of education, type of training and gender

		Job-related continuing education and training				All continuing education and training			
		Lower secondary education	Upper secondary and post-secondary non-tertiary education	Tertiary education	All levels of education	Lower secondary education	Upper secondary and post-secondary non-tertiary education	Tertiary education	All levels of education
Czech Republic	M+F	15	29	38	22	18	36	49	27
IALS 98/99	M	22	29	44	27	27	37	35	33
	F	7	29	30	17	9	35	44	22
Hungary	M+F	5	11	35	13	6	17	49	18
IALS 98/99	M	5	11	32	12	7	16	18	17
	F	5	11	37	13	5	18	56	19
Poland	M+F	5	18	27	11	6	23	37	14
IALS 94/95	M	7	20	26	12	8	25	22	15
	F	2	16	27	9	4	22	39	13

Source: Education at a Glance, OECD 2002, Table C4.1, www.oecd.org based on the OECD International Adult Literacy Survey 1994-1998 and national household surveys on adult education and training (see Annex 3 at www.oecd.org/els/education/eag2002 for details).

Table G8. Immigration from Poland, 1991-2001

Years	**1991-1995**	**1996-2000**	**2000**	**2001**
Total	112 716	112 231	26 999	23 368
Tertiary education	2 764	1 553	322	277

Source: Polish Statistical Office (2003)

Table G9. Enrolled students of IT and telecommunications in 2002

	Day studies	**Evening studies**	**Weekend studies**	**Overall**
Information Technology (IT)	15981	2634	2535	21150
IT and econometrics	3483	498	1220	5201
Electronics and telecommunications	10002	1133	693	11828
TOTAL	**29466**	**4265**	**4448**	**38179**

Source: Polish Statistical Office (2002)

Table G10. Graduates of IT and telecommunication studies in Poland in 2002 – per voivodships

Voivodship	**Graduates in 2000/2001**
Dolnoslaskie	470
Kujawsko-pomorskie	47
Lubuskie	379
Lodzkie	629
Lubelskie	0
Mazowieckie	1 016
Malopolskie	173
Opolskie	184
Podlaskie	134
Podkarpackie	118
Pomorskie	522
Slaskie	1 335
Swietokrzyskie	102
Warminsko-mazurskie	0
Wielkopolskie	324
Zachodniopomorskie	180
TOTAL	**5 613**

Source: Polish Statistical Office (2002)

H. NATIONAL AND REGIONAL DEMOGRAPHIC DATA AND PROSPECTIVE TRENDS

Table H1. Population dynamics in the years 1950 – 2001, in thousands

Year	**Population**
1946	23.930
1950	25.008
1960	29.776
1970	32.642
1978	35.061
1988	37.879
1990	38.119
1995	38.620
2001	38.644

Source: Polish Statistical Office (2002)

Table H2. Dynamics of the population growth (10 year periods)

Time span	**Population growth (%)**
1950-1960	19
1960-1970	10
1978-1988	8
1990-2000	1
1998-2001	0

Source: Own estimates based on the data provided by the Polish Statistical Office (2002)

Table H3. Fertility rate (average number of children per women aged 19-45)

Year	**Total fertility**
1970	2.200
1975	2.270
1980	2.276
1985	2.329
1990	2.039
1995	1.611
1996	1.580
1997	1.508
1998	1.431
1999	1.366
2000	1.337
2001	1.288

Source: Polish Statistical Office (2002)

Table H4. Population and density of population according to voivodships

Voivodship	Population	
	in thousands	**Per km2**
Dolnoslaskie	2 978	149
Kujawsko-Pomorskie	2 101	117
Lubelskie	2 235	89
Lubuskie	1 023	73
Lodzkie	2 653	143
Malopolskie	3 223	213
Mazowieckie	5 067	142
Opolskie	1 088	116
Podkarpackie	2 126	119
Podlaskie	1 223	61
Pomorskie	2 192	120
Slaskie	4 866	396
Swietokrzyskie	1 325	113
Warminsko-Mazurskie	1 466	61
Wielkopolskie	3 355	112
Zachodniopomorskie	1 733	76

Source: Polish Statistical Office (2002)

Graph H3. Persons professionally active 1990-2000 (in thousands)

	Total	**Women**
1992	17 529	8 048
1993	17 367	7 998
1994	17 122	7 917
1995	17 004	7 804
1996	17 064	7 825
1997	17 052	7 788
1998	17 162	7 878
1999	17 214	7 907
2000	17 300	7 903

Source: Twarowska, M. (2000), „Wielkość, struktura i dynamika podaży pracy w Polsce w latach dziewięćdziesiątych", Academy of Economics in Poznan.

Graph H4. Participation Rate 1990-2000 (%)

	Total	Women
1992	17 529	8 048
1993	17 367	7 998
1994	17 122	7 917
1995	17 004	7 804
1996	17 064	7 825
1997	17 052	7 788
1998	17 162	7 878
1999	17 214	7 907
2000	17 300	7 903

Source: Twarowska, M. (2000), ibid.

Table H5. Population development and changes in age structure in 1970-2001

Years	Population at specific age		
	Under 20		65 years and more
	total	Of which 0-14	
	In % of total		
1970	37.2	26.5	8.4
1975	33.7	23.9	9.7
1980	32.0	24.4	10.0
1985	32.3	25.6	9.4
1990	32.5	24.9	10.2
1995	30.9	22.5	11.2
2000	27.5	18.8	12.3
2001	26.8	18.2	12.5

Source: Central Statistical Office (2002)

Table H6. Projections on dynamics of Poland's population 2005 – 2030

Year	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**
Population (in thousands)	38.643	38.788	39.005	39.003	38.657	38.025

Source: Polish Statistical Office (2003)

I. CULTURAL AND SOCIOLOGICAL DATA

Graph I1. Relative deviations of average monthly gross wages and salaries from the average wages and salaries in the national economy, 1995 and 2001 (in %)

	1995	2001
Agriculture	-5	-4
Fishing	-15	-29
Industry	10	3
Mining	93	70
Manufacturing	5	7
Utilities	45	35
Construction	-13	-10
Trade and repair	-17	-15
Hotels and restaurants	-28	-31
Transport, communication	5	14
Financial intermidiation	45	75
Public administration	24	28
Education	-11	-4
Health	-18	-20

Source: Polish Statistical Office (2002)

Table I2. International migration of population for permanent residence by sex of migrants

Specification		**Immigration**				**Emigration**			
o – total m – males f – females		**1991-1995**	**1996-2000**	**2000**	**2001**	**1991-1995**	**1996-2000**	**2000**	**2001**
Total	**o**	32 504	40 348	7 331	6 625	112 716	112 231	26 999	23 368
	m	17 121	20 554	3 893	3 505	56 686	57 443	13 740	12 251
	f	15 383	19 794	3 438	3 120	56 030	54 788	13 259	11 117

Source: Polish Statistical Office (2002)

Table I3. Direction of immigration of citizens of Poland in 1997

Country	**Share in total in %**
Germany	70
USA	11
Canada	7
Austria	3
Sweden	2
Australia	1
France	1
Other countries	5
Total	100

Source: Polish Statistical Office (2002)

Table I4. Immigration to Poland in 1997 according to citizenship of the immigrants (in % of total)

Country	**Share in total in %**
Germany	25
Former Soviet Union	23
USA	15
Canada	5
France	4
UK	3
Austria	2
Australia	2
Other countries	21
Total	100

Source: Polish Statistical Office (2002)

Box I1.

A good illustration of the low mobility of the population and lack of culture of moving in quest of employment is the recent bankruptcy of a telephone and power cable manufacturer in Ozarow, a city near Warsaw. The factory in Ozarow, together with two other cable factories located in other regions of Poland, was bought in 2001 by a private entrepreneur. The new owner decided to close the factory in Ozarow and move the whole production to two other, more efficient factories. A large proportion of the Ozarow workforce was offered to relocate to Szczecin, a large city at the Baltic Coast, in the north east of Poland. Yet, only a very small group of people decided to move. All the others mentioned various reasons for not moving: „family roots are here, children are at school, all our friends and family are here, we own a house here, while over there we would have to rent an apartment, we like this place etc.". In the end, the remaining part of the workforce, who did not accept offers to relocate, put up a strike and a blockade of the factory, which lasted for more than a year. Still, as of August 2003, the conflict is not entirely resolved. The Ministry of the Economy is now involved in finding a solution.

Table I5. Full time paid employment and average gross monthly wages by occupational groups in October 2001

Specification	**Full time paid employees in percent**	**Average gross wages in PLN**
Total	100.0	2 217
Legislators, senior officials and managers	5.1	4 898
Professionals	18.5	2 869
Technicians and associate professionals	15.9	2 246
Clerks	11.6	1 987
Service workers and shop and market sales workers	7.5	1 476
Skilled agricultural and fishery workers	0.4	1 446
Craft and related workers	19.1	1 895
Plant and machine operators	12.3	1 982
Elementary occupations	9.6	1 310

Source: Polish Statistical Office (2002)

Table I6. Individual consumption expenditure of households sector in 1995 and 2000

	1995	2000
Total	100.0	100.0
Food and non-alcoholic beverages	29.2	21.6
Alcoholic beverages, tobacco	8.9	7.2
Clothing and footwear	5.9	4.7
Housing, utilities, other fuels	19.6	23.9
Furnishings, household equipment, maintenance	4.8	4.7
Health	3.3	4.3
Transport	11.1	13.3
Communication	0.8	1.4
Recreation and culture	6.5	6.6
Education	1	1.4
Restaurants and hotels	3.3	3.2
Misc. goods and services	5.6	7.7

Source: Polish Statistical Office (2002)

K. SCENARIO OF DEVELOPMENT OF THE INFORMATION SOCIETY IN POLAND

Table K1. Assessment of factors fundamental to the development of the information society in Poland: potential for positive change in the years 2004-2010

	High	Medium	Low
Real GDP growth	X		
State of public finances		X	
Absorption of EU funds		X	
Benefiting from the EU market opportunities		X	
Inflows of FDI		X	
Quality of political leadership and IS policies			X
Reform of education		X	
Digital divide			X
Improvement in R&D and innovation culture			X
IST penetration rates		X	
Overall assessment		**X**	

Table K2. Base line scenario – impact of ICT on meeting the Lisbon objectives

	High	Medium	Low
GDP per person (PPS)		X	
Productivity per person		X	
Employment rate (objective: 70%)			X
Employment rate of older (55-64) workers (objective: 50%)			X
Business investment (measure of changes in the physical capital stock)			X
Public expenditures on Education			X
R&D expenditure (objective: 3% of GDP)			X
Business demography (rate of created/destroyed companies per year)			X
Long-term unemployment			X
Regional cohesion (measure of coefficient of variation of employment rates across regions within one country)			X
Overall assessment			**X**

Source: Based on an internal note of DG EcFin (17.07.2003) and author's own