ICEG EC
International Center for Economic Growth
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*TRENDS IN THE REGION NR. 2*

# *FACTORS AND IMPACTS IN THE INFORMATION SOCIETY:*

## *A PROSPECTIVE ANALYSIS IN NEW MEMBER STATES AND ASSOCIATED CANDIDATE COUNTRIES*

**SYNTHESIS REPORT**

**DECEMBER 2004**

**PÁL GÁSPÁR**

**ICEG EUROPEAN CENTER**

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## FREQUENTLY USED ABBREVIATIONS

**ADSL** – Asymmetric Digital Subscriber Line

**ACC-3-** Associated Candidate Countries

**B2B** – Business to Business

**B2C** – Business to Consumer

**CEC-5-** Central European Countries (Poland, Czech Republic, Slovakia, Hungary and Slovenia)

**CEFTA** – Central European Free Trade Agreement

**DAI** - Digital Access Index

**EAN** – European Article Numbering

**EITO** - European Information Technology Observatory

**ERA** -European Research Area

**ESIS** - European Survey of Information Society

**EU** - European Union

**EUR** - Euro

**FDI** – Foreign Direct Investment

**GDP** - Gross Domestic Product

**GPRS** – Global Positioning Radio System

**GSM** – Global System of Mobile Communication

**G2B** – Government to Business

**G2P** – Government to Public

**3G** – Third Generation

**HDI** - Human Development Index

**ICT** - Information and Communication Technologies

**IS** - Information Society

**ISDN** - Integrated System of Digital Network

**IST** - Information Society Technologies

**IT** – Information Technology

**ITU** – International Telecommunications Union

**LLL**- Life Long Learning

**NACE** – Nomenclature Géneral des Activités Economique dans le Communautés Européennes

**NATO** - North Atlantic Treaty Organisation

**NMS-** New Member States (of the European Union)

**NDP**- National Development Plan

**NUTS** - Nomenclature des Unites Territorielle pour Statistique

**OECD** - Organisation for Economic Cooperation and Development

**PC** – Personal Computer

**PPP** – Purchasing Power Parity

**PPS** – Purchasing Power Standard

**R&D** – Research and Development

**R&U** - Research & University

**SMEs** - Small and Medium Enterprises

**SIBIS** - Statistical Indicators Benchmarking in the Information Society

**SPD**- Single Programming Document

**UMTS** - Universal Mobile Telecommunication System

**WIPO** - World Intellectual Property Organisation

**WTO** - World Trade Organisation

# INTRODUCTION

At the European Council held in Lisbon in March 2000, EU15 Heads of Government set a goal for Europe for the next decade: to become "the most competitive and dynamic knowledge-based economy in the world", and called for Europe to rapidly exploit the opportunities of the knowledge-based economy and the Internet. In response to this call, the eEurope Action Plan was launched at Feira Summit in June 2000.

The European Ministerial Conference held in Warsaw in May 2000 recognised the strategic goals set by the EU-15 in Lisbon and decided to launch an "eEurope-like" Action Plan complementing EU political commitments in this area. In February 2001, the European Commission invited Cyprus, Malta and Turkey to join the other Candidate Countries in defining and implementing this common Action Plan, known as eEurope+.

The Sevilla Summit endorsed the eEUROPE 2005 action plan which aimed "to provide a favourable environment for private investment and for creation of new jobs, to boost productivity, to modernise public services and to give everyone the opportunity to participate in the global information society." It encompassed the then Acceding and Candidate countries, expanding its actions and its eEUROPE Steering Committee to those Countries and merging eEUROPE and EUROPE+ in one "enlarged" project.

The Institute for Prospective Technological Studies (IPTS) is one of the seven institutes of the Joint Research Centre (JRC) of the European Commission (http://www.jrc.es). It has launched since 2000 a broad foresight activity aimed at reaching a better understanding of the uncertainties and challenges associated with the Enlargement process. The "Enlargement Futures" project examined the main contemporary technological, economic, political and social drivers and their impact on science and technology policy, competitiveness and employment in the wider Union over a 10-year horizon.

In keeping with the high political priority given to Information Society (IS) developments within the Candidate Countries, a specific area of analysis was assigned to this topic. Trends in the development and use of Information and Communication Technologies (ICTs, or ISTs - Information Society Technologies) were therefore made the subject of a series of workshops and a separate research program.

Part of this research program, a project called "Factors and Impacts in the Information Society: A Prospective Analysis in the Acceding and Candidate Countries„ was launched in 2003. The overall aim was providing a series of national case-studies describing and explaining the specific issues related to the development of supply of and demand for information and communication technologies and their impacts in these countries. Each national development was to be presented as a contextualised, multi-causal, multifaceted and comprehensive picture of the most relevant aspects.

Based on these country monographs, the International Centre for Economic Growth (ICEG EC), co-ordinator of the research project, has prepared this final Synthesis Report that tries to identify the common factors affecting the development of information society and economy in the New Member States (hereafter NMS) and in the three Associated Candidate Countries (hereafter ACC-3)[1]. The Synthesis Report tries to consolidate the findings of the 13 country monographs with the research results of other international research programs (SIBIS Report, OECD, World Bank, DG INFSO). This final report consists of a review of the monographs, their prospective insights, their general conclusions and

[1] The ten New EU Member States (NMS) are the Baltic republics of Estonia, Lithuania and Latvia, the Mediterranean countries of Malta and Cyprus and the Central European countries of Czech Republic, Hungary, Poland, Slovakia, and Slovenia. These ten countries joined the EU in May 2004: Bulgaria and Romania are expected to join in 2007, while Turkey's joining timing is under analysis. Together they form the group of three Candidate Countries (ACC-3)

their policy implications. It offers comparative elements concerning factors and impacts related to the development of the Information Society, and integrates the elements developed in each single monograph but goes beyond the simple aggregation of discrete results and looks towards the NMS and the ACC-3 as a whole.

This final study is organised in the following structure: after the introduction a brief review is given in Chapter One on the relative position of the NMS and the ACC-3 in terms of the Lisbon indicators most relevant for the development of the Information Society. Six Lisbon indicators compare the NMS and ACC-3 with the average of the EU-15[2] showing both the progress towards meeting Lisbon targets and the existing gaps between those countries and the EU-15 average.

Chapter Two presents some quantitative facts about the information society (IS)) in the NMS and the ACC-3. It starts with the comparative assessment of the indicators that catch most the spread and use of information society technologies (IST) in these countries. This section is followed by the presentation of data relative to the production side of the ICT sector (ICT) and finishes with a qualitative assessment and grouping of the countries in terms of their position in IST and ICT development. This distinction between IST and ICT sides is specific to this report and further explained in the report itself.

Chapter Three presents the main factors affecting the development of the use and supply of information society technologies in NMS and ACC-3. Noting the non-negligible differences in the major economic indicators of the countries (size, economic structure, level of development, openness), their economic history (transition vs. market economy), the paper identifies those factors that have influenced IST and ICT developments in the past and will do so likely in the future. The purpose is to account for the factors influencing past developments and simultaneously provide input for policy lessons and suggestions.

Chapter Four gives a brief account and assessment of information society related government policies in the NMS and ACC-3. Chapter Five turns to those new factors that are likely to influence in the short- to medium term the evolution of information economy and society in the NMS and ACC-3. This analysis is based on the foresight assessment provided by the country monographs for the individual countries.

The final chapter Six provides some policy suggestions and conclusions based on recent experiences and identified future trends in the NMS and the ACC-3.

While much of this report is based on the data and analysis available in the thirteen Country case studies produced by the project "Factors and Impacts in the Information Society: A Prospective Analysis in the Acceding and Candidate Countries„[3] the author wishes also to acknowledge the creative and critical support offered by the external experts who have participated to the International Expert workshop: "*Enlarging the European Information Society: Potential Information Society Strategies towards Lisbon 2010 objectives"*, organized by the IPTS, DG JRC, European Commission, Seville, on18-20th March 2004.

[2] EU-15: The period of elaboration and publishing of this report has coincided with the Enlargement process itself. When referring in this report to EU-15, the author points at the 15 "former" EU Member States, as of before 1st of May 2004

[3] All thirteen reports are listed in the References and are freely available on the web at: http://fiste.jrc.es

# CHAPTER I.

## A BRIEF INSIGHT TO RELEVANT FOR IS DEVELOPMENTS IN LISBON INDICATORS IN NEW MEMBER STATES AND CANDIDATE COUNTRIES

### *a. Methodological note*

The European Council held in Lisbon in March 2000 called for the creation of a set of structural indicators, targeted at the major challenges identified at the Summit, internationally comparable at European level and offering a suitable basis for benchmarking and policy decision-making. These indicators, applied since to the NMS and the ACC-3 help gaining a first insight of their relative position and their most recent evolution in a variety of domains such as growth, employment or R&D.

The following sections aim at giving a brief overview of some of those indicators, as they relate indirectly to various facets of the Information Society development and might help understanding part of the dynamics supporting this development. They also give a first insight in the differences that exist among those 13 countries which too often are simply taken as a homogeneous group of "new" Member States or EU Candidates.

Among those structural Lisbon indicators, there is only one - ICT spending / GDP - that is directly illustrative of information society developments. It is meant to reflect in a synthetic way the uptake of Information and Communication Technologies in a given country, by measuring the relative size and by benchmarking the national investment in those technologies. The report offers some insights about this proxy in its chapter two.

Out of the remaining Lisbon indicators, most are not connected to the information society, but six may be seen as linked indirectly to this process of change: GDP per capita, labour productivity, employment rate, long-term unemployment, spending on human resources, R+D / GDP ratio.

We might consider that two of those indicators - GDP / capita and long-term unemployment rates reflect indirectly some aspects of the potential for accessing to information technologies and services by individuals. As such, they offer an insight in some aspects of the demand side of the Information Society.

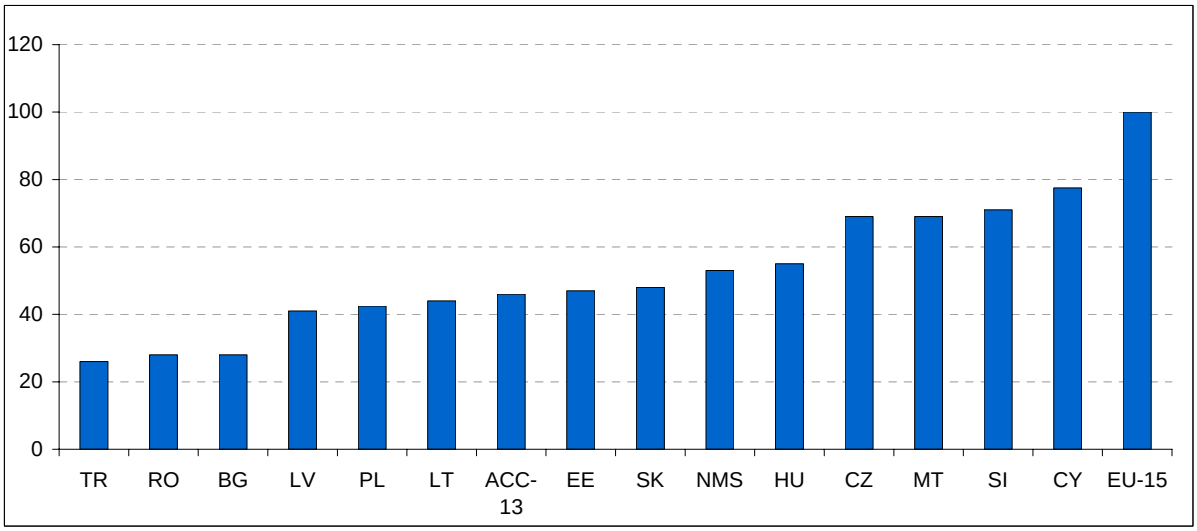
The other four indicators give rather insights in the supply side of the Information Society while pointing at factors which might influence the production of information technologies and services, and in particular their location: Labour productivity, Employment rate, Spending on human resources and Research and Development affect investment decisions, comparative advantages and competitive position of countries.

Considering that these six indicators have some indirect relation with the demand or supply side of the Information Society, it is worthwhile presenting the performance of each NMS and ACC-3 and comparing it with the EU-15 average while keeping in mind that such presentation does not cover all of the Lisbon structural indicators, neither all of the aspects of an Information Society. Still, it helps giving a first profile to each of the observed countries.

## *b. Snapshot and dynamic evolution of the selected Lisbon indicators*

The NMS and the ACC-3 represent a heterogeneous group in terms of their per capita GDP, as two of them are high-income ones (Cyprus and Slovenia), where per capita GDP on PPS approaches 80% of the EU-15 average and the gap between PPS and actual exchange rate is also relatively small compared to other countries.[4] The majority of countries are upper middle income ones, where per capita GDP is around half of the EU-15 average, while the Baltic[5] and the Balkan countries have per capita GDP levels around one third of the EU average on PPS terms.[6]

***Chart 1. Per capita GDP in NMS and ACC-3 on PPS terms, 2003 and EU 15=100[7]***




*Source: Eurostat, Country Monographs*

The differences between the new and old members of the EU are still sizeable, but have been narrowing in recent years, thanks to the growth differences between the NMS and ACC-3 countries and EU-15 and to the observed appreciation of exchange rates. The average difference in GDP growth rates for the 1998-2002 period between the average of the EU-15 and the Central European five NMS (CEC-5) was 3%, between the EU-15 average and both the NMS group, between all analysed thirteen countries and the EU-15 average was 2,5%.

When looking at the time series, the dynamic picture shows that the catch up of individual countries occurs at varying speed. Some countries experienced growth problems and their convergence has recently slowed down or has even been reversed: Cyprus, Malta, Turkey, and Poland and to some extent Czech Republic are the relevant examples. On the other hand in recent years the Baltic countries have been able to reduce the income gap the fastest, thanks to their rapid GDP growth, while the same occurred - though at smaller rates – in case of Central European economies in Slovenia, Hungary and Slovakia. The less developed associated candidate countries (Romania and Bulgaria) have also overcome most of their structural and macroeconomic problems and started to grow well above the growth rates of EU-15.

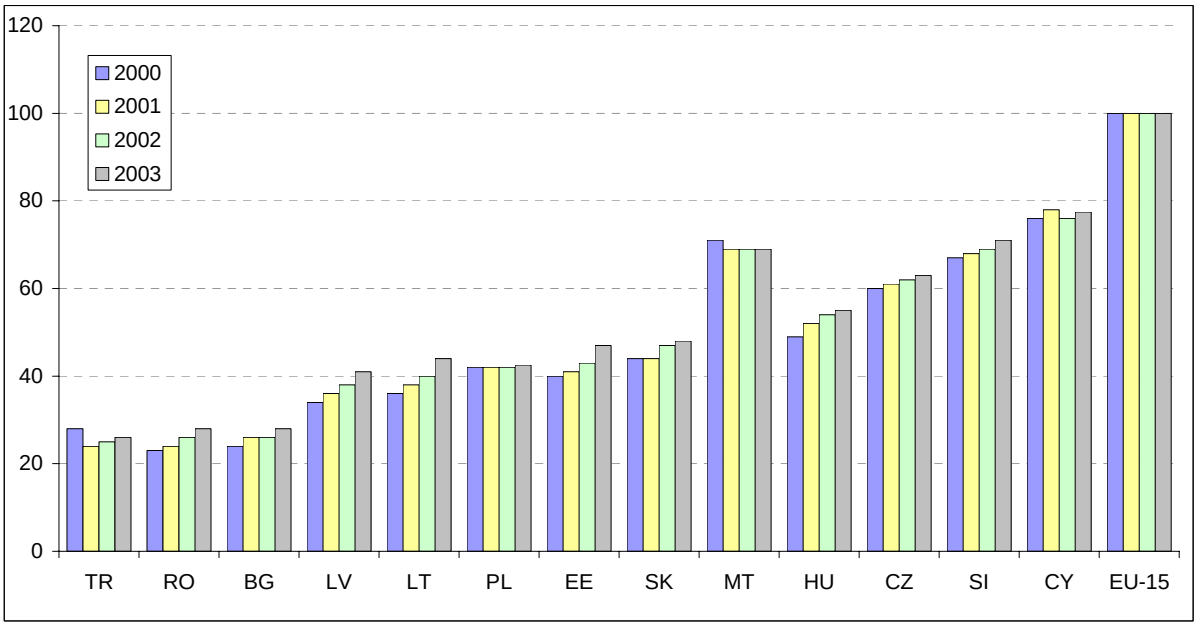
[4] The gap between the actual and equilibrium exchange rate reflects the differences in price and income convergence achieved by NMS and ACC countries. The smaller is the gap, the stronger progress has been achieved in income and price convergence and as a result actual exchange rates approach long-term equilibrium ones.

[5] With the exception of Estonia, which however has per capita GDP level lower than the CEC-5 group.

[6] In case of the Balkan countries the deviation of the actual exchange rate from the PPS one is much above the Central European levels, making the difference of per capita GDP on actual exchange rate much higher for these countries than for other accession ones.

[7] ACC-13 represents the unweighted average of the analysed 13 countries.

***Chart 2. The evolution of per capita GDP in PPS terms, 2000-2003 and EU-15=100***



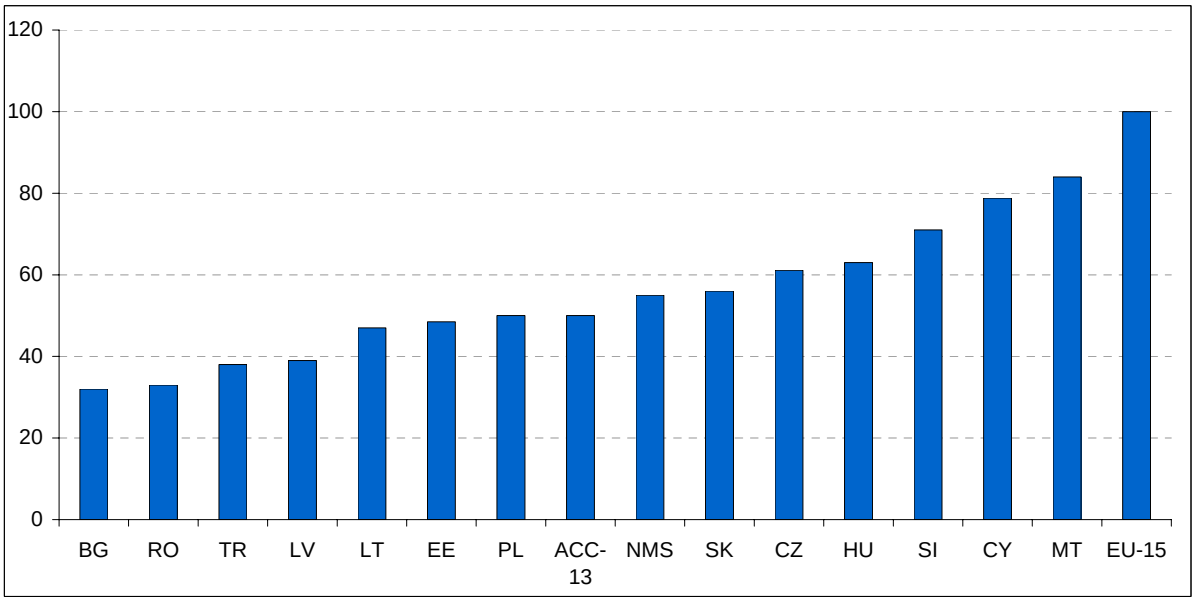

*Source: Eurostat and Country Monographs*

This structural indicator, illustrating one facet of the Lisbon's targets of growth and economic development also relates indirectly to Information Society developments. While GDP/capita, in particular when expressed in PPS terms might reflect consumption and investment capacities, and hence some aspects of the demand side for Information and Communication Technologies, it also behaves as output indicator of the economic activity, which includes the economic impact on GDP of ICT investment and use, as well as, to a smaller extent, of ICT production[8].

There is a similar pattern of distribution among the countries in terms of labour productivity levels. There are only three countries, where labour productivity exceeds 60% of the EU-15 average: Cyprus, Slovenia and Hungary. On the other hand the four poorest countries (Bulgaria, Romania, Turkey and Latvia) are also those with labour productivity levels below 40% of the EU-15 average. Two groups of countries deserve also attention because of the gap between their per capita GDP and labour productivity: Hungary, Poland and Bulgaria have recorded sizeable positive gaps between labour productivity and per capita GDP, reflecting that wage convergence has been lagging behind income one. The reverse is true for Slovenia and the Czech Republic, where labour productivity levels have lagged behind income convergence reflecting that wage growth has exceeded income. In the case of the remaining countries the two indicators are almost exactly at the same level.

[8] Such analysis is strongly supported by an extensive international literature even though its application to the 13 NMS and ACC-3 is a more recent effort. See for example Bart van Ark and Piatkowski (2004)).

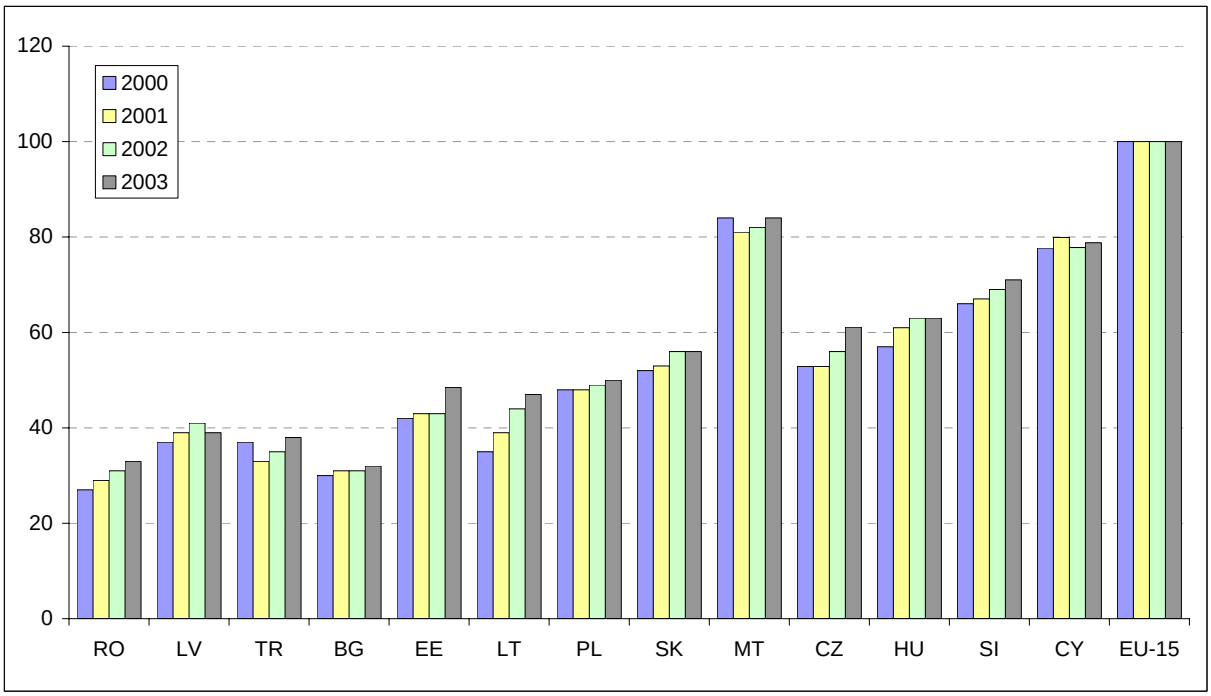
***Chart 3. The level of labour productivity in NMS and ACC-3, 2003 and EU-15=100***




*Source: Eurostat and Country Monographs*

While there is a considerable gap in the average level of labour productivity in EU-15 and NMS and ACC-3 on the Labour productivity increases in the NMS and ACC-3 have recently outpaced their growth in the European Union driven in some countries by a spectacular rise in manufacturing productivity. The faster increase in productivity is also a reflection of the catch up process and the differences in return to capital in the two country groups.

***Chart 4. The changes in labour productivity in NMS and ACC-3, 2000-2003 and EU-15=100***




*Source: Eurostat and Country Monographs*

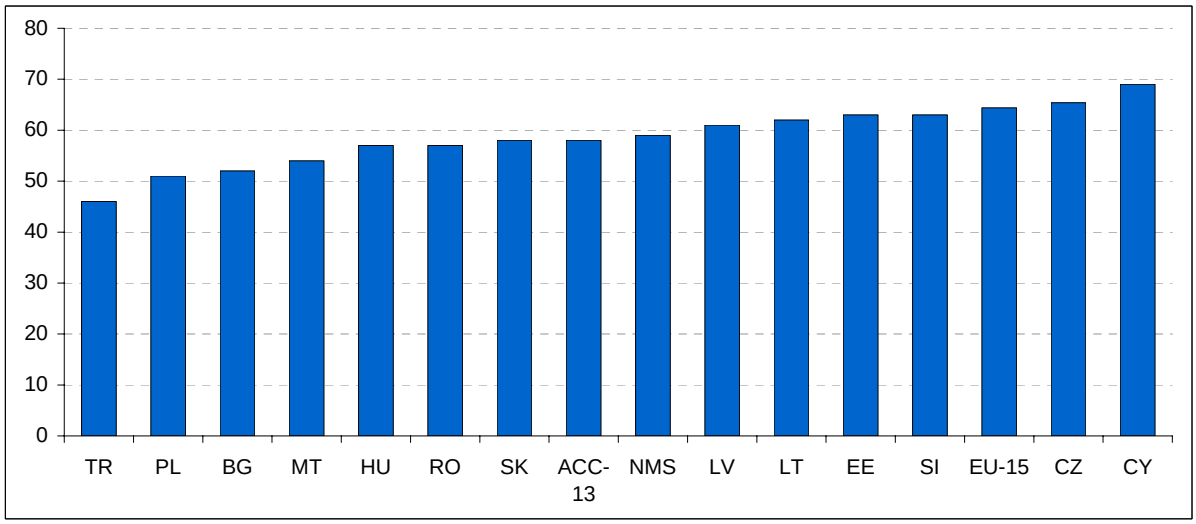
At the same time there have been quite significant differences in productivity growth of the NMS and ACC-3 countries. Several of them, at very different level of economic development (Romania, Hungary, Czech Republic, Slovenia and Lithuania) recorded spectacular rises in productivity, while others (Latvia,

Poland, Malta and Cyprus) have experienced its stagnation. In the former group this is mainly due to relatively fast GDP increases, growth of investments and accelerated capital deepening, which has been less pronounced in the latter group.

Finally, it has to be noted that increases of labour productivity have however been achieved either with unchanged employment rates (Hungary, Slovenia) or continuous reduction of employment (Poland, Slovakia, Romania).This shows the smaller contribution of output developments to productivity changes and the overwhelming effect of labour market dynamics. Even those countries, where sizeable increases in labour productivity were achieved, need to maintain this growth with the expansion of employment rate and improvement of labour market conditions.

The level of labour productivity and IS development are also closely linked to each other. On the one hand labour productivity levels and changes influence investor decisions on choosing the location of production and thus on deploying ICT industries in individual countries. Labour productivity plays an above the average role in influencing investment and location decisions of ICT producers than in other industries. On the other hand the way labour productivity increases is also linked to the demand for ISTs: labour substituting productivity increases may be accompanied by widening regional and social disparities, while labour productivity growth accompanied by expanding employment may see these differences declining. The former has a positive, while the latter, as expected, a negative effect on demand for IST .
The employment rates of all NMS and ACC-3 are well below the 70% Lisbon target and with the notable exceptions of the Czech Republic and Cyprus employment levels are today below the EU-15 average. The differences among the analysed 13 countries are narrower than in per capita GDP levels, but some countries have very low employment levels with the average level of the 13 countries being 58,2% in 2002, and New Member States around 60%. The two most sizeable economies, Poland and Turkey, have employment rates around 50%.

***Chart 5. Employment rates in the NMS and ACC-3, 2003 in %***

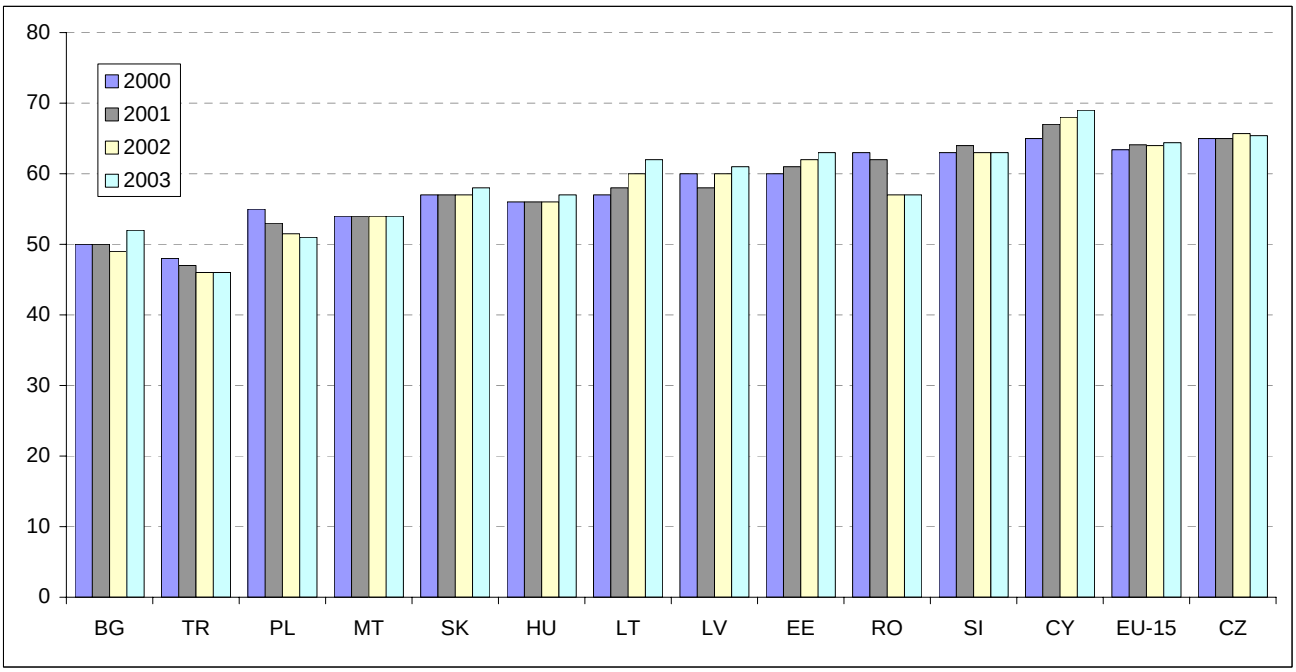



*Source: Eurostat and Country Monographs*

The evolution of employment rates also shows a different pattern in the analysed 13 countries. Some countries have experienced either declining (Poland, Romania and Turkey) or stagnating (Czech Republic and Slovenia) employment rates. Restructuring and structural reforms have been the main factors behind the worsening employment indicators of the economy, which coincided with significant slowdown and layoffs in the tradable and non-tradable sector. In other countries employment rates increased in the past four years. In some countries (Baltic countries, Bulgaria) this was related to very fast GDP growth, which

spilled over to increase in employment, while in others (Slovakia, Hungary) it has been rather due to labour market reforms and reduction of the parallel economy.

***Chart 6. Changes in employment rates of NMS and ACC-3, 2000 and 2003 in %***




*Source: Eurostat and Country Monographs*

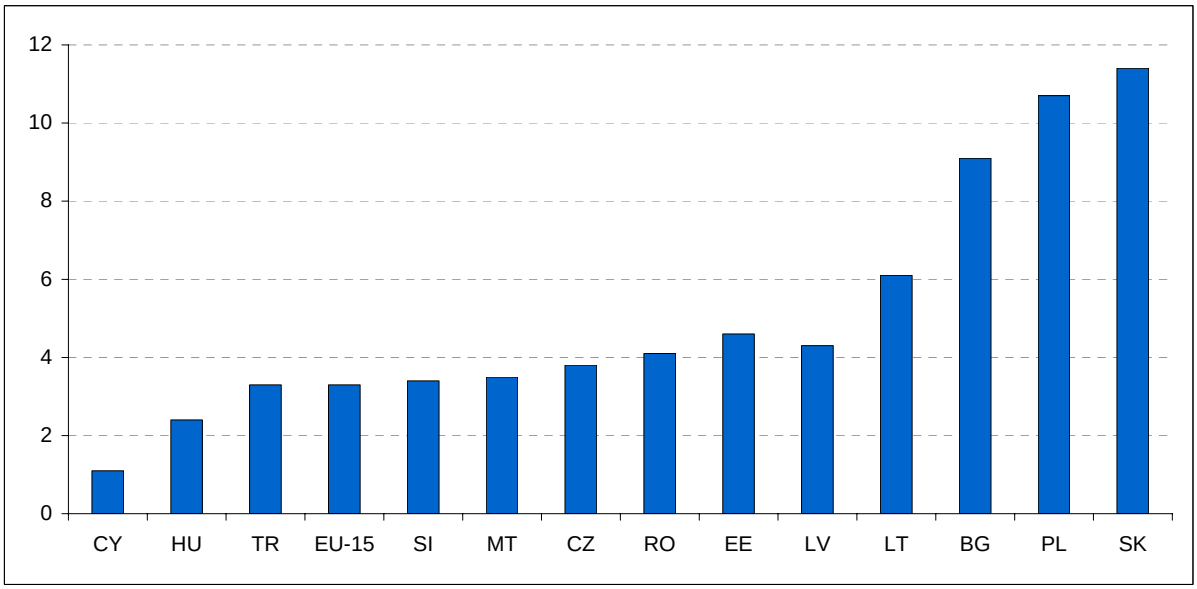
Another important Lisbon indicator reflecting labour market conditions is the share of long-term unemployed among total unemployed. Similarly to the EU-15 countries there are significant differences among the NMS and ACC-3, but their level of long-term unemployment is above the former EU-15 Member States. This is due to the impact of several factors, among which the most important are the overall higher unemployment rates, ongoing structural changes and remaining labour market rigidities.[9]

While there are five countries where long-term unemployment is below or around the EU-15 average (three small countries (Cyprus, Malta and Slovenia) and two economies with low unemployment rates (Hungary and Romania), in the remaining countries long-term unemployment is much higher than among the EU-15 countries. In the Baltic countries it is almost twice, while in countries with high unemployment rates (Bulgaria, Poland, and Slovakia) it is more than three times higher than the average of the EU-15.

While these countries show significant variation in regional unemployment rates, there is a positive correlation between the level of unemployment and long-term unemployment on the one hand and the dispersion of unemployment rates at NUTS-2 levels on the other hand. Economies with higher unemployment and long-term unemployment rates (Bulgaria, Slovakia and Poland) have higher differences in unemployment rates between the individual regions.

[9] Higher unemployment rates and structural transformation increase the number of those who get out of the labour markets with low probability of return, while labour market rigidities increase the costs of labour search.

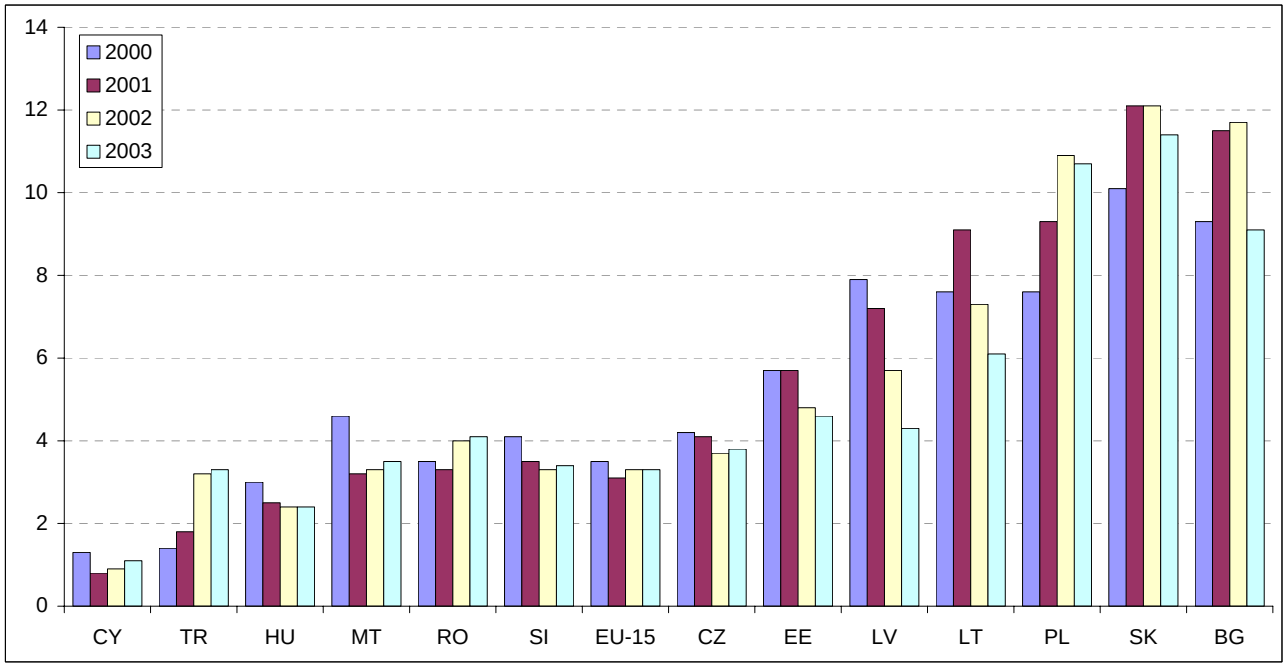
***Chart 7. Long-term unemployment rates in the NMS and the ACC-3, 2003 in %***




*Source: Eurostat and Country Monographs*

While the level of long-term unemployment is considerably higher among the NMS and ACC-3, there is a positive sign that it has mainly declined in recent years in the analysed countries. Strong declines were recorded in all Baltic States and Bulgaria, while in countries which had long-term unemployment rates close to the average of EU-15 the decline was more gradual. Accelerating growth, changes in labour market regulations, sometimes exit of the unemployed from registries stand behind the observed declines. However, the two countries with the highest long-term unemployment rates (Slovakia and Poland) have so far been unable to transform the acceleration of economic growth to job creation and due to ongoing structural changes experience only a limited decline of the rate.

***Chart 8. Changes in long-term unemployment rate in NMS and ACC-3, 2000-2003 in %***

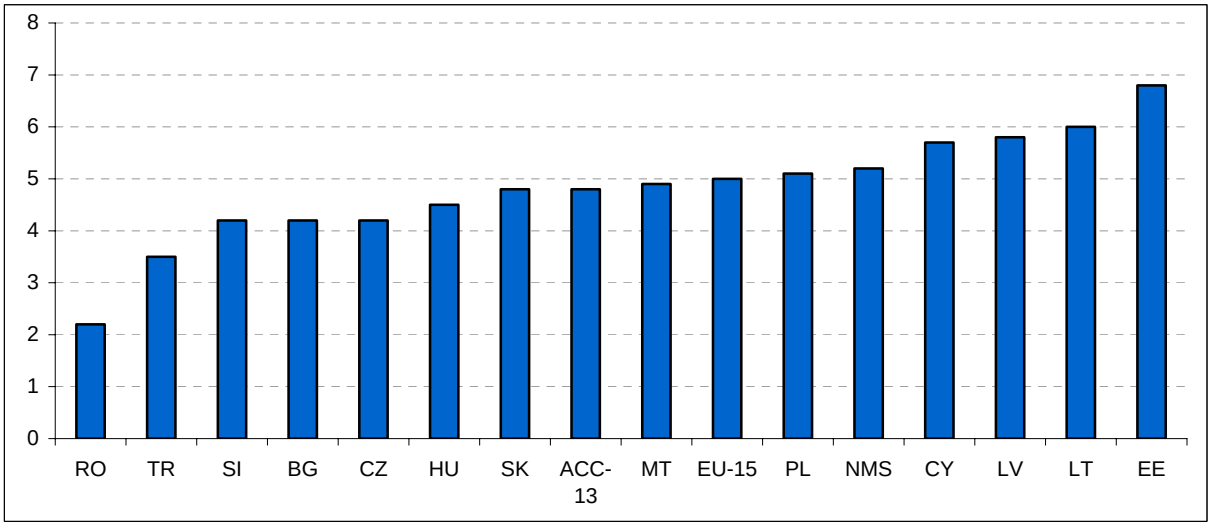



*Source: Eurostat and Country Monographs*

Employment and long-term unemployment rates have a direct link to information society, mainly related to the demand for IST. Both indicators are strong reflection of regional, social differences and give some hints about the likely equity in access to IST services and goods. While other factors matter too, generally countries that have higher long-term employment and share of population out of the formal labour markets, have lower penetration rates for information society indicators. On the other hand labour market distortions and difficulties may have negative effects on the information economy too: high long-term unemployment and low employment rates can serve as a reflection of structural problems, which may reduce the willingness of domestic and foreign investors ("wait and see" attitude) to invest in the ICT sectors.

Human resource spending in the 13 analysed countries is close to EU-average, with the exception of Turkey and Romania which spend much less. On the contrary, the Baltic countries spend more relatively on human resources than other NMS and the EU-15. While there are differences between the countries in the quality of spending on human resources, in quantitative terms its level is close to the Lisbon targets. In general, this performance reflects the strong past preference given in Eastern European economies to education and human resource development.

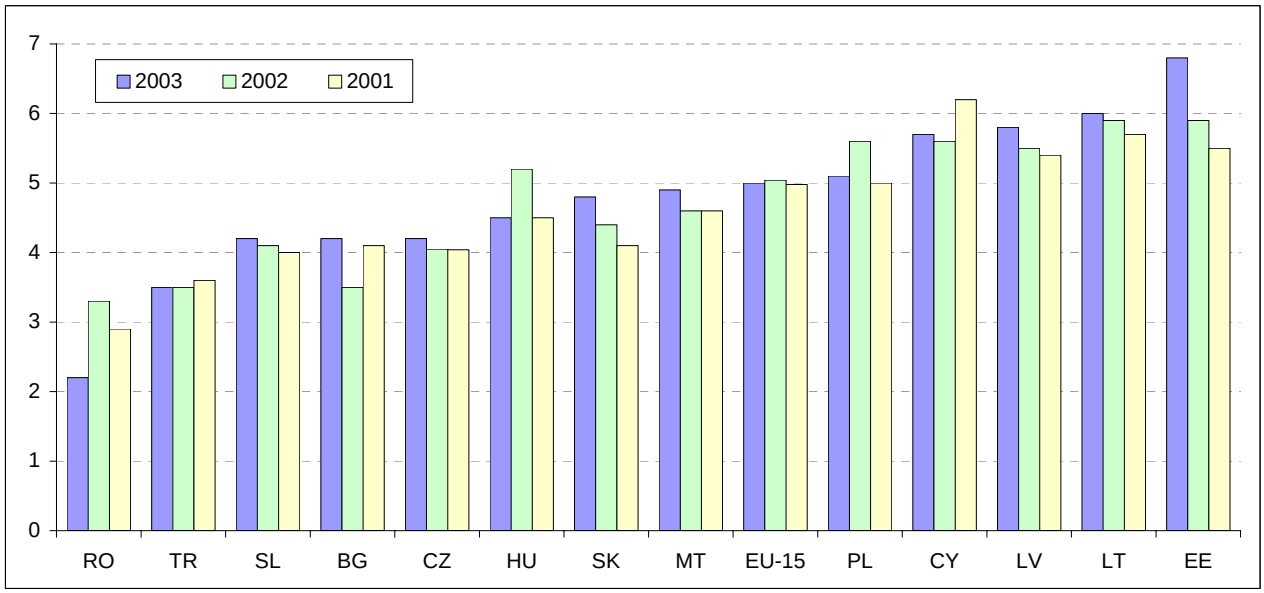
***Chart 9. Spending on human resources in NMS and ACC-3, in 2003 in % of GDP***




*Source: Eurostat and Country Monographs*

The annual changes in the spending on human resources are country specific with two discernible groups of countries. In the first group comprising mainly from Slovakia, Estonia, Malta and Latvia spending in absolute terms has increased in recent years reflecting an increasing attention of policy makers towards education and human resources. In the majority of the analysed countries however, spending rates relative to GDP declined as a sign of growing fiscal tensions, reduction of both private and public sources for human resource spending.

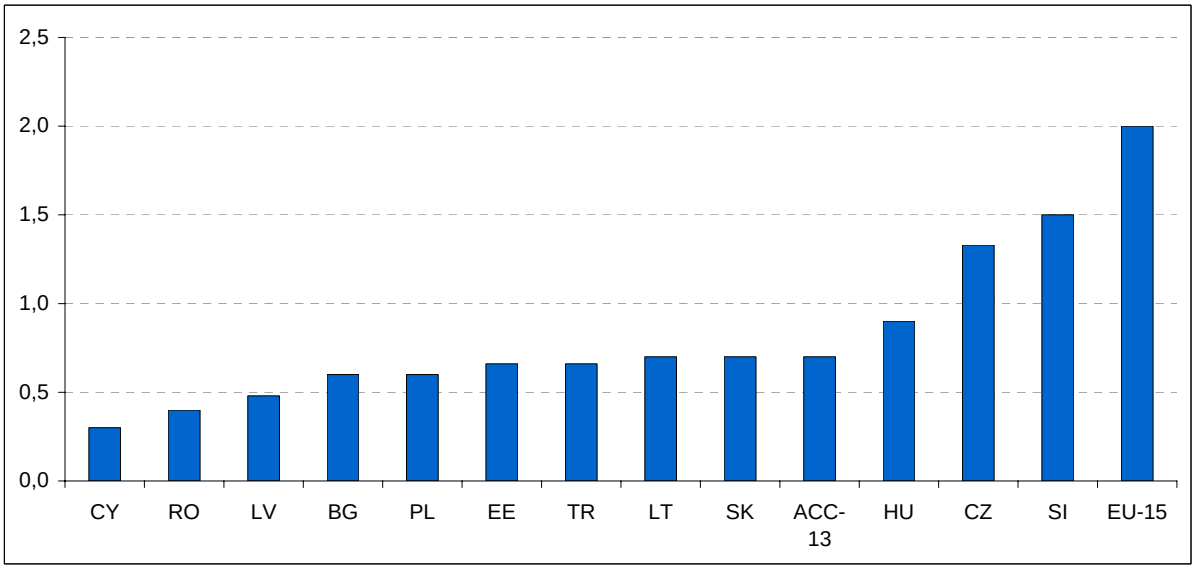
***Chart 10. Changes in spending on human resources of NMS and ACC-3, between 2001-2003 in %***




*Source: Eurostat and Country Monographs*

The case of R+D expenditures differs completely from the spending on human resources, as in the former case the vast majority of countries are well below both the past EU-15 level and Lisbon targets. Most of the economies devote exceptionally low share of their GDP to research and development: with the exception of Slovenia and the Czech Republic the levels are below 1% and in most cases around 0,5%. Moreover, as the country studies show, these expenses have been devoted mainly by the public sector and the share of corporate sector in R+D is smaller as compared with the European Union shares[10].

***Chart 11. R+D/GDP ratios in the NMS and ACC-3 in 2003 in %***



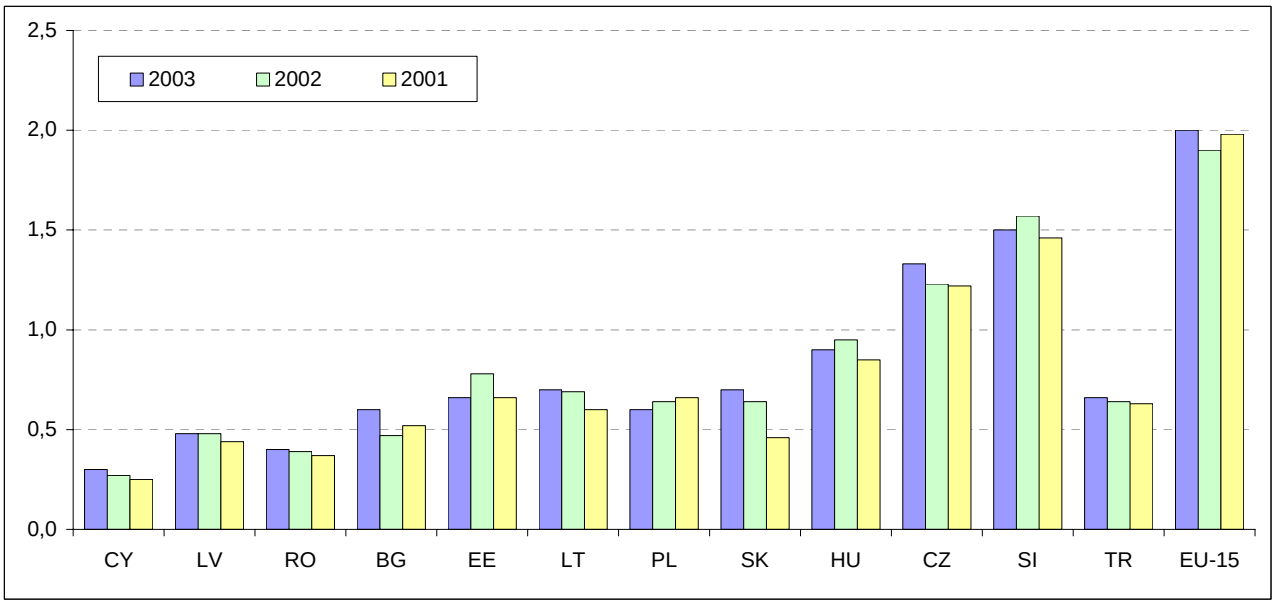

*Source: Eurostat and Country Monographs*

The recent annual changes in R+D expenditures are not very spectacular, which is understandable reflecting the low capacity of NMS and ACC-3 spending level. The annual variations mainly reflect the

[10] This situation is in a sharp contrast with the recent findings of an OECD study dealing with sources of economic growth in the OECD countries. The OECD concluded that the vast majority of R+D spending in advanced countries was carried out by the private sector, while governments play a small and decreasing in time role in R+D financing. OECD (2003).

fiscal constraints and spending levels allowed by the underlying fiscal balances, as the share and level of corporate sector R+D is very low in total spending.

***Chart 12. Changes in R+D/GDP ratios in NMS and ACC-3, 2001-2003 in %***




*Source: Eurostat and Country Monographs*

Both spending on human resources and R&D expenditures have a strong effect on the information economy. Spending on human resources and on R+D determines the quality of human and physical capital, thus it affects the return on capital and the decision of investors concerning the location of their investments. The better is the supply of human and physical capital the more likely the investment decision would favour the given country.

The few structural indicators presented above already reflect that there are significant differences between the 13 analysed countries. This should be considered while reading the report: e.g. behind the general term of NMS (New Member States) there are countries with very different level of economic development, structural indicators, short-term structural tensions and long-term catch-up potential.

Within the analysed thirteen countries there are three major groups: the Central European economies (CEC-5), the Baltic countries (included in NMS) and the South Eastern-European ones (included in ACC-3). The data confirm that together with Cyprus the Central European economies have the smallest gap with the EU-15 average in most Lisbon indicators with the South Eastern European economies lagging considerably behind the first two groups.

***Table 1. Comparative position of analysed countries with six Lisbon indicators, 2003***

| | CZ | CY | EE | HU | LV | LT | MT | PL | RO | SK | SI | BG | TR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| GDP per capita, (EU 15=100) | 60 | 80 | 42 | 57 | 34 | 39 | 55 | 39 | 25 | 47 | 74 | 28 | 22 |
| Labour productivity, (EU 15=100) | 56 | 80 | 43 | 66 | 32 | 43 | 55 | 48 | 30 | 54 | 71 | 38 | 34 |
| Employment rate, (%) | 66 | 64 | 62 | 57 | 60 | 60 | 54 | 52 | 62 | 57 | 63 | 49 | 51 |
| Spending on human resources /GDP (%) | 4,2 | 5,7 | 6,8 | 4,5 | 5,8 | 6 | 4,9 | 5,1 | 2,2 | 4,8 | 4,2 | 4,2 | 3,5 |
| R+D/ GDP (%) | 1,3 | 0,2 | 0,7 | 0,8 | 0,4 | 0,7 | 0,2 | 0,7 | 0,4 | 0,7 | 1,5 | 0,6 | 0,7 |
| Long-term unemployment (%) | 3,7 | 1,5 | 4,8 | 2,4 | 5,8 | 7 | 2,6 | 11 | 3,2 | 12 | 3,3 | 12,6 | 1,8 |

*Source: Eurostat and Country Monographs*

The NMS group is closer to the EU-15 values only in two indicators out of the six: in spending on human resources (thanks to high spending level in the Baltic countries) and in employment rates (where the low employment rate of Poland biases the Central European figure downwards).

***Table 2. The relative position of certain country groups vis-à-vis the EU-15 averages***

| | EU-15 | CEC-5 | NMS | ACC-13 |
|---|---|---|---|---|
| GDP per capita (EU-15=100) | 100,0 | 55,4 | 52,7 | 46,3 |
| Labour productivity (EU-15=100) | 100,0 | 59,0 | 54,8 | 50,0 |
| Employment rate (%) | 64,0 | 58,8 | 59,5 | 58,2 |
| Spending on human resources/GDP (%) | 5,0 | 4,6 | 5,2 | 4,8 |
| R+D / GDP (%) | 1,9 | 1,0 | 0,7 | 0,7 |
| Long-term unemployment (%) | 3,5 | 6,5 | 5,4 | 5,5 |

*Source: Eurostat and own calculations*

During the last decade, a progress has been observed with most of Lisbon indicators in the NMS and ACC-3, especially in terms of GDP per capita, employment rate, productivity levels. But in most of Lisbon indicators there still exists a very significant gap between the EU-15 and NMS/ACC-3, and in many indicators the convergence has been and will be a slow process.

Moreover, in several cases one should devote particular attention to the qualitative data in addition to comparing quantitative indicators: the example of the share and distribution of spending on human resources is certainly a strong one. Some aspects of the following chapters intend to fulfil such aim.

# CHAPTER II.
# IST DEVELOPMENTS IN THE NMS AND ACC-3

## I. Methodological introduction

The analysis of the information society development in the NMS & ACC-3 is presented in this report under two major headings respectively called "Information Society Technologies" (IST) and "Information and Communication Technologies" (ICT). While "IST" refers mainly to the presence, measurement and activity of the demand and user side of those technologies, "ICT" aims rather at encapsulating a synthetic insight upon the Information and Communication Technologies production, the services and industrial sector activity and its related usual economical indicators. The distinction is rather didactic and methodological and serves in the report a support to a better understanding of the observed facts.

The level of IST development intends to reflect the extent and readiness in the analysed countries to use information and communication technologies and services by households, companies and governments. IST reflects the demand side of the information and communication technologies sector, showing the extent to which these services and goods are used by the society, have penetrated to everyday life and application. The IST indicators are more social than economic ones, reflecting that they show the level of pervasiveness of the information society in a given country's everyday life, and strongly depend on its social conditions: regional and social divide, education structure, type and structure of governance and policies, etc.

The level of ICT development assesses the ICT production capacity of a given country with the help of traditional economic indicators. These indicators show the contribution of this sector to variables as employment, production, exports and investments. ICT indicators are almost exclusively economic ones as economic conditions (evolution of production factors, their costs, changes in comparative advantages and competitive position) influence their level. Since these factors are country specific, there might be a much bigger difference in the level of ICT development between countries at similar level of economic development. At the same time the evolution of ICT indicators depends also on global trends as the growth of the ICT sector strongly hinges on corporate sector's decision concerning the allocation of production between individual and competing countries.

There is a two sided causality link between level of economic development and ICT sector. On the one hand there is an extensive theoretical and empirical literature that links differences in growth and productivity performance of advanced economies to the differences in the spread of ICT sector and of the use of information and communication technologies in traditional, non-ICT producing sectors (Stiroh, K.J. (2002), McGuckin R.H. and B. van Ark (2001), Bart van Ark (2004)). At the same time advanced countries with developed institutional and financial structures, competitive production tends to be the major producers in the ICT sector.

Income level and structural features influence besides the geographical location of the ICT producing sectors the evolution of IST indicators as well. The level of incomes and employment, the share of societies' spending on human resources, the regional and income inequalities strongly influence the level of demand for IST, the extent and equality of the spread of information society. The way these channels work strongly depends on the economic and societal features of the respective countries, which are partly taken up by the Lisbon indicators.

These two group of indicators, IST and ICT, measure different aspects of the information society. As this report will show there is no strong correlation between the level of development in IST and ICT indicators: among the analysed countries it is possible to find countries which are strong in both, one or neither group of indicators.

The following quantitative description of the Information Society is therefore divided into IST and ICT indicators.. It is meant to be illustrative rather than offer a precise measurement. Much has already been said in scientific literature about the difficulty for gathering internationally comparable data in such areas. With time (and much effort on behalf of the National Statistics institutes!), this might improve, but as far as today, we'll have to satisfy our curiosity with the available.

The multiplicity of indicators also needs a word of explanation. While some of these indicators are correlated, their use is justified as they measure various aspects of the demand for IST or supply of ICT. Their presence and some redundancy help giving a more detailed and balanced picture of the level of development of the information society in the given country.

Finally, while one could wish so, these indicators cannot serve as a basis for an integrated benchmarking exercise. There is no available model aggregating and moderating those indicators in a relevant and valid way. At best, the observable trends and complementarities help us identifying countries which obviously are at the forefront of Information Society related changes.

The level of IST development will be illustrated with the help of the following indicators.

1. *ICT market value*: it represents the total end user spending measured per capita, in relation to GDP and in total value. It shows the volume of the ICT market. The study also gives a division of the ICT market to communication technologies and information technologies.

2. *Fixed line access*: a view on total access measuring the degree of telecommunication penetration in the analysed countries.

3. *Number of personal computers per 100 of total population:* measures the technical capacities for access to Internet which is considered as the most representative activity of the IS up to now..

4. *Percentage of households online*: measures the extent of access of the household sector to the Internet.

5. *Number of total Internet users per 100 of total population* : captures the share of those who regularly use the Internet, home or elsewhere.

6. *Number of Internet hosts per 100 of total population*, which shows the extent to which there is a demand for IST services in the household and enterprise sectors.

*7. Number of Public Access Points*: a complementary access mean that helps better understanding the above indicators of access and use

8. *Costs of access to the Internet* measured by the relative costs for households to purchase a personal computer and by the access prices to the Internet.

9. *The share of broadband access to total* reflecting the quality of access

10. The *Digital Divide Index* to measure how equally population gets access to these products and services.

These IST indicators can be divided into three major groups. Some of them give a rough picture about the technical background allowing the users to get access to information services. Other indicators show the extent to which the society has been able to integrate the use of the Internet and the extent of the usage of Internet services. The final group of indicators gives information about the conditions of access: its quality, its division between different groups of society and the costs paid by the users.

The report uses four indicators when it assesses the level of development of the ICT sector in NMS & ACC-3.

1. Share of ICT sector in total production

2. Share of ICT sector in total exports.

3. Trade balance in ICT-s: a related indicator which shows whether the ICT production is only a processing one or has higher value added content.

4.Share of ICT sector in total employment.

In this chapter, each of those indicators and their position are compared to the EU-15 average, which gives a first but fragmented view about the contemporary state of development vis-à-vis the advanced European countries and also among the NMS & ACC-3. Second, a brief approach to the statistical series of each of those indicators, as far as available, helps appreciating the trajectory of that development and the importance of the trend. A conclusive part, introducing additional qualitative views from the national monographs, helps consolidating a view on the given indicator.

These attempts for a quantitative approach of IS developments show similarities with, as well as differences, from earlier attempts carried out by international organisations and benchmarking reports (*OECD, the World Bank, United Nations, eEurope+, etc.).* Among similarities some data were brought from other recent analyses and databases to fill the gap with unified data existing from the Country Monographs. Second, some of the indicators have already been used in other analyses and reports, but in case of the current report the data are more recent and broader.

However, the data set covered both by the Synthesis Report and the Country Monographs present some unique features compared with earlier assessments. First, the data is unique as it covers all the NMS & ACC-3 and is supported by 13 Country Monographs. Second, the data cover a much larger variety of reliable sources than earlier reports, trying to incorporate the latest annually comparable data (2003) for all countries. Finally, there is a clear distinction both at analytical and descriptive quantitative level between the use and the production side.

# *II. IST developments in the NMS & ACC-3*

## 1. The ICT market value

*a. Methodological note*

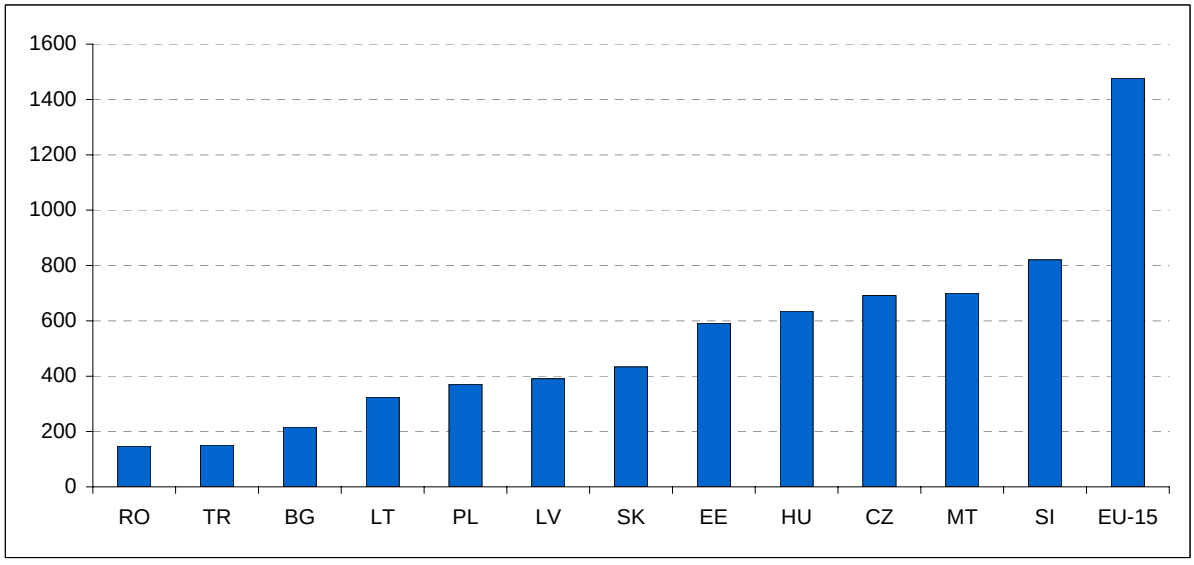
The ICT market value represents the end user spending on information and communication technologies. The data available in national currency units have been converted to Euro using the end year average exchange rate. Two indicators were used to assess the relative importance of the ICT market value: ICT market value at current price per capita in Euro, and ICT market value relative to GDP at current market prices.

*b. Snapshot*

There is a considerable difference between the positions of the NMS & ACC-3 in relation to the EU-15 average, when using the two indicators of ICT market value. The level of ICT spending per capita has been considerably lower in the NMS & ACC-3 than in the EU-15 both in absolute levels and as an average of the two country groups. The extent of the gap is reflected by the fact that the country with the highest value in per capita spending among the NMS & ACC-3 group, Slovenia, exceeds only Portugal and Greece which have the lowest levels among the EU-15 countries.

The order of countries shows that higher income countries within the NMS and theACC-3 group had highest spending levels, as all of them - except Estonia - have upper middle income levels. The ranking was closed by Romania, Turkey and Bulgaria, which have the lowest per capita income levels among the analysed thirteen countries. The ranking of countries in terms of ICT spending corresponded to income ranking. This is a usual, important but insufficient observation as other indicators reversely challenge such basic ranking.

***Chart 13. ICT market value per capita in Euro, in 2003***




*Source: Eurostat 2003 and Country Monographs*

While the average and absolute levels of ICT spending per capita differ considerably between the NMS & ACC-3 and EU-15 countries, the variation within these two groups of countries is almost identical. Among the EU-15 countries per capita ICT spending in 2002 varied between 693€ in Greece and 2390€

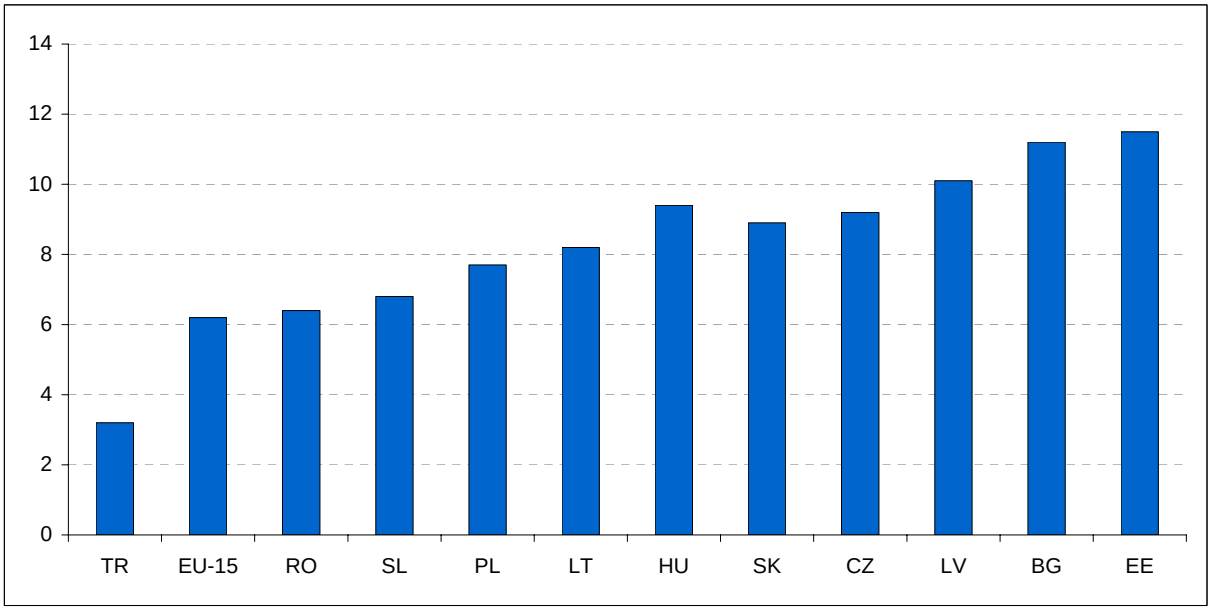
in Sweden, and the 1:4 relation was similar in case of the NMS & ACC-3 countries with Romania (less than 200 €) and Slovenia (almost 800 €) being at the edges of the spending line.

The ranking of the countries changes considerably when the market value is measured in relation to GDP. While the upper middle income countries in the NMS & ACC-3 group generally maintain their ranks (with the exception of Slovenia, which considerably falls back), the two lower income countries (Bulgaria and Lithuania) gain a much better position in ICT market value to GDP ratio than in the per capita one. Second, the EU-15 average (6.1%) is underperformed only by Turkey, while other analysed countries have higher shares than the EU-15 average. Finally, – similarly to EU-15 countries – the differences between the individual countries in terms of market value to GDP are much smaller (1:2 instead of 1:4) than in the case of their analysis per capita.

Several closely related factors explain the differences in absolute levels and ranking of individual countries in case of those two alternative indicators. The main reason for the difference in ranking and relative position vis-à-vis the EU-15 lies in the difference of income and ICT price convergence of the NMS & ACC-3. Income levels - even measured on Purchasing Power Standards - are much lower in these countries than in the EU-15. The same is true for price levels in general, but ICT prices have converged fast due to import liberalisation and equalising effect of international trade. Sizeable differences in income levels coincide with small or no difference in price levels, which explains why spending (measured on market value) to GDP is much higher in the NMS & ACC-3 than the EU-15 average. This also explains why the lower income countries – as Bulgaria or Latvia – have much better ranking in case of ICT market value to GDP than in per capita terms.

The differences in income and price convergence may also explain the sizeable gaps in ICT market value per capita levels. Similar to income convergence, wage convergence has also been relatively modest and in generally below price and income convergence. As a result per capita spending is much lower as the relationship between prices and disposable incomes available for ICT spending is worse in the NMS & ACC-3 than in the EU-15.

***Chart 14. ICT market value in % of GDP in 2003***

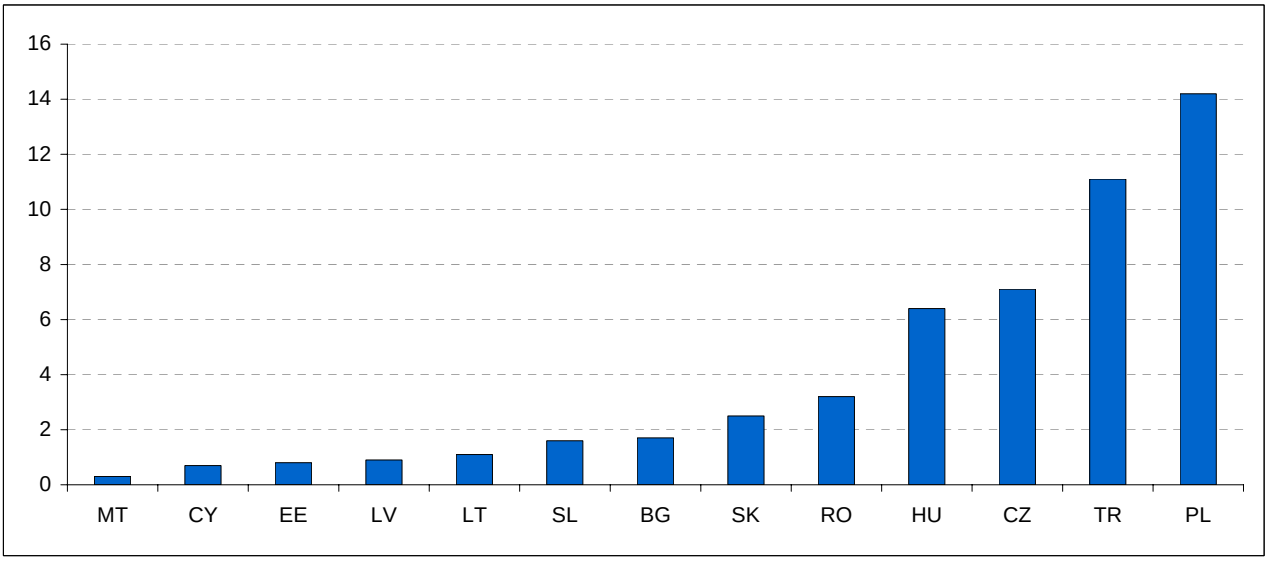



*Source: Eurostat 2003 and Country Monographs*

Looking at the size of the ICT markets in the individual countries, it can be noted that the population size of the country matters as the biggest markets are represented by the most populous countries (Poland and

Turkey) notwithstanding the fact that the per capita and GDP related level of the ICT market value is below other countries. Still, among those larger countries Romania has a fairly small internal ICT market, while among the smallest ones, Slovenia has a market value equal to Bulgaria with a population four times smaller.

***Chart 15. The size of the ICT market in the NMS & ACC-3, in billion €, 2003***

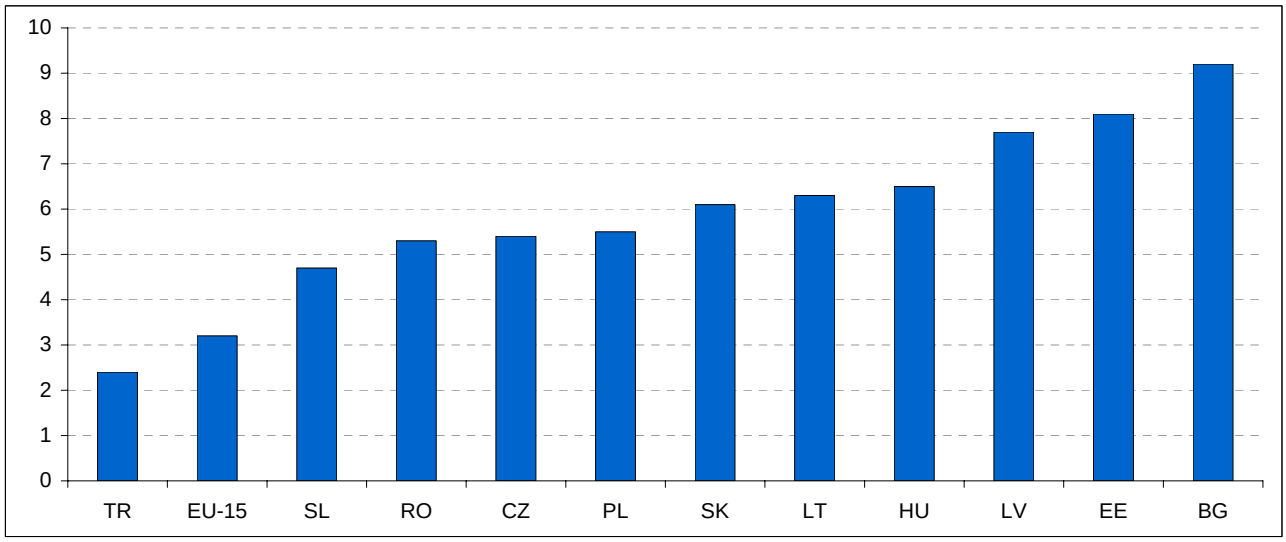



*Source: Country monographs*

When the snapshot picture of the ICT market is divided to its components an interesting picture emerges concerning the relative size and strength of the IT and CT markets in the analysed countries. The market for communication technologies shows some countries in places which differ from what will be presented later on their level of IST development. Bulgaria and Latvia have much bigger CT markets than ones implied by their income level and other IST indicators.

On the other hand Slovenia and the Czech Republic, which generally perform among the leading countries are relatively back in the ranking: this refers especially to Slovenia, where the size of the CT market is only 4,5% of GDP. These differences between the individual countries are linked to the special features of their local market, and have less to do with the general level of IST development.

***Chart 16. The size of the communication technologies measured by its contribution to GDP, 2003.***

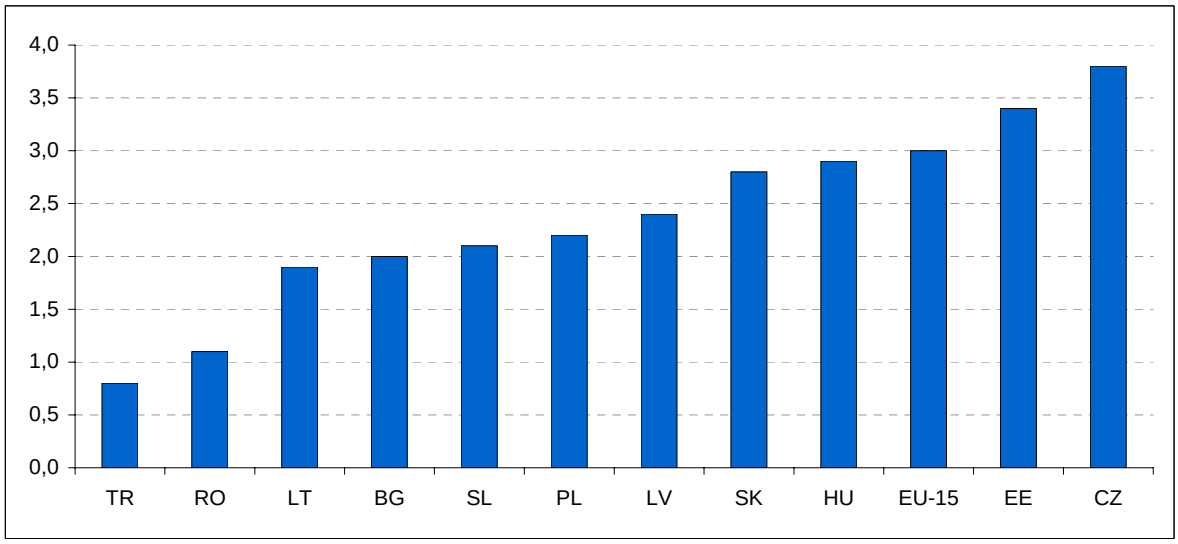



*Source: Country Monographs*

The size of the market for information technologies is generally smaller in all NMS and ACC-3 countries than the communication technologies market. The ranking of the countries in the IT market value is linked more with their traditional ranks in IST and ICT indicators and their level of economic development in general.

The ranking is led by the higher income Czech Republic, Hungary and Slovenia and Estonia, which has a much better level of IST and ICT indicators, than it would be justified by its income level. On the other hand the ranking is closed by countries that have the lowest level of income and all the three ACC countries are at the end of the ranks. The size of the IT market is a good indicator for later data showing the level of IST development in NMS and ACC-3 countries.

***Chart 17. The size of the information technologies measured by its contribution to GDP,*** *2003.*




*Source: Country Monographs*

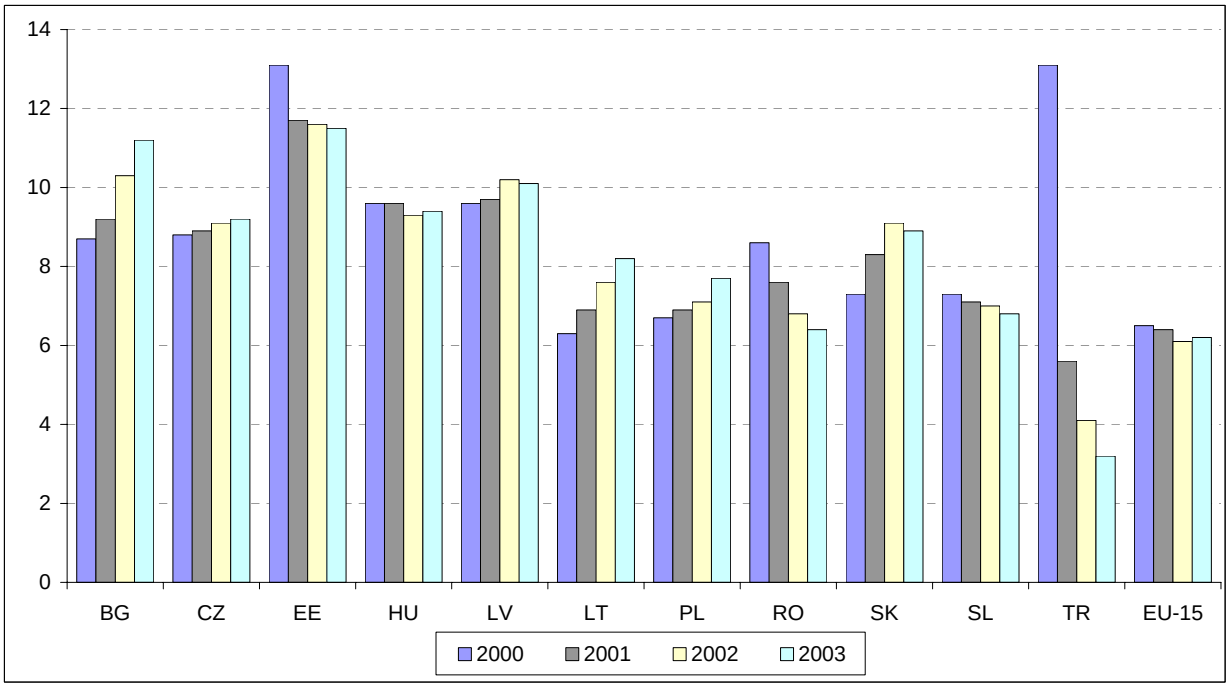
*C. The dynamic picture*

The statistical time series of the indicator show that behind a general expansion of the ICT market, the dynamics in the individual countries vary considerably. In the three countries where ICT market value to GDP increased without interruption, the driving factors have been both the increase of disposable incomes and the expansion of corporate sector ICT related investments. The expansion of the market in Poland and in Slovakia is closely linked to their recent privatisation-restructuring policies, as these were followed by significant increases in investments, which spilled over to ICT products as well. In other countries the market values were increased by the growing spending of the household sector, which was due to the increase of disposable incomes and government policies supporting the purchase of information and communication technologies (Hungary). In those countries which recorded declining levels of ICT market value to GDP this was due to temporary saturation of market coinciding with fast expansion of GDP.

When looking at this dynamic picture it should also be considered that these countries had relatively favourable economic growth rates in recent years. Therefore even in case where the ICT spending to GDP stagnates, this may coincide with a significant increase in nominal volume and real value of the ICT markets. Hence, all countries analysed have witnessed in recent years a sizeable expansion of ICT markets, driven by the increase of disposable incomes and greater emphasis put on ICT related investments both by the corporate and household (and recently also public) sectors. Moreover, when one compares the data back to 1998, most countries– even those, where the market value to GDP ratio stagnated or even declined in recent years – show levels that are by 25-45% higher in 2003 than in 1998.

This nominal and real expansion of the ICT markets should a priori be considered when noting that the evolution of ICT markets in size to GDP has been different in the analysed countries. There were some countries which have recorded sizeable increases in the level of their ICT market to GDP: the most notable cases were Lithuania, Poland and Slovakia. In the majority of countries relative figures have however stagnated in recent years: this holds especially for Hungary, Czech Republic and Latvia, while two countries – among them Estonia, which had in relative terms the highest level – show a small decline in ICT market value to GDP.

***Chart 18. The evolution of ICT market value in some countries in % of GDP, 2000-2003***




*Source: Eurostat 2003 and Country Monographs*

## 2. Access path and fixed line penetration rates

*a. Methodological note*

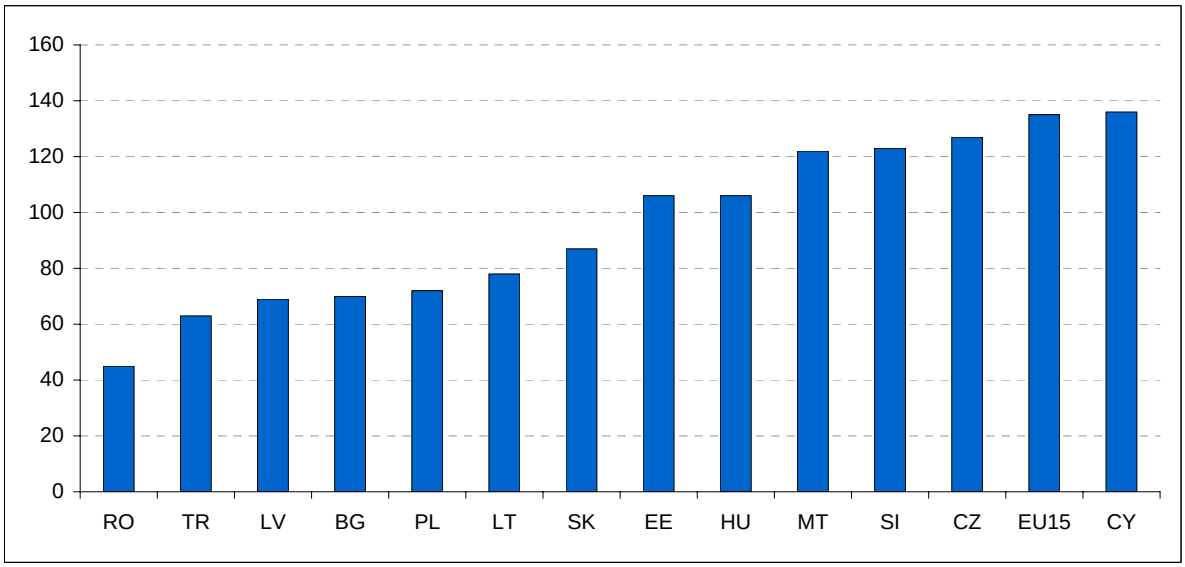
Access path reflects the cumulative number of fixed and mobile phone lines. Such indicator illustrates indirectly the extent to which a society has access to communication services from a technical point of view. Fixed lines being the main channels to the Internet and to related IS applications , several IST indicators hinge on their level. Therefore a separate presentation of fixed line access is also provided.

*b. A snapshot*

Currently access paths in the NMS & ACC-3 are lower than in the EU-15 countries: in 2003 the aggregated fixed and mobile lines resulted in a 135 per 100 inhabitant ratio in EU-15, while it varied between 45 and 125 with an average of 75 in the NMS & ACC-3. With stock figures showing a considerable gap between the two groups, the gap narrowed in recent years.

There are important differences in access rates among the NMS & ACC-3 themselves and with the exception of the Baltic States it correlates strongly with income differences among them. Out of the NMS and ACC-3 three countries have access paths rates close to the average of EU-15, while in other countries access paths rates are much lower: this is especially true for the ACC-3 and among NMS for Poland.

***Chart 19. Access paths in the NMS and ACC-3 and EU-15 average, in 2003 in %***




*Sources: Eurostat, 2003 and Country Monographs*

There is one structural characteristic, which makes the figures of NMS& ACC-3 different from the EU average: access path is the result of *high* mobile and *much lower* fixed line penetration. This observation goes equally for countries, which privatised "early" their incumbent operators (Hungary, Estonia or Lithuania) or postponed it (Czech Republic, Poland among others).

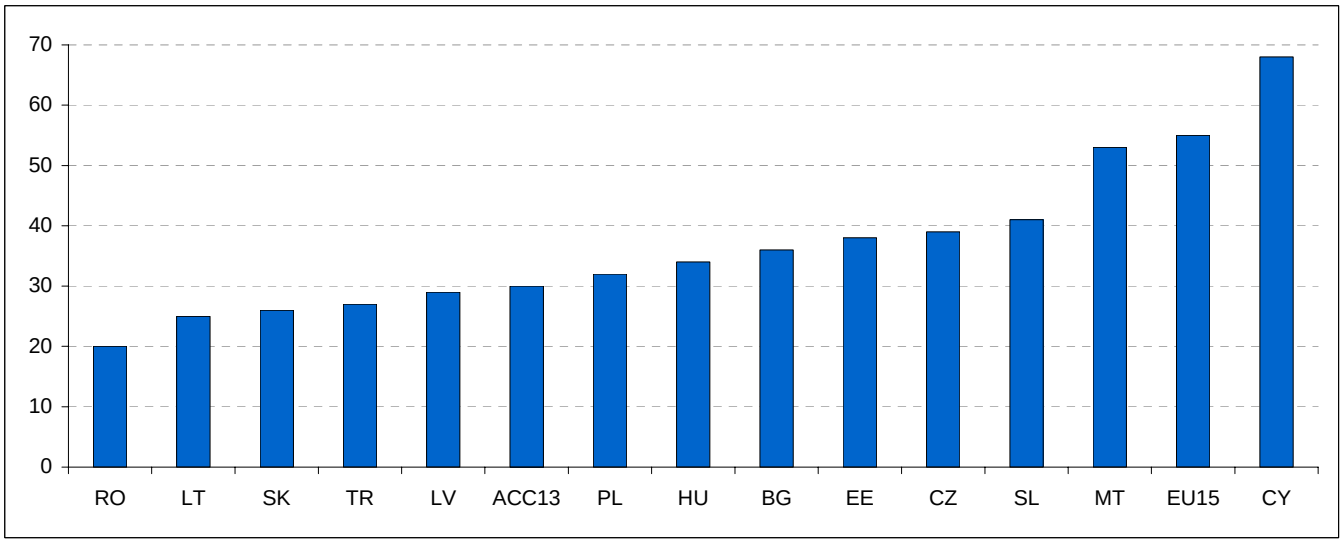
The next chart shows fixed line penetration rate per 100 citizens in 2003: besides the household sector it also includes the business one as it represents all fixed line subscriptions. The fixed lines penetration rate shows smaller variation than the access path, but the differences between the countries are still significant: the fixed line penetration rate of the Czech Republic is more than twice higher than that of Romania's. Two groups of countries lead the ranking: highest income ones (Malta, Cyprus), but also Estonia, the Czech Republic and Slovenia.

The differences between fixed line penetration rates could be traced back to various factors. First, the heritage and general level of economic development mattered: among former transition countries: some have inherited better developed telephone systems from the former regimes (Slovenia and the Czech Republic), while others much worse (Poland and Hungary).

Second, income level is an important explanatory variable as higher income countries (Cyprus, Malta and Slovenia) have higher penetration rates than lower income ones[11]. The differences also show the impact of telecommunication policies: countries fast in privatisation (Bulgaria and Hungary) reached higher penetration rates than slower ones (Romania, Slovakia).

[11] But the differences in fixed line penetration rates (with the exception of Romania) are smaller than in case of mobile penetration.

***Chart 20. Fixed line penetration rate per 100 citizens, 2003***




*Source: Country Monographs, 2003*

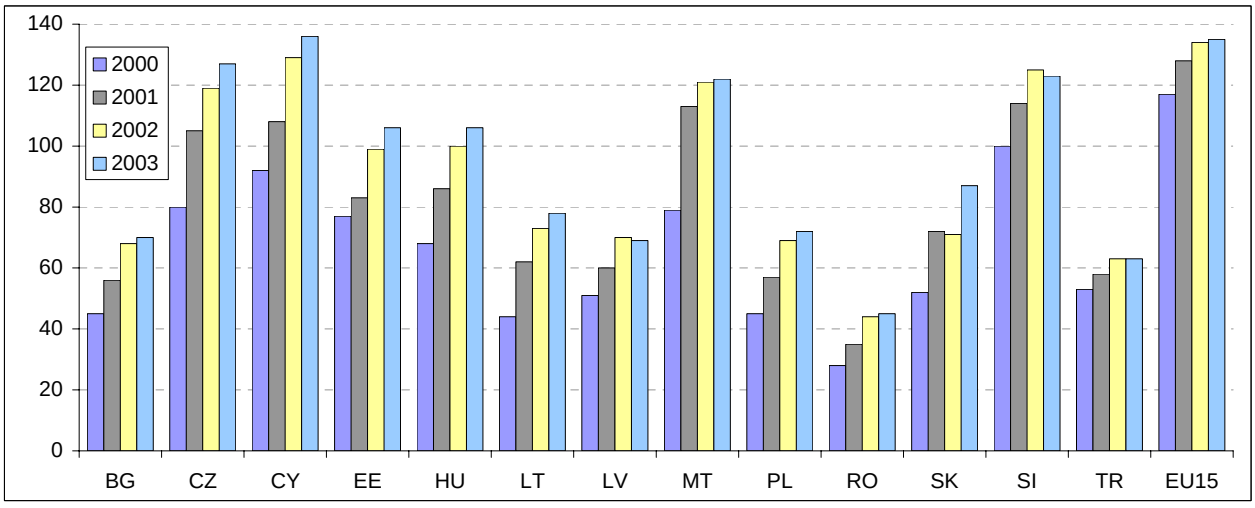
While penetration rates show country differences, quality of services matters too: in Malta penetration rate is not only higher than in other countries but Cyprus, but almost 100 percent of these lines is capable of providing xDSL services, while in the Czech Republic, Slovenia or Estonia this share is much lower. Equal penetration rates hide significant differences in technology and level of services.

There has been significant technical improvement of telecommunications services: Cyprus, the Czech Republic, Malta and Slovenia achieved complete digitalisation of their fixed line telecommunications system, while Hungary, Lithuania reached a 90 % digitalisation rate. In other countries this progress has been more modest. In Bulgaria and Romania the share of digitalised lines remains below 40% and the forecast is to accede 50% only by 2005.

*c. The dynamic picture*

Access paths rates in recent years have increased significantly: this applies equally to the countries which had in 2000 and in 2003 the lowest (Romania) and the highest access path rates. The growth has been accompanied by differentiated rhythms in the 13 surveyed countries: Bulgaria, Hungary, and Slovakia have recorded below average, while Czech Republic above average expansion rates.

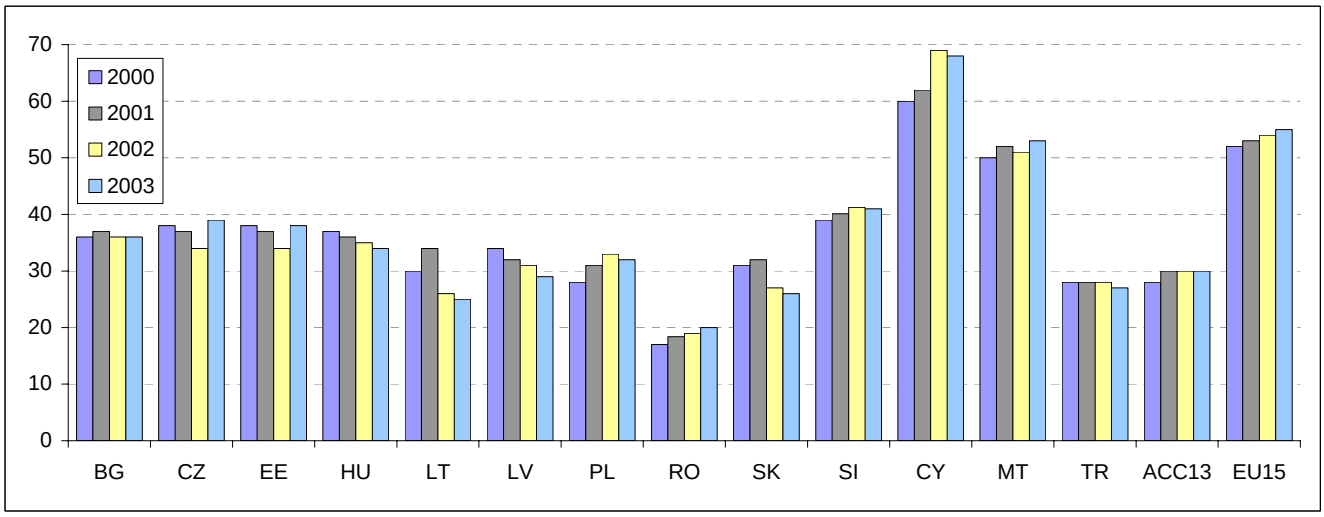
***Chart 21. The evolution of access path, 2000-2003 in %***




*Source: Eurostat, 2003 and Country Monographs*

Recent increases in access path in the NMS & ACC-3 have been driven by growth of mobile penetration, while fixed line penetration increased much slower, in some countries even stagnated. This trend is partly similar to advanced countries with two differences: the decline of fixed line penetration rates in the NMS and ACC-3 group has been slightly stronger and started from lower levels of penetration rates. The reasons are partly similar to those given in advanced economies (portability, broader and more flexible services and applications of mobile connections) but partly show specific NMS and ACC-3 factors (much higher differences in the quality of fixed and mobile services, faster declining charges, more competitive market structures in case of mobile than fixed line operators, etc.).

***Chart 22. The evolution of fixed line penetration rates, 2000-2003 in %***




*Source: Eurostat, 2003 and Country Monographs*

This weak evolution of fixed line penetration has implications for the NMS & ACC-3 countries. Mobile and fixed line communication channels are not fully substitutive. The access paths to the internet may have been weakened insofar fixed lines lost ground and new mobile access technologies do not develop and reach the market rapidly in NMS & ACC-3. more funding from local and external sources should be spent on fixed line improvements. Alternatively, public initiatives aimed at reaching further rise in fixed line penetration rates (even with public sector financial support) could be provided.

## 3. Number of PCs in total population

*a. Methodological note*

The number of personal computers per 100 inhabitants illustrates the spread of the major technical instrument to access IS services. The indicator shows the number of personal computers available for the total population, and it is a raw indicator as it does not show the differences in the quality of computers, neither their connectivity potential[12].

*b. Snapshot*

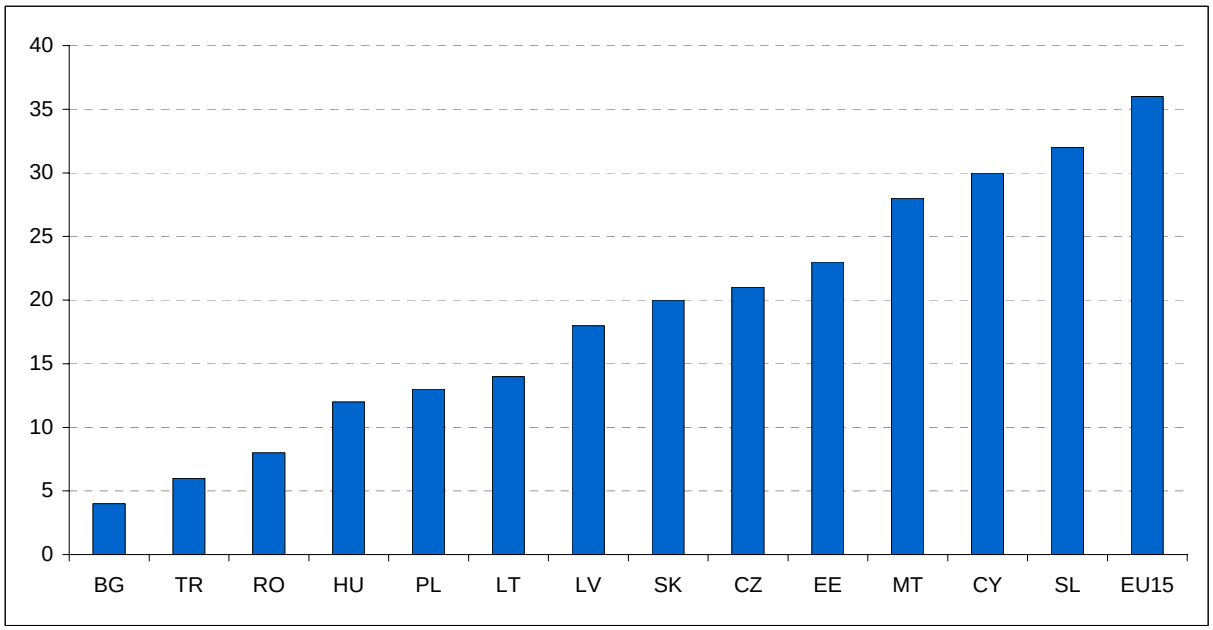
Contrary to access path and especially mobile penetration, the gaps in PC penetration rates between the NMS & ACC-3 and EU-15 are much higher and have been growing in recent years. Even in the two countries with the highest PC availability (Cyprus and Slovenia) the gap with the average of EU-15

[12] Although it can be assumed that differences in the level of indicator are positively correlated with the quality of computers used.

remains significant. The use of PCs in the NMS & ACC-3 is again strongly correlated with the income level, the analysed 13 countries can be divided into three groups.

The lower income countries (Romania, Bulgaria and Turkey) have the lowest penetration rates of personal computers, while middle income Central European countries and the two smaller Baltic States have medium level of PC penetration oscillating around 10 per 100 inhabitants. Finally, the higher income countries (Cyprus, Slovenia and also Malta) but also Estonia, have the highest penetration rates in personal computers.

***Chart 23. The number of personal computers per 100 inhabitants, 2003***




*Source: Eurostat, 2003 and Country Monographs*

Various factors explain the low level of computer penetration compared with the EU-15. The affordability and the price of computers seems to be the major factor as in relative terms (purchasing power and relative to disposable incomes) computers are more expensive in the NMS & ACC-3 than in EU-15. Second, in case of the household sector there is a vicious circle between services available online and the number of personal computers used by the population. As the eServices are relatively underdeveloped, potential users feel weaker desire or usefulness to buy computers. Third, this backwardness has not been counteracted by public policies, which until recently have not been directed to the increase of affordability of PCs. Governments have rarely used tax incentives, favourable credit or depreciation treatments or alternative fiscal measures that could have reduced the costs of access to PCs. While the market of personal computers has been fairly competitive and prices generally follow global trends with some delay, gross income gap has been too big to allow the narrowing of the gap in PC acquisition.

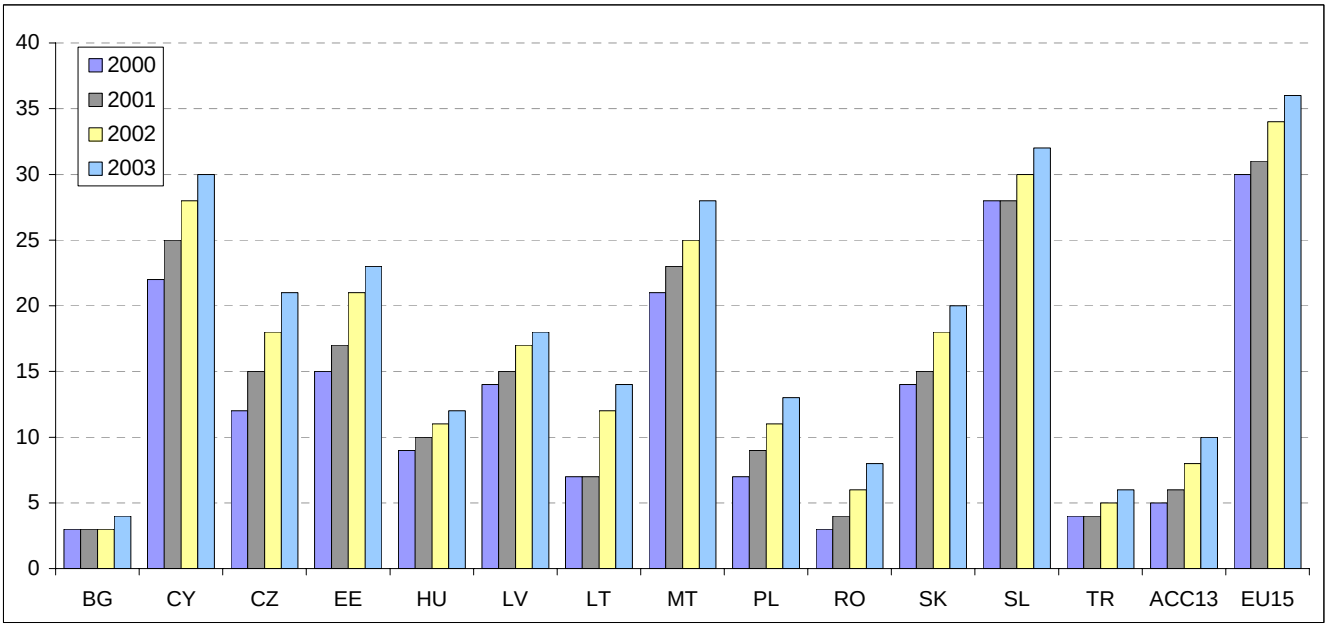
*c. The dynamic picture*

PC penetration rates have increased in all the NMS & ACC-3 in recent years. As a result Cyprus, Malta and Slovenia have PC penetration rates close to the average of EU-15. On the other hand most of the analysed 13 countries keep having considerably lower PC penetration rates and the gap between the averages for the NMS & ACC-3 and EU-15 did not always decline in recent years.

The increase in the number of computers, if any, is very gradual. Recently Estonia and Slovakia recorded an above the average growth of PCs in households, while Hungary, Lithuania, Poland and Slovenia experienced only a slight increase. The remaining countries show even stagnating PC penetration rates.

Those recent dynamics help raising some conclusions concerning PC penetration rates. First, the overall gap between EU-15 and the NMS & ACC-3 is not closing necessarily. In some cases it might be rather widening. Second, income convergence and further decline of computer prices (thanks to open markets and competition) may improve their affordability and may generate additional demand for them. However, governments could better support this process with tax credits, more attractive depreciation rules and any other fiscal policy measures to stimulate the purchase of PCs. Finally, critical levels in available services, as well as their standard high quality should be reached to reduce fixed costs and increase attractiveness to buy PCs in ways similar to the mobile phone market.

***Chart 24. The number of personal computers per 100 citizens, 2000-2003***




*Source: Eurostat, 2003 and Country Monographs*

## 4. Internet Access in the household sector

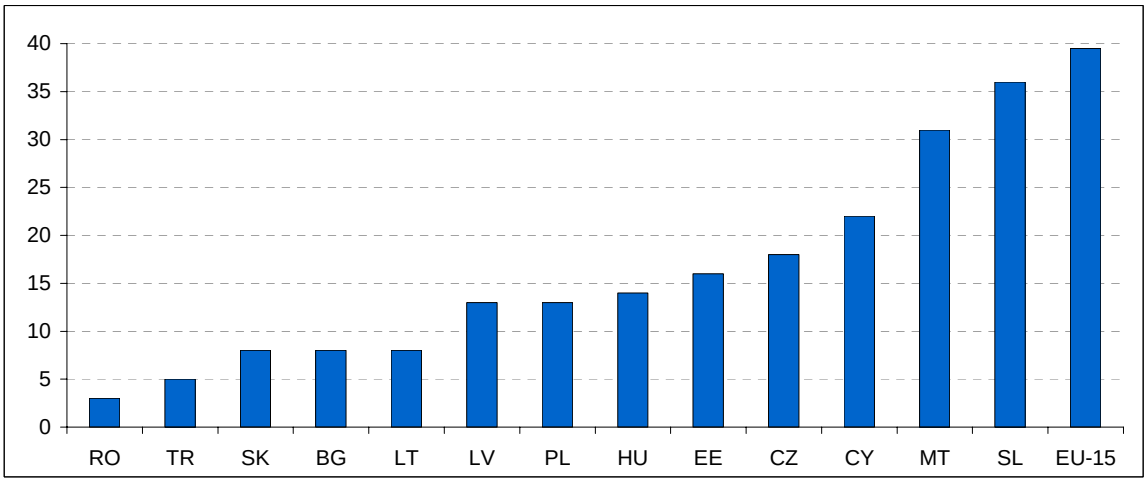
*a. Methodological note*

This indicates intends to capture the percentage of households that have access to the Internet. The figure does not discriminate between various forms of connection including cable networks, broadband or traditional phone lines, therefore it is not able to give a qualitative differentiation between the analysed countries.

*b. Snapshot*

The share of households having Internet access at home is comparably lower in the NMS & ACC-3 than in the EU-15. Out of them only Slovenia and Malta crossed the 30% threshold: the Czech Republic, Estonia and Cyprus have shares approaching one fifth of the households sector. Many countries remain under or around the 10% mark.

***Chart 25. Households online in percentage of total, 2003***




*Source: Eurostat, 2003 and Country Monographs*

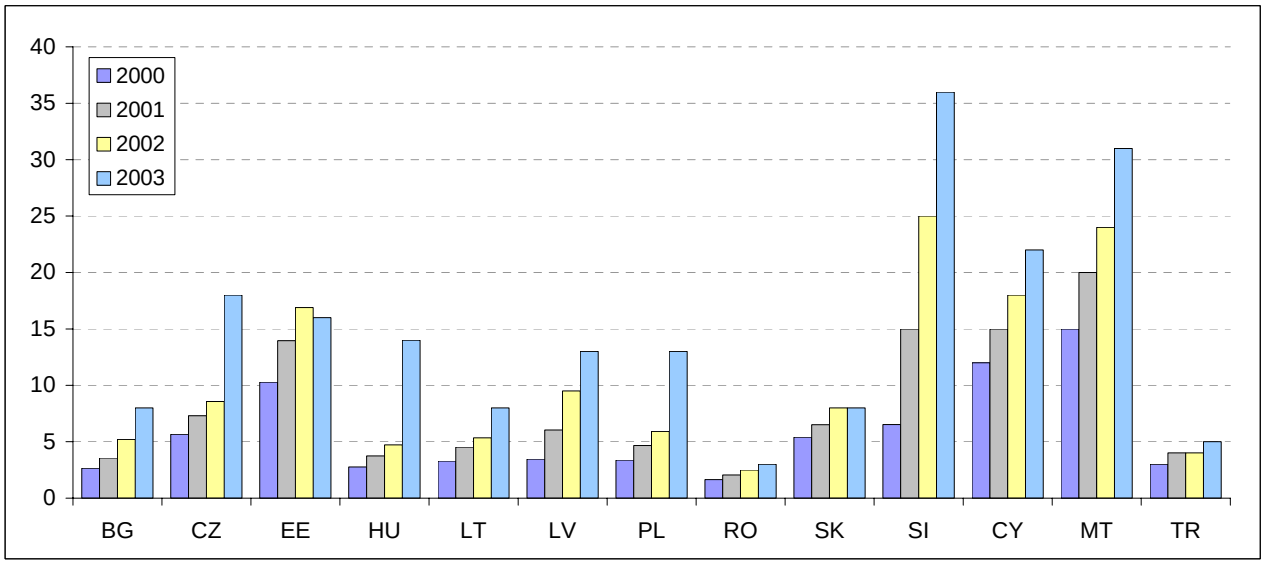
This striking low level of online households in the NMS countries may find its explanation in the low income factor, the relatively underdeveloped level of eServices, and the cost factor of Internet access (price of Internet access, price of phone calls and also of computers). Such problems are magnified by the income differences in case of Romania, Bulgaria and Turkey, which explains their very low levels of households' Internet access.

There is a strong correlation between the percentage of online households and the relative level of development measured by per capita GDP. On the other hand the correlation is also strong between the number of households online and the level of fixed line penetration rates in the NMS & ACC-3: countries with a higher level of fixed line penetration have the highest share of household sector connected to the Internet. Finally, there is also a strong correlation between the number of PCs in percentage of population and the share of households connected to the Internet, notwithstanding the fact that many of those who are connected, access the Internet from Public Access Points or other places.

*c. The dynamic picture*

While the static picture is rather negative and shows significant gaps with the EU-15, the dynamic analysis presents a steady growth in the number of households connected online to the Internet in the NMS & ACC-3. The growth rates have been significant over the recent years, the low starting levels allowing these high growth rates. There was an especially significant increase in penetration rates in 2003 in most of countries but particularly in the Czech Republic, Hungary, Poland, Slovenia and Malta. This is due to the effect of several factors including robust income growth, more targeted and ample government policies supporting the access to the Internet, and slightly declining prices thanks to enhanced competition between the Internet and phone service providers. These same factors seem to stand behind the somewhat surprising decline of the level in Estonia and its stagnation in Slovakia (slow down of income growth in the former and less supportive and generous government policies in the latter).

***Chart 26. Households online, in percentage of total, 2000-2003***




*Source: Eurostat, 2003 and Country Monographs*

Second, simultaneously the differences among the NMS & ACC-3 countries grow as the two countries with considerably higher levels of Internet access by households (Slovenia, Malta and to lesser extent Cyprus) improve rates faster than the other countries. There is no sizeable difference in the growth rate of Central European and Southeast European countries in the sample. Some countries show very fascinating speed of increase (like Hungary and Poland in 2003) while other countries have desperately low levels and rates of expansion (Romania, Turkey and Slovakia).

## 5. Use of the Internet by the population

*a. Methodological note*

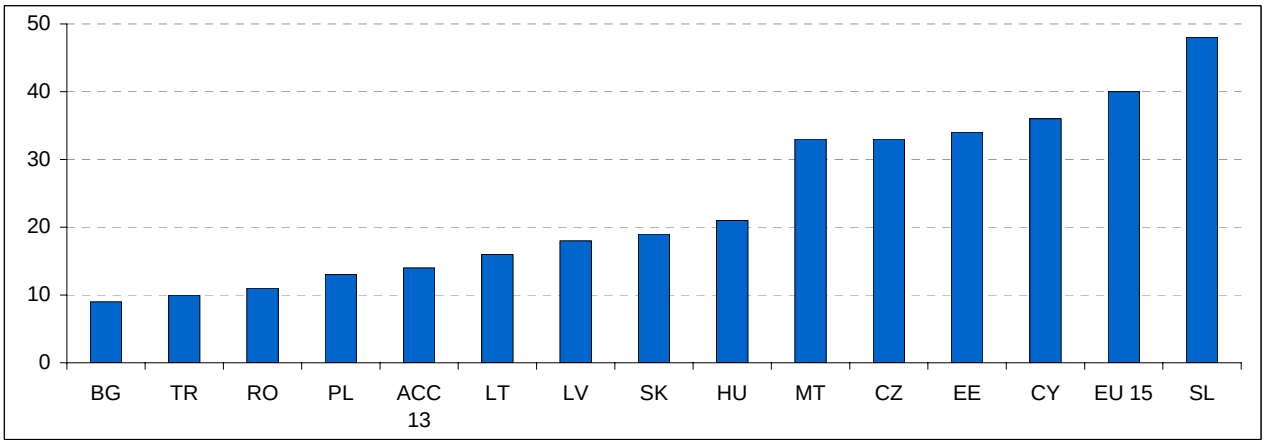
This indicator measures the proportion of the population that has had access to the Internet in the last 4 weeks prior to the measurement. It does not make a difference concerning the location of the access of Internet users (from office, home), neither the age group nor sex, etc. It offers an image of the total use of the Internet in a given country.

*b. Snapshot*

The snapshot shows that there is again a considerable gap both between the average of NMS and ACC-3 and EU-15 countries and also between the countries of the former group. The average number of Internet users in the EU-15 countries is 53% with some countries having very high shares of their population using the Internet. Still, the use of the Internet has been close or above the EU-15 average in Slovenia and Cyprus and in Malta, Czech Republic and Estonia it approaches the levels observed in the last ranking EU countries (Spain, Portugal). The share of Internet users in total population in these NMS exceeds 30%.

Concerning the differences between the NMS & ACC-3 the chart below illustrates that there is some correlation between the number of households connected to the Internet and the number of users. The countries that were ahead in household access are the ones that lead also this variable.

***Chart 27. The number of Internet users per 100 citizens, 2003.***




*Source: Eurostat, 2003 and Country Monographs*

In other accession economies (Lithuania, Latvia, Slovakia, Poland and Hungary) the share of population regularly using the Internet is much lower and these economies belong to the group with medium level of Internet users, oscillating around 15% with Hungary and Slovakia being positioned slightly above other countries. In the South Eastern European countries the use of the Internet is very limited as the share of population regularly using it is around 10% which is one fifth of the level observed in the EU-15.

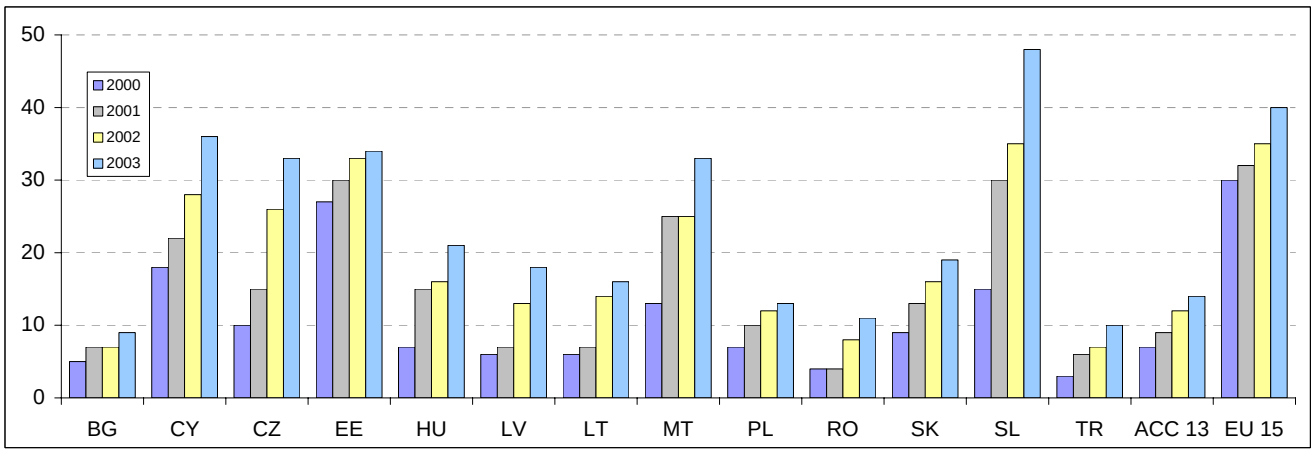
There are several factors that may explain the differences. First, income gaps and differences in per capita GDP and disposable income matter strongly as in countries with higher income levels Internet use is more affordable than in lower income ones. Second, this figure might be assumed as a summary figure, showing the effect of various indicators (PC ownership and use, Internet access price, telephone penetration rates, etc.). Therefore it is not surprising that countries that generally perform better in the majority of these indicators are ahead in the Internet use by population, while the ones lagging behind in one or more of those indicators have lower shares of population using the Internet.

*c. The dynamic picture*

The difference between the EU-15 and the NMS & ACC-3 countries has not been changing significantly as both country groups have recorded similar rates of growth.

Among the NMS & ACC-3, the leading countries grow faster, with Slovenia, Malta and Cyprus being the leaders. On the other hand the number of Internet users has been growing relatively gradually in Bulgaria, Hungary and Lithuania, which is in sharp contrast with the former group.

***Chart 28. The number of Internet users per 100 citizens, 2000-2003***




*Source: Eurostat, 2003 and Country Monographs*

The dynamic and stock picture both show that there is an ample opportunity for the NMS & ACC-3 countries to increase the share of population having access to the Internet, especially in narrowing the gap between them and EU-15 average. The dynamic analysis also shows that many countries have started to experience significant increases in the usage indicators and when threshold levels are reached, growth rates may accelerate further.

While this threshold level will be country specific, it may lie around the levels observed in case of mobile penetration. In the latter case when market penetration reached 40-45%, the market started to expand extremely fast driven both by demand and supply side factors and soon much higher penetration rates were reached. Something similar may happen in case of Internet penetration, which requires this threshold levels to produce spill-over effects in favour of faster expansion.

## 6. Number of Internet hosts

*a. Methodological note*

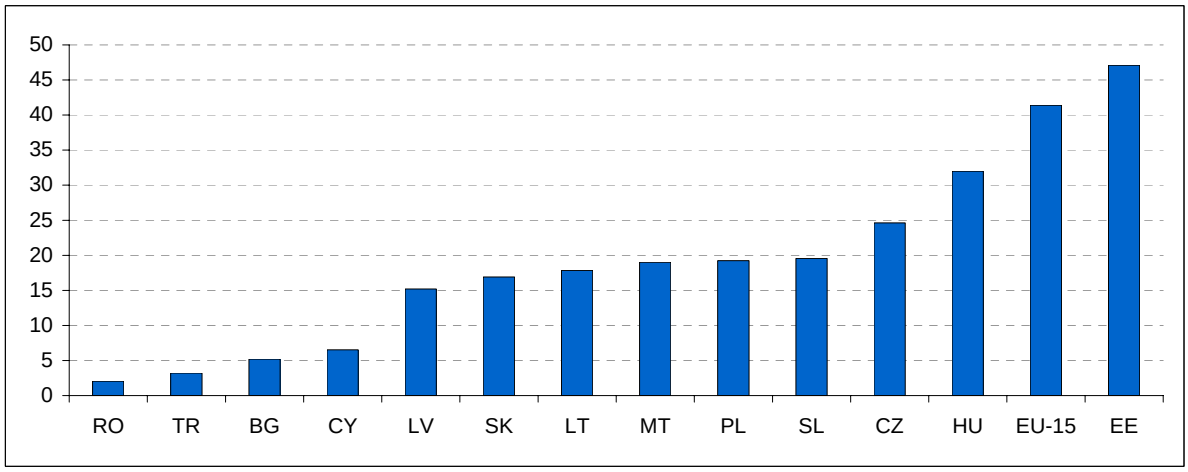
This indicator measures the number of registered Internet hosts per 1000 inhabitants. It gives an impression about the diversity and extent of online information and services provided in the individual countries. This indicator aims at grasping some of the digital content-related developments but it shows two major shortcomings.

Methodologically speaking and similarly to other indicators, this figure does not reflect the extent and quality of services provided by Internet hosts, nor should it be considered that it reflects precisely the number of services available because of the variable easiness of registration of domains in different countries. Estonia has had a very liberal legislation on this aspect until recently. Second, it measures only domains with country extensions, which includes more generic servers such as .edu, .com or .int, which may be expected to be supplied in an unequal distribution between the analysed countries, biasing thus the indicators. Still, it is an available, usual and complementary view on IS developments in a given country.

*b. Snapshot*

Estonia leads the NMS & ACC-3 as its number of Internet hosts per 1000 inhabitants exceeds even the average of EU-15. Estonia is followed by Hungary and the Czech Republic, which have around 25-30 hosts per 1000 inhabitant followed by a relatively homogenous group of other NMS, which have around 15 Internet hosts per 1000 of population. Hungary is slightly ahead and Malta is slightly behind its usual position in the ranking of the individual countries. The line is closed by the ACC-3 countries which have already been ranked low in terms of various other IS developments.

***Chart 29. The number of Internet hosts/1000 people, 2003***



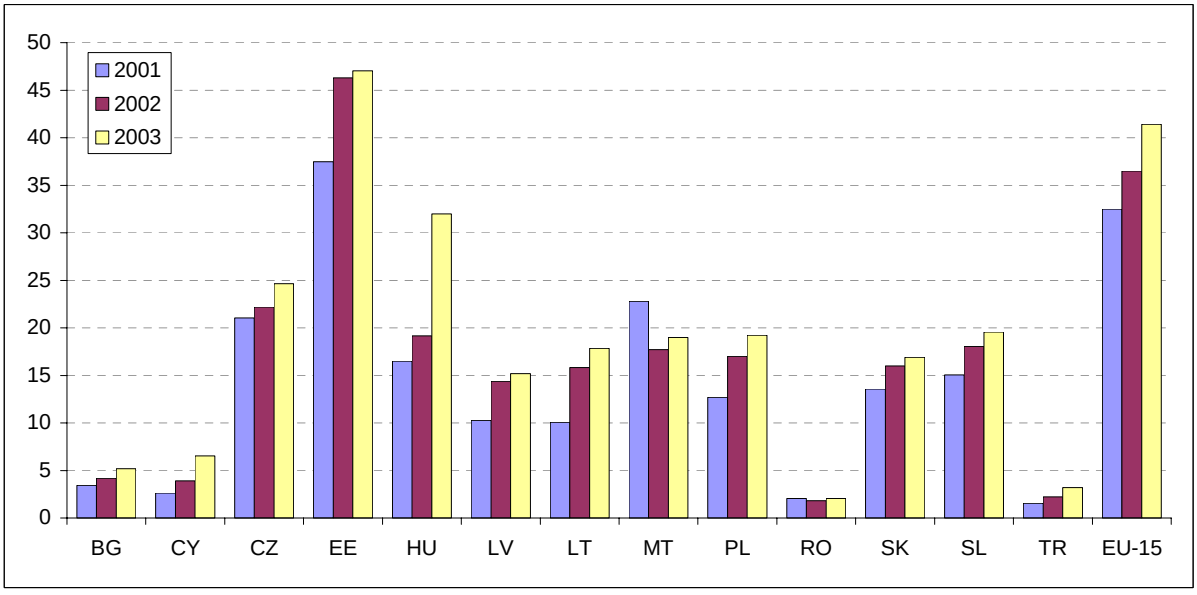

*Source: Eurostat, 2003 and Country Monographs*

*c. The dynamic picture*

The dynamic picture reveals sizeable differences between the NMS & ACC-3. The countries leading in the ranking (Estonia, Hungary and the Czech Republic) have recorded the fastest increase in the number of Internet hosts. Some countries have recorded almost unchanged relative figures: the slow dynamics of Cyprus, Romania, Bulgaria and Turkey are consistent with their absolute ranking among the analysed 13 countries. The remaining countries, which were ranked lower according to their 2003 figures have been experiencing fast increases in the number of Internet hosts over the recent years: the best examples are Lithuania, Poland and Slovakia.

In absolute numbers only the Polish figures (around 750.000 hosts) are of comparable size with the majority of current EU member states. In other countries the figures are much smaller in absolute terms with the exception of Czech Republic and Hungary (which experience fast increase in the number of Internet hosts) and to a much smaller extend, Turkey. In other countries the number of Internet hosts barely exceeds 50.000, which is a small number indeed.

***Chart 30. The evolution of Internet hosts between 2001 and 2003 in thousand***




*Source: Eurostat, 2003 and Country Monographs*

## 7. Public Access Points

### a. Methodological note

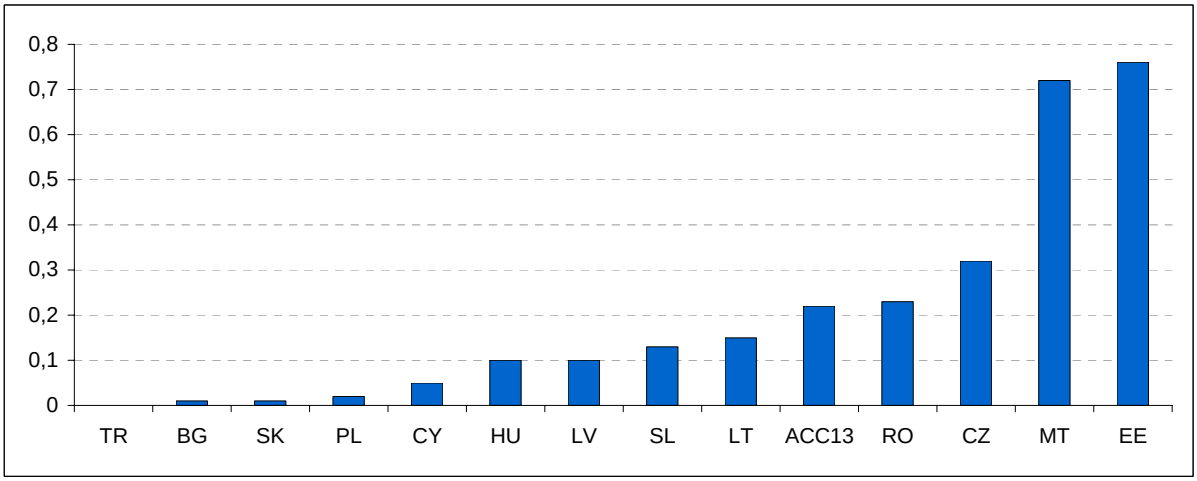
This indicator shows how many Public Internet Access Points are available per 1000 citizens. Public access points are an important source of access to the Internet and IS services wherever they are established, but especially in less developed areas and certain strata of societies. These include among others younger generations widely using PAPs[13], people who have lower affordability to access the Internet and also people living in less developed areas, though there the use of the Internet and information society services is also generally more limited. The amount of people using those PAPs is not available, comparatively, across those countries.

The data does not make any difference between different forms of public access (Free or charged, open 24/7 or on restricted schedule, etc.) and focuses on their absolute numbers. Rather than a measurement of IS development, this indicator shows indirectly part of the public effort for encouraging use among the population of a given country and also completes with intermediary data the image concerning access and use of Internet.

*b. Snapshot*

The number of Public Access Points shows a huge difference among the NMS & ACC-3 countries: Estonia has 72 times more PAPs per 1000 inhabitants than Bulgaria. The spread of Public Access Points shows the importance attached to their development by governments: in Estonia, Malta, in the Czech Republic and especially in the lower income Romania, their spread was the result of deliberate policy actions aimed at supporting their establishment and broader use. Governments in these countries spent significant budgetary resources to develop Public Access Points, and also paid more attention to other measures indirectly promoting the spread of Public Access Points, including promotion of eGovernment services and provision of better eContent.

***Chart 31. Number of Public Access Points (Units / 1000 inhabitants) in 2003***



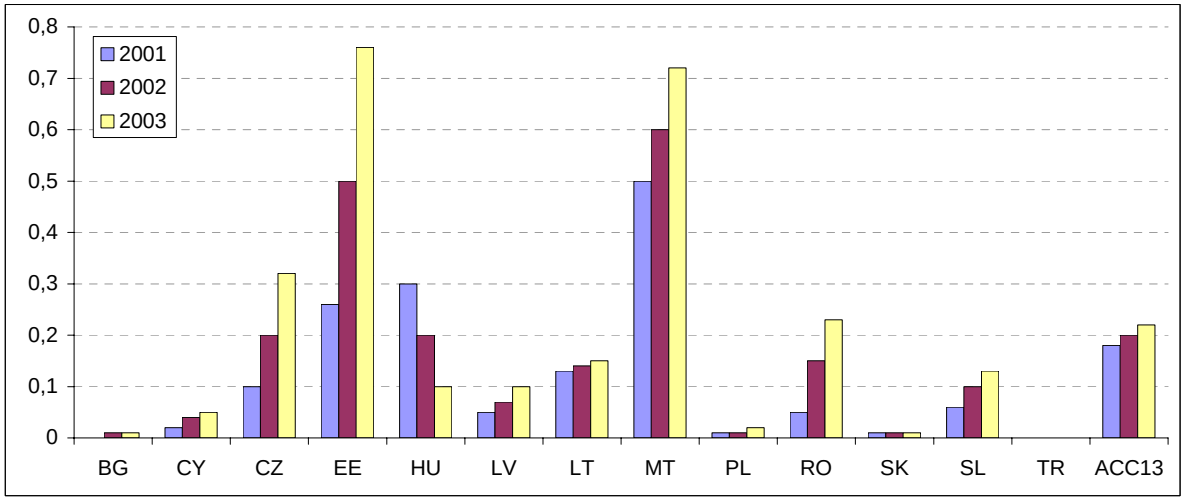

*Source: Eurostat, 2003 and Country Monographs*

[13] This explains the fast spread and popularity of Internet cafes in many analysed countries. Other forms of public access points popular in these countries are public libraries, which have been established even in smallest towns and villages and which allow the access to Internet.

*c. The dynamic picture*

The evolution of Public Access Points shows a similar division among the NMS & ACC-3 as emerged from the snapshot. The countries which had higher levels of Public Access Points experienced their fast expansion in the last three years: in the Czech Republic, Estonia and Romania their relative number tripled, while in Malta it increased by 50%. In other countries, which stood below the NMS & ACC-3 average in 2003, the developments were much slower or even reversed: the low number of access points remained almost unchanged in Bulgaria, Cyprus, Poland and Slovakia, while they have even declined in Hungary. This mixed speed of spread explains why in the NMS & ACC-3 the average number of Public Access Points remains around 0,2 per 1000 citizens.

***Chart 32. The changes in the number of Public Access Points, 2001 - 2003 (Units / 1000 inhabitants)***




*Source: Eurostat, 2003 and Country Monographs*

## 8. ISDN and broadband access

*a. Methodological note*

Broadband allows fast access to Internet and is formulated as a key priority for European IS developments. Broadband developments have been relatively new phenomenon in the NMS & ACC-3 ; Therefore ISDN has been selected as a relevant benchmark for broadband availability while other ways of fast access exist but are still very limited in these countries.

On the other hand in advanced countries ISDN has already been loosing ground to alternative and faster technologies (ADSL, cable and wireless connections, etc.). In EU-15, ISDN is an outgoing technology, while in the majority of the NMS & ACC-3 it is still an important improvement compared with earlier connection technologies. This explains why the EU average might appear to be low compared with some NMS & ACC-3. The case of Germany is revealing in that respect as its 47% ISDN use is accompanied by 21% ADSL, 13% cable modem and 16% wireless use:

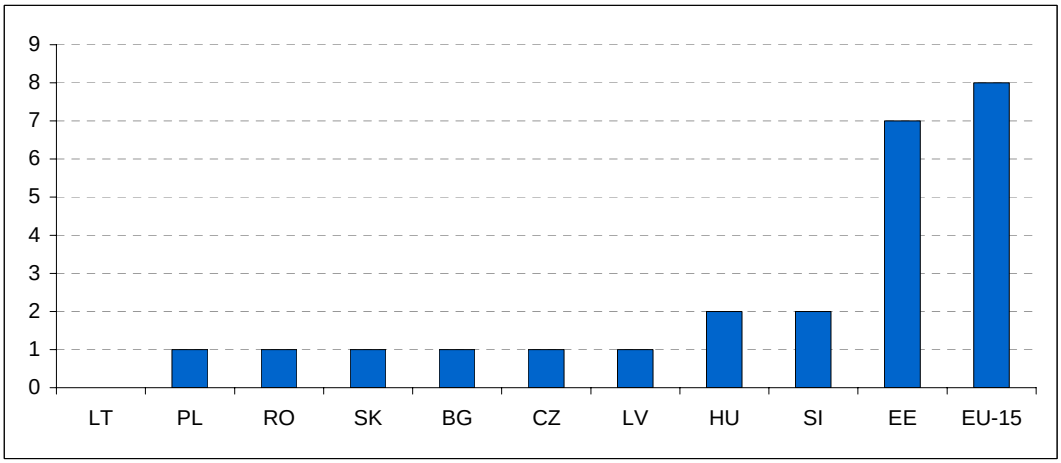
ISDN allows 64 kilobits/sec access for users. The figures below show the number of ISDN subscriptions per thousand citizens in the NMS & ACC-3 countries with a comparison to EU-15 average.

*b. Snapshot*

In broadband access, with the notable exception of Estonia, all the NMS & ACC-3 perform rather weakly. The average share of broadband access in EU-15 in 2002 was 13%: among the NMS and ACC-3 only Estonia was close to it with 8%, while in other countries the level was below 2%.

The existing technologies over which the access to broadband is provided are outdated and require significant investment for upgrading. Broadband development has been restricted to telephone copper network using ADSL technology, and cable TV networks using cable modems, while other forms (fixed wireless access, third-generation mobile systems, and satellite among others) are still non-existent.

***Chart 33. Broadband connection in % of total ones, 2002***




*Source: Eurostat, 2003 and Country Monographs*

There are both supply side and demand factors explaining the low figures for broadband access. First, the established technical capacities and development of broadband have only been recent developments even in EU-15 and much more so in the NMS & ACC-3. The resources so far have been devoted to other essential telecommunication investments and less has been spent on broadband access. Third, neither the government nor the private sector have invested in broadband applications enough resources. At the same

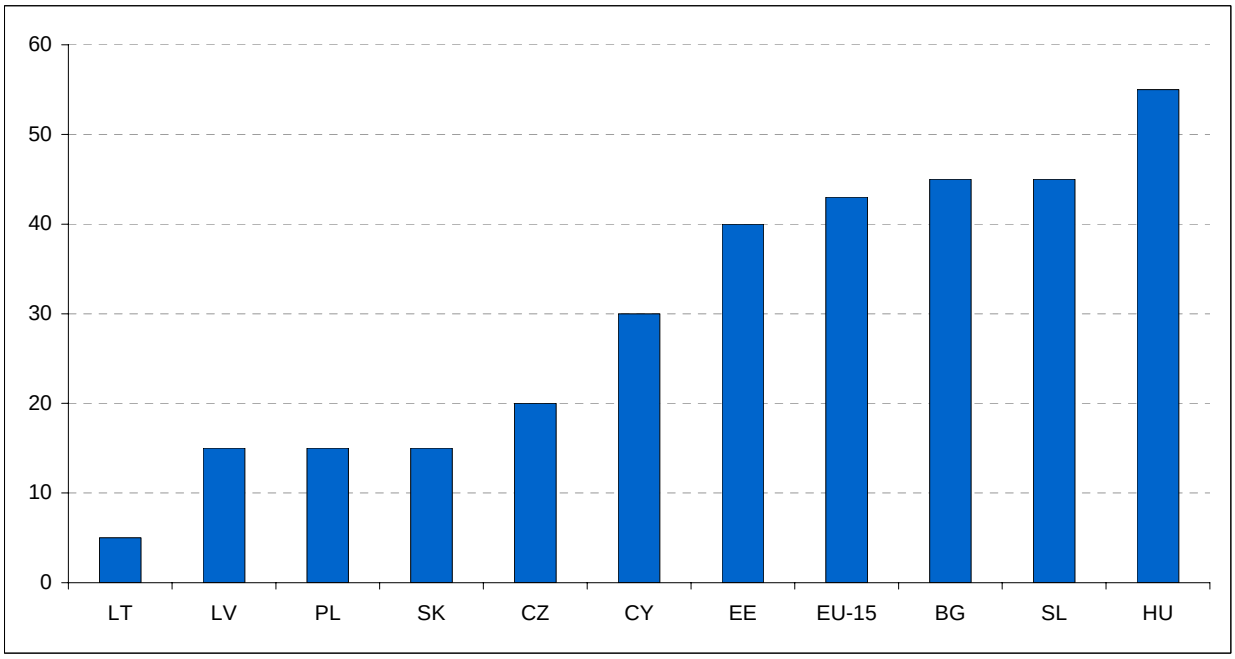
time in the remote and loosely inhabited areas it is still not profitable to establish broadband access and government policies to substitute for private capital are either missing or remain insufficient.

Second, access prices compared to purchasing power of consumers are too high, which reduces the affordability of broadband. This relates not only to the costs of introduction, but also to monthly phone and access charges. Only recently have government policies devoted more attention to broadband issues and have more actively supported private and public initiatives to increase broadband use.

Even considering the methodological problems of comparing with the EU-15 countries it should be recognised that several NMS and ACC-3 countries have performed relatively well in international comparison. The high level of ISDN lines in Hungary, Estonia and Slovenia does not come as a surprise as – with the notable exception of Hungary – these countries have generally the best IS indicators.

On the other hand the leading position of Bulgaria comes as a surprise, especially if its relative level of development and position in case of other indicators is considered. Bulgaria has performed extremely well in the case of ISDN line subscriptions and exceeded most of the accession and candidate countries. In other countries for which data were available and comparable it comes as another surprise that both the Czech Republic and Slovakia had low levels. [14]

***Chart 34. The number of ISDN lines per 1000 citizens, in 2002***




*Source: Eurostat, 2003 and Country Monographs*

Bulgaria, the Czech Republic and Hungary have almost tripled the number of ISDN subscriptions, and the number has also increased fast in Cyprus though from a lower level.

[14] This IS partly due to the low level of broadband access and partly to the fact that other than ISDN technologies developed faster in these two countries.

## 9. Internet access prices

*a. Methodological note*

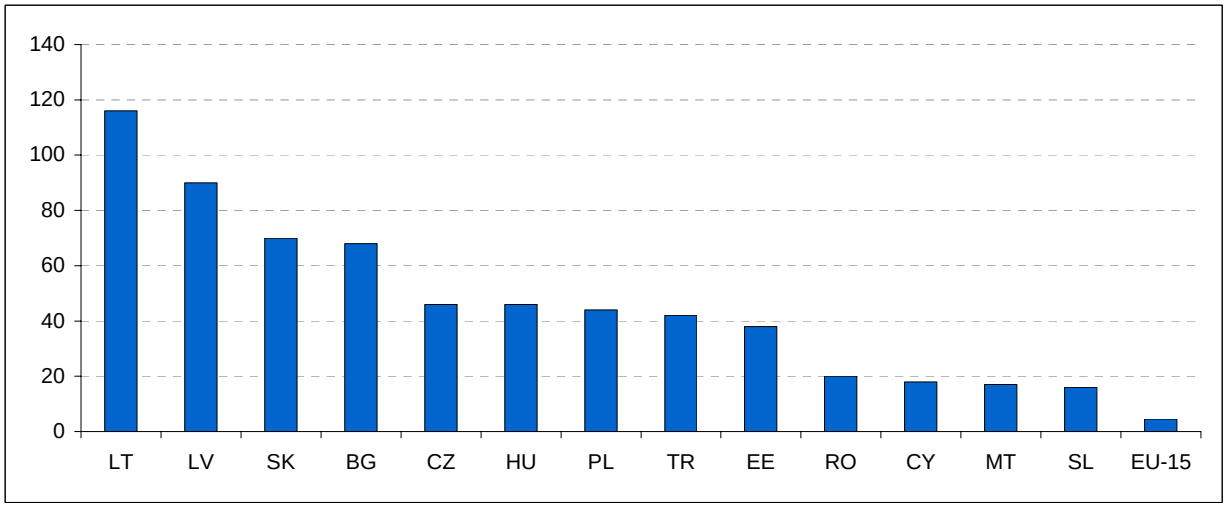
An important indicator helping understand the spread of IST is related to the cost of access and use of Internet. Three indicators are proposed below to approach the affordability of IST services: Internet access costs, dial-up costs and PC purchasing costs.. First, in order to compare the price of access in relative terms, monthly Internet access prices in individual countries were converted to Euro on PPS determined exchange rate level. The measure used was the 40 hours off peak time Internet access cost. But as the main cost item is not the access to Internet services but dial up costs, they were also compared across countries. The indicator used was the 20 hours peak dial up costs in percent of the available disposable income of households. The third indicator calculates the relative costs of purchasing an average quality PC by a household as percent of total household income.

*b. Snapshot*

Looking at the charts the ranking of individual countries differs indicator by indicator, but there are several common trends. First, in all three indicators Cyprus, Malta and Slovenia are the leading countries as the relative costs of Internet access, dial-up costs and PC purchase in PPS adjusted level and relative to household income are the lowest. On the other hand Latvia, Lithuania, Bulgaria, Slovakia and Romania have in general higher rates in those indicators. There are several factors that might account for the significant differences: the two major ones of them are income levels of individual countries and market structures, the extent of competition on the telecommunications and Internet service market. T with the exception of Slovakia he costs in some cases reflect the indirect (tax concession, etc.) or direct support provided by the governments, mainly in the case of purchase of personal computers.

In the case of Internet access costs for 40 hours off peak time PSTN usage, the differences in charges between (leading) Slovenia and (last) Latvia are one to six. The differences reflect two factors. First, income differences matter: countries on the right side of the chart are the highest income countries with the exception of Romania, while ones on the lower end of the chart are the lowest ones, with the exception of Slovakia. Second, differences are also explained by the extent of market competition, and the presence of alternative to the incumbent operator service provides.

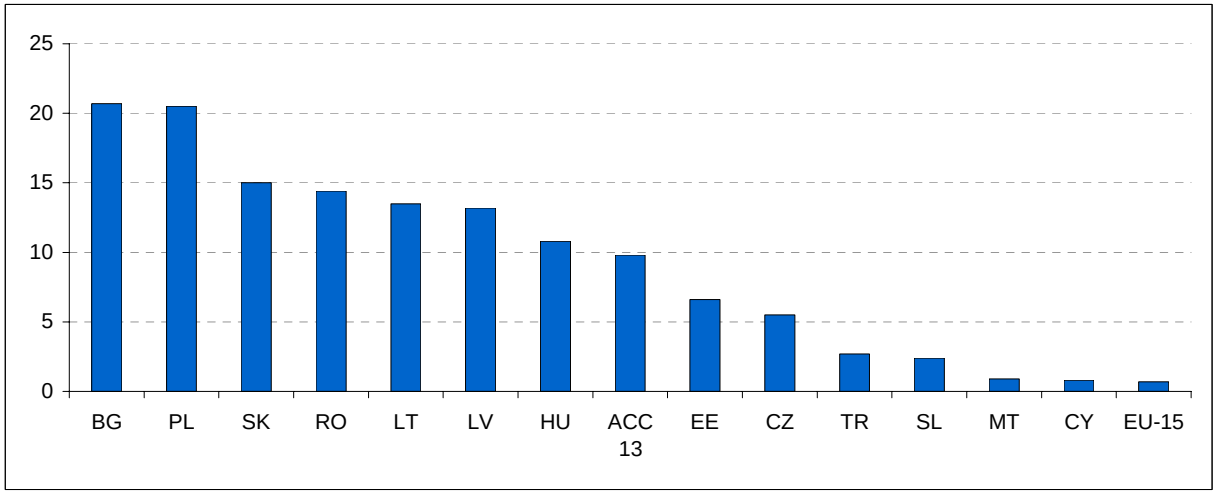
***Chart 35. Internet access costs measured by 40 hours off peak time, PSTN usage, in PPP adjusted €, in 2003***




*Source: Eurostat, 2003 and Country Monographs*

In case of dial up costs the factors behind the differences between the countries are quite similar to the previous one. One of them is the gap in per capita GDP income between Cyprus/Malta/Slovenia and the other countries. The differences in dial up costs are more important than those in income levels: market competition is also a factor. Countries which have the highest dial up charges still have either strong monopolistic incumbent operators and/or have missed their sale: prices and quality differences reflect missed opportunities in telecommunication policies.

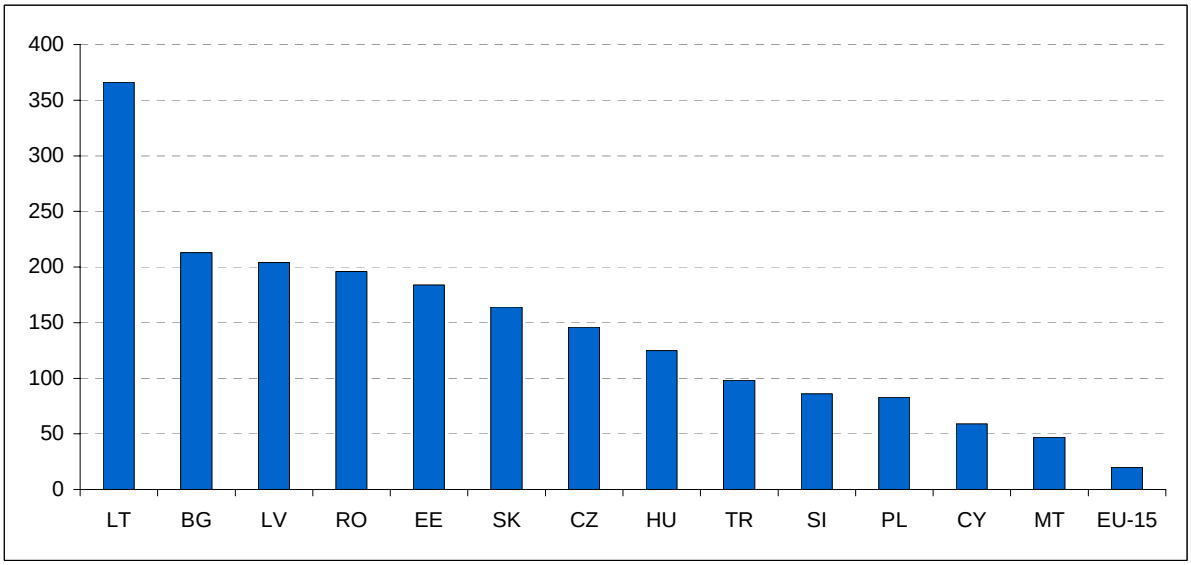
***Chart 36. 20 hours peak dial up costs as % of households income in 2003***




*Source: Eurostat, 2003 and Country Monographs*

The purchasing cost of personal computers (by households) reflects the same income differences: there is a reverse correlation between the income level and the relative costs of a PC in terms of household income. In high income Cyprus and Slovenia, households need to spend "only" 5 to 7 times less of their income than in the lower income Baltic or South-Eastern European countries. Still, in countries with lower income such as Poland and Turkey, purchasing costs are relatively smaller than in medium income countries (Slovakia, Hungary, and Czech Republic): market structure and size also matter. The good position of Poland and Turkey has to do with the size of their internal markets, which are the biggest ones among the NMS & ACC-3 and give much better prospects for corporations to reap scale effect from local production.

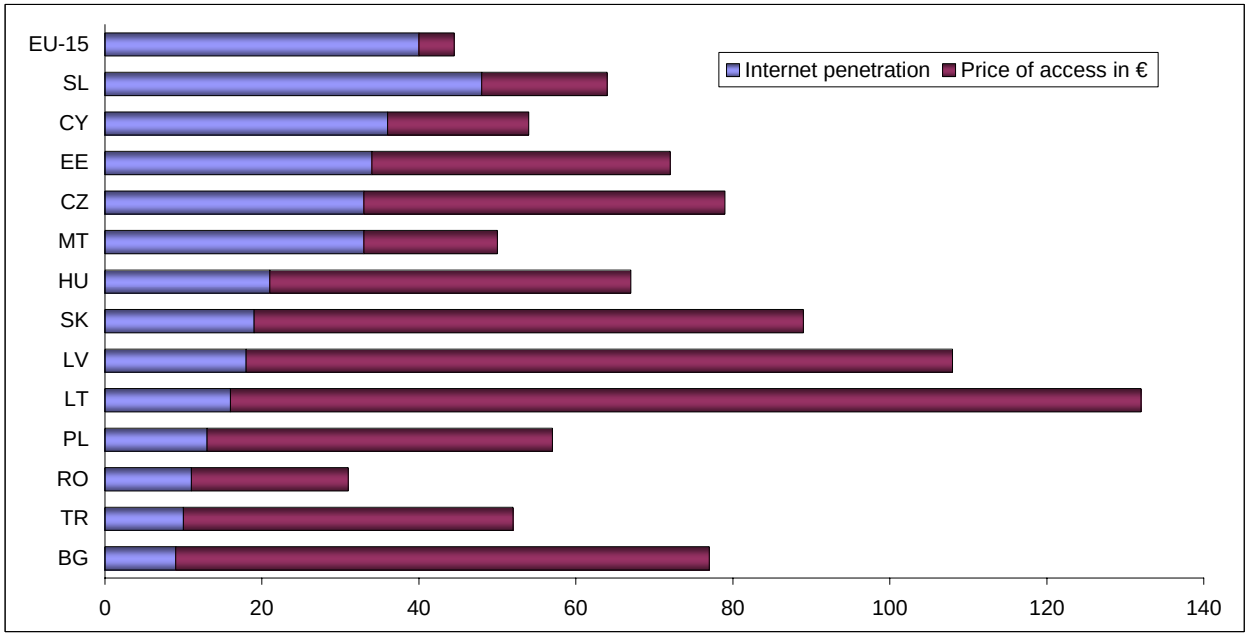
**Chart 37. Cost of a PC as % of households income**




*Source: Eurostat, 2003 and Country Monographs*

The high absolute and relative prices of purchase and access could be one of the impediments affecting the evolution of IST in the analysed 13 countries. The chart below exemplifies that there is some correlation between Internet penetration rates and price of Internet access. The same would be true if instead the 40 hours peak Internet access the other two indicators – relative costs of PCs and of dial up connection for households – were plot against the penetration rates.

***Chart 38. The link between access price and Internet penetration rates in the NMS & ACC-3, based on 2003 data***




*Source: Eurostat, 2003 and Country Monographs*

But the extent of this problem and the impact of tariff structure depends on the source of relatively high prices: it has a completely different impact on IS developments if it is caused by price convergence or if the tariffs are the outcome of regulation failures and/or loopholes. In many cases it is true that prices are too high to allow broad affordability of these services, and neither market competition nor government regulation and direct policy measures seem to be sufficient to improve the affordability of these services.

## 10. Digital Divide

*a. Methodological note*

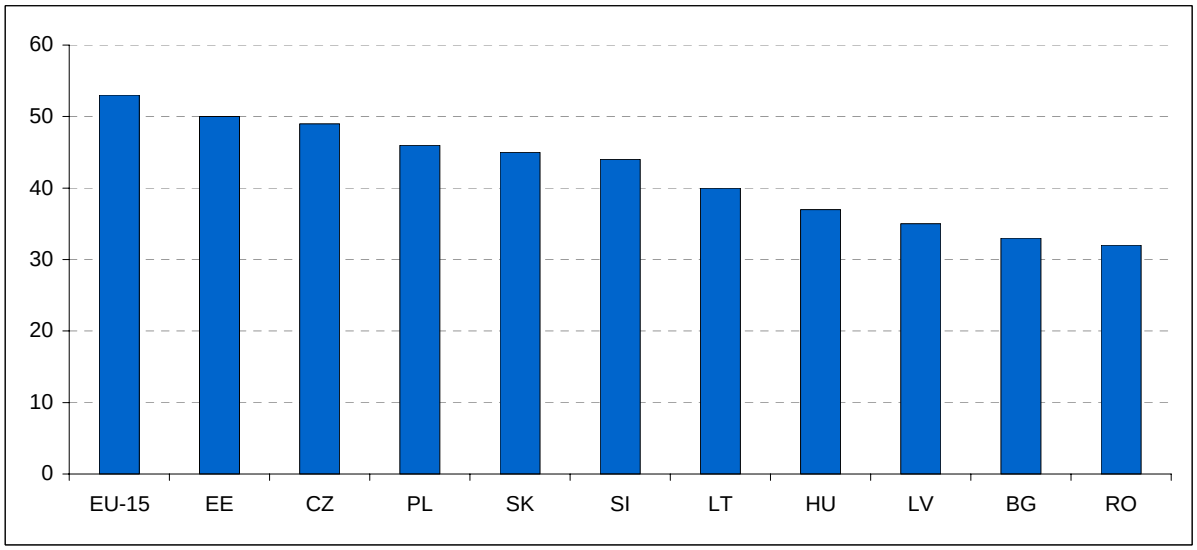
The Digital Divide Index that has been developed by Empirica, a research institute based in Germany, is a compound index comprised of four indices, measuring diffusion of computer and Internet access, and the use amongst four "risk" groups in relation to the population average. The four risk groups measure the impact of gender, age, and income and education level on Digital Divide in the analysed countries. The weight of each of these individual factors is a country specific factor, but their aggregate value gives a fairly good approximation of the level of digital divide in the individual countries if one accepts the premise that the Index is build exclusively upon demand side aspects, neglecting the supply side ones - such as infrastructure availability - and their obvious complementary effects on use. The lower the Index value, the more severe the divide is, with equality resulting at the value of 100.

*b. Snapshot*

In the EU-15 countries digital divide has been declining though very slowly according to the available data. This has to do with the different evolution of the components of the index: while age and gender based digital divide had been decreasing, education based increased with almost no change in income based digital divide.

The chart shows that while the digital divide is higher in the NMS & ACC-3 than in the EU-15, the differences are not substantial on average. Digital divide indices among the leading NMS countries (Estonia, Czech Republic, Slovenia, Slovakia) are even better than in the worse performing EU-15 Member States.

***Chart 39. The Digital Divide Index for the NMS and ACC-3***




*Source: SIBIS report(2003)*

On the other hand the composition of this index differs slightly from the EU-15 average, as the gender gap is narrower, while other three indicators have a higher value and bigger impact on the equality of access to digital services. The biggest inequalities emerge from the education gap, which shows that people with low level of human capital are especially vulnerable to be excluded from the Information Society. Income gaps are also strongly impacting which is understandable due to the short-term

inequalising effect of transition related economic and social changes in 10 out of the 13 analysed countries.

In relation to this– though not measured explicitly in the Digital Divide Index - the digital divide in these countries is also linked to stronger social and regional divides.

## 11. IST indicators: a cumulative conclusion

The above tables and charts present a selective overview of the state of IST indicators in the NMS & ACC-3. While there are sizeable differences also among the analysed countries the data presented above allow to draw several conclusions concerning the overall level of IST development in these countries.

First, the data confirm that in most and major IST indicators the NMS & ACC-3 lag considerably behind the EU-15 countries on average and also in most cases on individual account. The gaps however are different: in case of certain indicators (like overall access path and fixed line penetration rates, or digital divide) the gaps are relatively small, but in the majority of the analysed indicators they are quite significant, though very country specific. The ranking of the individual countries in terms of their level of IST development closely follows two factors: their overall level of development (i.e. GDP) and the attention paid by governments to providing and supporting the access to information society services through a variety of measures and channels.

Second, the dynamic analysis in case of most indicators illustrates that the existing gaps have in recent years not narrowed between the EU-15 and the NMS & ACC-3, but widened due to several factors. One is certainly the difference in affordability of these services, which is strongly linked to the income differences between EU-15 Member States and the NMS & ACC-3. Besides the private sector the approach of governments mattered too as in the EU-15 – with significant country differences – governments have spent more sources and devoted much more attention to the development of the demand side for IST than in the NMS & ACC-3.

Third, the figures in the NMS & ACC-3 reflect significant differences among the countries: some of them are ahead of the majority and average of accession countries in IST indicators. Six countries can be easily identified as being on the forefront of the IS developments: Czech Republic, Estonia, Hungary, Malta, Slovakia, and to a lesser extend Cyprus. The seven remaining countries are slightly lagging behind, usually in several indicators.

Fourth, the gaps existing between the NMS and ACC-3 and EU-15 are sometimes critical and point to policy areas of high importance. Among the critical issues the low level of PC use in households and in general the high - especially compared to disposable households income and purchasing power standards – access prices, the low share of broadband access are of concern. The differences and especially the trends between the NMS & ACC-3 and EU-15 in these areas raise the possibility of widening gaps unless the trends are reversed and the NMS & ACC-3 are able to catch up in these areas. This is especially so, if it is considered that the differences in indicators were able to reflect only statistical but not qualitative differences. But quantitative differences hide also qualitative ones: in terms of the computers used, in terms of the density of PAPs, in terms of speed and quality of broadband access. The qualitative differences magnify the existing quantitative ones, and put the NMS & ACC-3 in an even more backward position.

Fifth, there is a close link between the individual indicators in many cases. The level of access prices to Internet services, phone calls as well as purchase of computers is positively correlated with Internet penetration rates. The extent of fixed line penetration is also linked to Internet access showing a strong positive relationship between them. The close relationship is due to two factors: on the one hand these

indicators have a cross influence on each other and on the other hand they are affected by similar independent variables.

Sixth, while the stock figures reflect significant and sometimes widening gaps, time series data show several positive developments in the NMS & ACC-3. Among them the speed of expansion of both the use and supply of IST has significantly increased in recent years: in most accession countries one could observe an accelerated increase of penetration rates and other IST access figures. Moreover, the still low levels of IST consumption, investment and output have been rising faster lately than in the second half of 1990s. Related, governments devoted increasing attention to this sector compared with late 1990s and this might improve indicators in the short-term future.

Seventh, there are differences in the use of information and communication technologies by the business, household and public sectors. In general they are more limited than in EU-15 countries: business sector uses it less for everyday commercial activity due to a vicious circle of lower demand for such services, private sector has also much lower access due to the described income gaps and affordability problems, and public sector use is also more constrained due to public finance problems. The more limited use can be seen in the differences in the number of host, services provided by existing web sites, by the availability of online services in the private and public sectors.

Finally, some examples show that in certain areas leapfrog is possible and even with the underlying economic conditions, fast catch up in several areas is not unlikely provided competitive market conditions and well designed policy measures are implemented. The increase of mobile penetration rates, the level of Internet use by population show that very fast quantitative and qualitative developments may occur in these countries too provided – as described later especially in Chapter VI- the right and committed policies are in place and the available resources are fully utilised.

## *II.B. ICT indicators in the NMS & ACC-3*

This section presents successfully the state of development of four sector-related indicators with the aim of giving a brief insight into the state-of-affairs of the production side of ICT in NMS & ACC-3. The following indicators are described:

1. ICT sector share in production
2. ICT share in exports
3. Trade balance in the ICT sector
4. ICT share in employment

Those ICT indicators are presented in a similar way as those related to the use, or demand side (IST). First, their absolute level is presented and compared to the EU-15.average,. Second, a brief approach to the statistical series helps assessing the trajectory and the importance of the trend. Finally, a conclusive section, introducing additional qualitative views from the national monographs, helps consolidating the view on the ICT sector.

## 1. The share of ICT sector in output

*a. Methodological note*

The share of the ICT sector production in the domestic economy is appreciated by comparing the contribution of the ICT industries (Manufacturing and Services including Telecommunication Services) to the total output of the economy (GDP)[15].

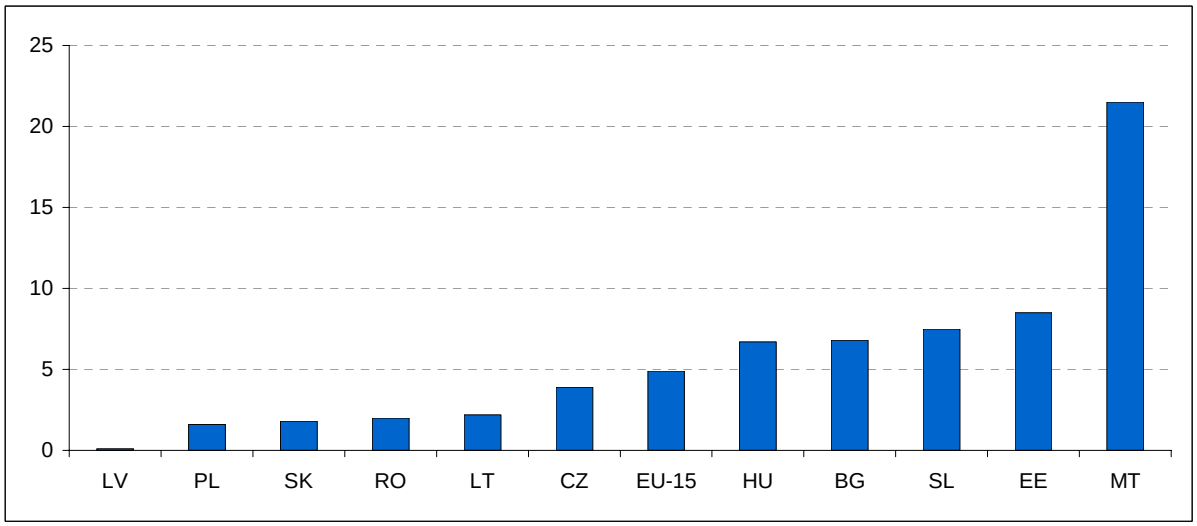
*b. Snapshot*

Among the NMS & ACC-3, five countries have ICT producing sectors which contribute stronger to their national economy than the EU-15 countries on average: those five countries are Malta, Hungary, Estonia, Slovenia, Bulgaria, and Hungary. Still, it should be noted that some countries within the EU-15, such as Denmark, Greece or Portugal, have very small ICT producing sectors, which reduces the level of the EU-15 ICT sector average contribution.

Those five countries have high shares of ICT in production for a variety of reasons. In the case of Malta, Estonia and Hungary, this is mainly due to the rapid penetration of foreign firms. For Slovenia and Bulgaria, it is associated with structural changes in industrial production, due to the presence of relatively strong (and partly domestic) software producing companies.

The share of the ICT sector production of NMS & ACC-3 in their domestic economy shows a wide dispersion reflected in the chart below: it varies between 1,3% and 22,5% of GDP, both extremes being represented by small size countries, Latvia and Malta.

***Chart 40. The share of ICT sectors in GDP in % in 2003***




*Source: Eurostat and Country Monographs*

In the remaining NMS & ACC-3, the ICT sector represents a much smaller share of the total output: in some countries its relative weight is of a little relevance in the national economy (Latvia, Slovakia, Poland, Romania and Lithuania). These countries either did not have the required level and diversification of industrial production, and/or have followed a more conservative approach towards privatisation and FDI. Still, Poland and Slovakia which have followed open policies towards FDI and had better than the average human and physical capital supply indicators developed (small) ICT production sectors. They

[15] The ICT sector is measured based on the NACE classification from data available in internationally comparable national sources.

have been able to modernise their sectors with the help of a recent surge in capital inflows. Romania may be the next country to follow as it has experienced a recent boom in FDI and has kept wages at a competitive level and thus may expect an increase in the scope of its ICT sector. In the Czech Republic the share of ICT sector is below the level of manufacturing development of the country, and may reflect two related factors: most of the industry is represented by small and medium sized enterprises and the privatisation started here later than in Hungary or Estonia.

Some qualitative statements can be made about the nature of ICT production in the NMS & ACC-3. First, in the most populous countries there is room for a few domestic-owned companies to serve both the global markets and remain competitive on the domestic one with major multinational players. This is especially the case of Poland and Turkey, where several locally owned companies maintained their production and were able to withstand the competitive pressures and stay on the market contrary to local producers in other, mainly smaller countries.

Second, in some other countries there is a room for domestic, mainly foreign owned companies to serve the global market and to orient their activity mainly on exports (Hungary, Estonia and Malta are the best examples). Besides the insufficient size of the domestic market the main reason for such a strategy is the competitive advantages these countries have against other countries specialising on export sales due to cost, quality of factor supply and institutional and structural heritage.

Finally, in the majority of countries (but mainly in those which have higher value added producers, labour force skilled above the average, strong connection with international companies, etc.) there is room for niche market domestic-based multinationals serving the global market besides supplying the local one. This relates mainly to ICT services and certain labour intensive software products. This is equally true for countries that have already embarked on such a specialisation (Slovenia) and others, which have a broader spectrum of product supply.

## 2. The contribution of the ICT sector to exports

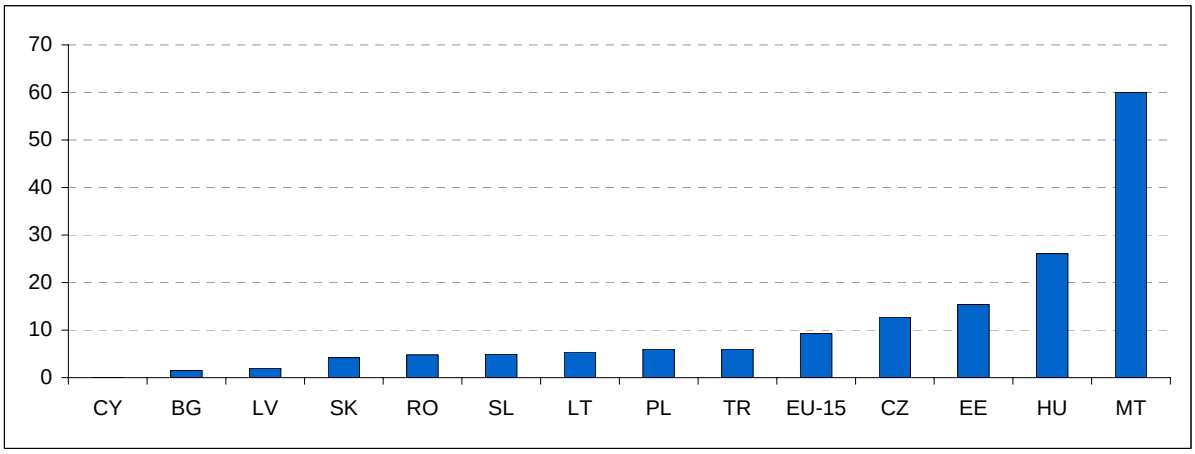
*a. Methodological note*

The indicator measures the share of the export of ICT sector against total export of a given country. The various ICT producing sub-sectors are added up and then their total export value is divided by the total export value of the country.

*b. Snapshot*

There are very important differences between countries in the contribution of their ICT sectors to exports. These differences reflect the size of the domestic economy and show for some of them the strongly outward oriented production and the variation in ICT output value.

***Chart 41. The contribution of ICT sectors to total exports in % in 2003***




*Source: Eurostat and Country Monographs*

The ICT sector represents an exceptionally high share (60%) of total export revenues in Malta, mainly due to the high level of production and export of a major multinational microprocessors producer. In three other countries the share of ICT sector in total exports exceeds the equivalent average figure of EU-15 countries: ICT sector makes respectively 25% of total export revenues for Hungary, 18% for Estonia and 12% for the Czech Republic[16]. All three countries are small ones, have already well established production and export capacities based on foreign firms locating their production facilities in these countries to utilise their cost advantages and the supply with human capital.

In Malta, Hungary and Estonia the ICT sector is mainly based on re-exporting activities and assembling ICT products, though recently the content and local value added have already been increasing. These countries are increasingly experiencing inflow of foreign capital related to the establishment of R+D, marketing and logistics centres, which have increased the value added of ICT sector's production. In Slovenia this has been slightly different as there exports are linked more to the software industry than to hardware production.

In the other new member states the share of ICT exports is much smaller: it varies between 1% (Latvia), and 9% (Czech Republic) of total sales.

*c. The dynamic picture*

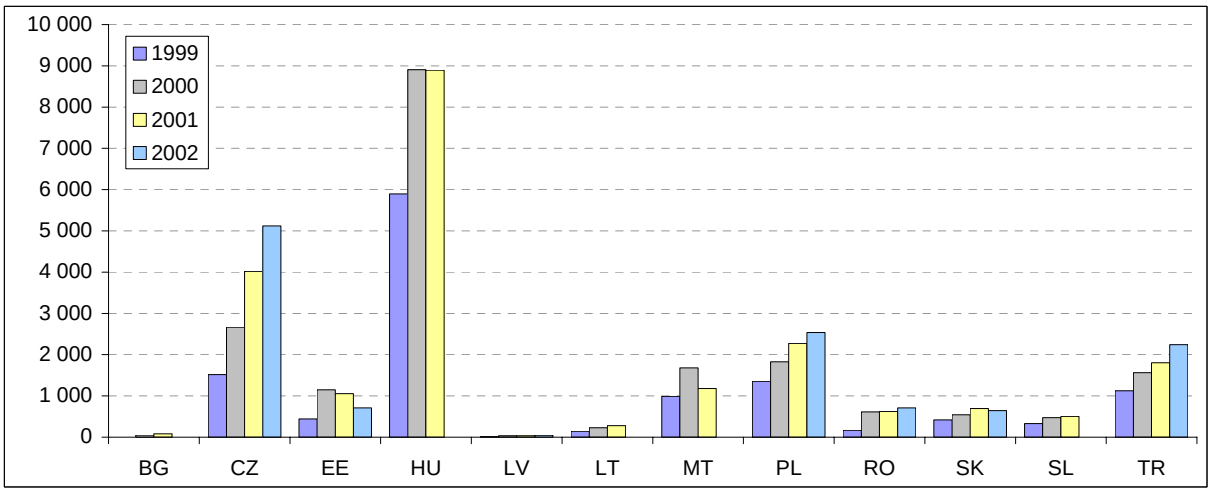
The ICT exports are vulnerable to external shocks. Vulnerability means that exports and ICT production depends on the demand of major export markets and on changes in relative competitiveness vis-à-vis other major exporters. This is clearly seen from the dynamic picture, which shows the evolution of the annual value of ICT exports from 1999 till 2002. The collapse of the ICT boom at the beginning of this decade created serious export problems for the leading exporters (Malta, Estonia, Slovenia and Hungary), when the producers saw their market size diminishing fast. The changes in external demand resulted in stagnation of exports that earlier were increasing very fast.

The chart also shows that in absolute numbers the Czech Republic and Hungary are the leading exporters of ICT products, with Poland lagging considerably behind them. While in relative terms both Estonia and Malta seem to be leading countries, the level of their export sales is limited and therefore their absolute data are much smaller. Out of the NMS & ACC-3 countries only Hungary, the Czech Republic and to a

[16] In 2002 the share and ranking were different as ICT sector made 29,1% of total exports in Hungary, 26,5% in Estonia and 16,6% in Slovenia with the Czech Republic having 9,5% share.

smaller extent Poland and Turkey can be regarded as significant exporters on the international markets, while others have much smaller capacities and export sectors.

***Chart 42. The annual value of ICT export in million Euro, 1999-2002***




*Source: Eurostat 2003 and Country Monographs*

## 3. The trade balance of the ICT sector

*a. Methodological note*

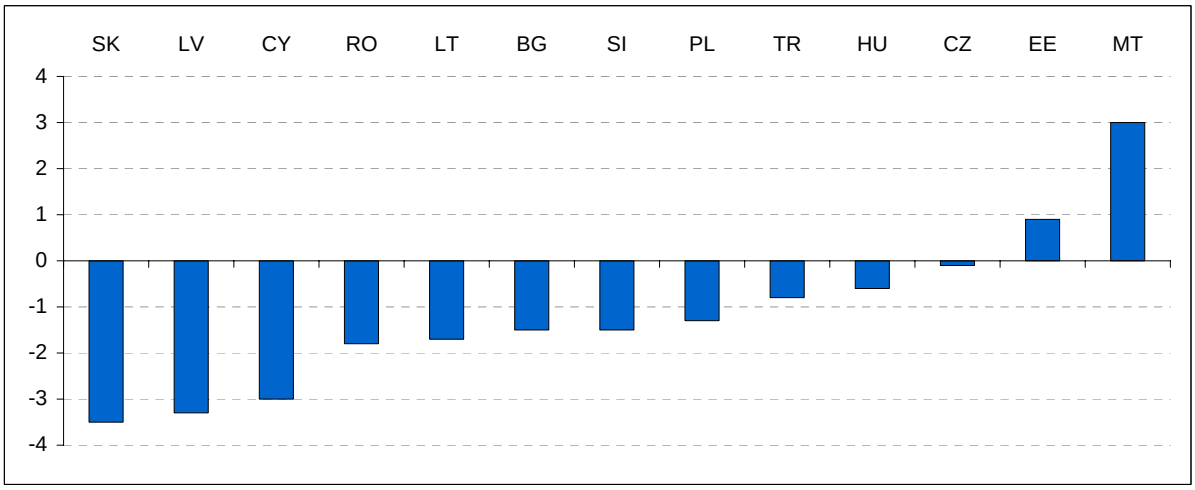
The trade balance of the ICT sector is another variable, which helps in understanding the role of this sector in NMS & ACC-3. The trade balance reflects whether a country has a diversified production sector or if it is simply a processing country, or one which needs to import excessively ICT equipments and services due to the lack of domestic production. The trade balance helps slightly in refining the picture from the previous indicator.

Two indicators are used: the first one is the trade balance in ICT products as a percentage of GDP, which is the traditionally applied indicator. The second one is the share of the ICT trade balance in total exports, which aims at taking to account the size of the export sector. The reason for taking this indicator is that similar ICT trade balance to GDP ratios may be produced by different export values and ICT sectors. The indicator comparing the ICT trade balance relative to exports tries to indicate these differences between individual countries, considering also the size of their export sector.

*b. Snapshot*

In 2002 only Malta and Estonia had a surplus in ICT trade. As seen from the dynamic figure there was a third country, Hungary, whose traditional surplus shifted to deficit in 2002: this was caused by the stagnation of its exports, hit by the decline of EU (mainly German) import demand. Among the surplus countries, the case of Malta is very interesting as it produced significant surplus with the help of a single multinational producer. The export surplus also shows the relatively high value added in case of Maltese production. The same is not entirely true for Estonia, which did not always have surplus in its ICT trade.

***Chart 43. The trade balance in % of GDP in 2002***

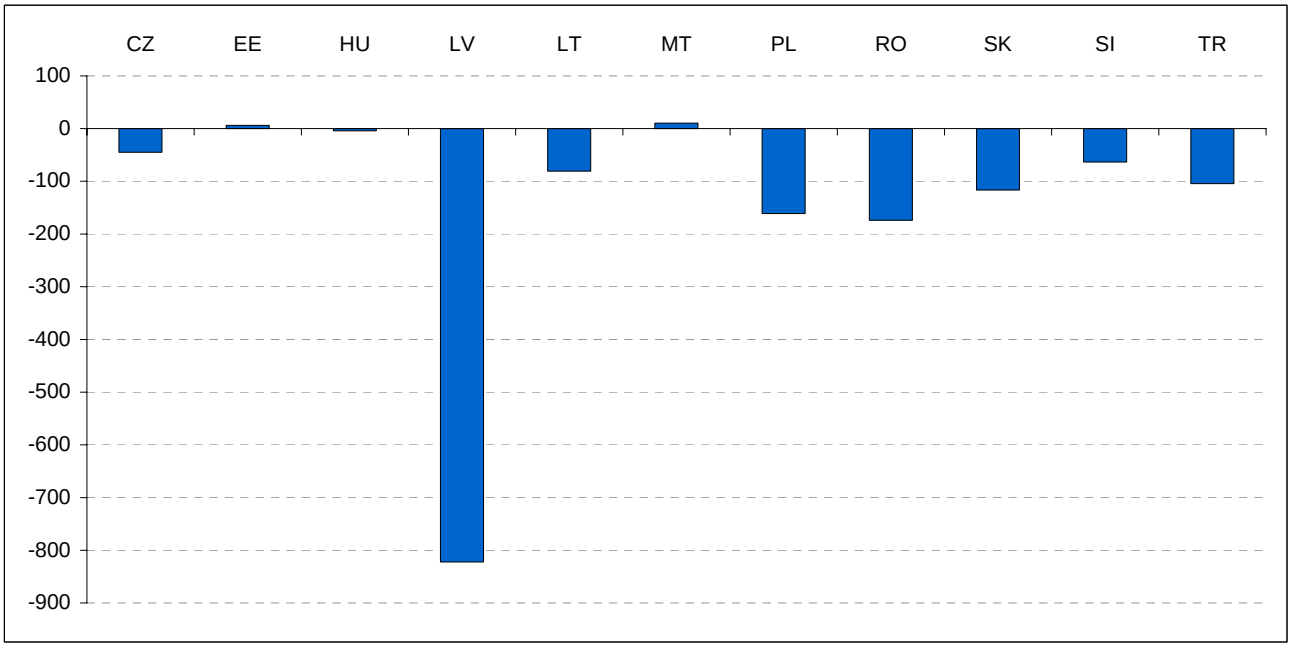



*Source: Country Monographs, 2003*

In other countries the trade balance was in deficit, but this deficit was due to various factors. In some countries the deficit reflected the temporary effect of increasing ICT production which is accompanied initially with rising import demand (Poland, Slovakia), while in other countries it was a reflection of very tiny local production and exports, and consumption entirely based on imports (Latvia, Lithuania, Slovakia).

The second indicator reveals the role of the size of the export sector. Countries which have relatively small trade balance to export ratios have significant export sectors, while those where the figure is high small ones. The chart shows that Malta, Estonia and Hungary have the biggest ICT producing sectors and the trade deficit or surplus is only a tiny part of their ICT exports, even if the trade surplus represents a significant portion of GDP. In countries with smaller ICT sectors a small trade deficit to GDP may become sizeable: Latvia, Poland or Romania have accumulated significant trade deficits in ICT sectors.

***Chart 44. ICT Trade balance as a share of total exports (%), 2002***

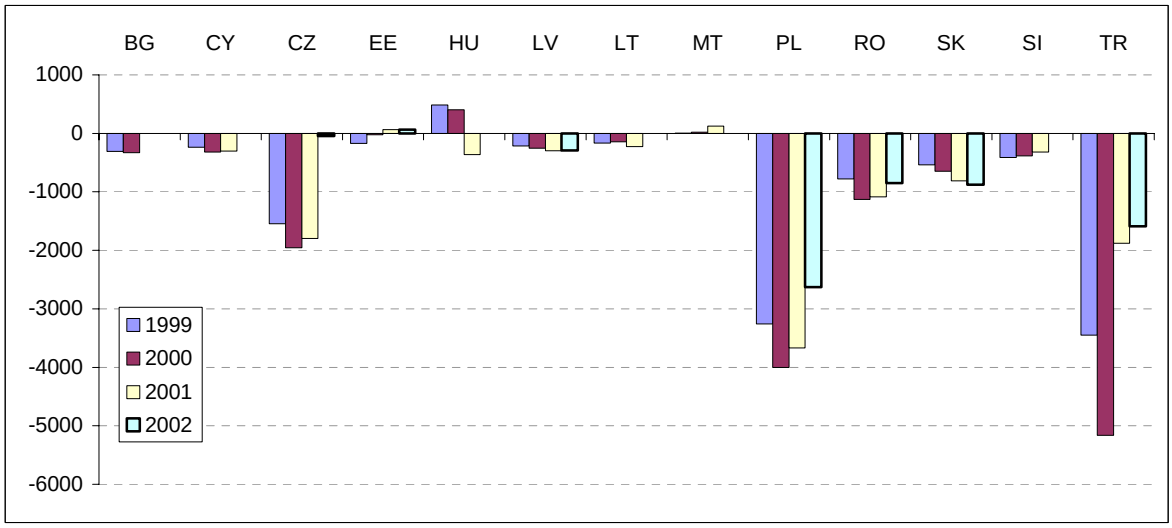



*Source: Country Monographs, 2003*

*c. The dynamic picture*

The dynamic picture presents the evolution of the trade balance of the ICT sectors in absolute levels. As can be seen from the chart all countries except Malta and to some extent Estonia and Hungary recorded trade deficits in this area. The growing trade deficit of Poland, Slovakia and the Czech Republic may represent the initial stage of the expansion of the ICT sector, when it requires more imports than produces exports, as the initial investments have high import content while export processing starts later.

***Chart 45. The evolution of the ICT sector trade balance in million of Euro, 1999-2002***




*Source: Country Monographs, 2003*

While the level of imports is similar or even higher in Hungary, Estonia and Malta, in these countries the production began to expand much earlier and countries now have much higher export and import levels as well. There is also a third group of countries (Bulgarian, Romania, Slovenia) where the production of ICT for exports plays a small role and where the trade balance varies depending on the strength of consumer demand.

## 4. The share of the ICT sector in employment

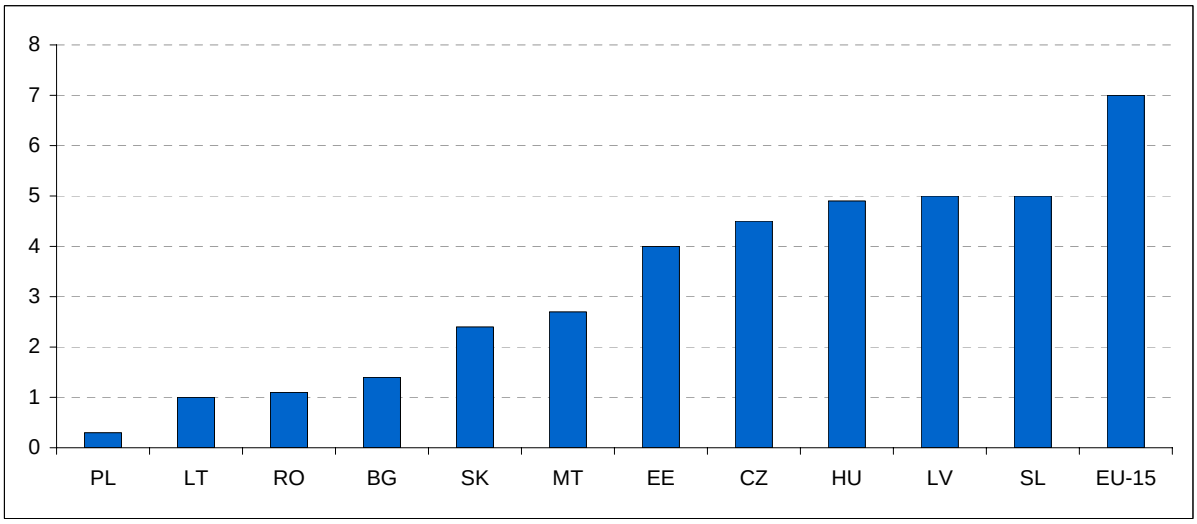
*a. Methodological note*

The share of the ICT sector in employment is calculated as the share of employment in the ICT sector to total employment.

*b. Snapshot*

In NMS & ACC-3, the share of the ICT sector in employment varies between 0,3%(Poland) and 5% (Slovenia). This share is lower than the average EU-15, where 7% of the labour force was employed in the ICT sector in 2002.

***Chart 46. The share of ICT producing sectors in total employment, 2002***




*Source: Eurostat, 2003 and Country Monographs*

Two factors account for the low share of the ICT sector in employment in NMS & ACC-3. One of them is the low level of ICT output in general: this holds especially true for Poland, Lithuania and Slovakia. In other countries, where the ICT sector makes a higher share of output, low level of employment is due to the capital intensive nature of production as ICT production generally represents the electrical equipment, phones and other similar products, which have high productivity levels and require relatively low labour inputs.

Second, this share is generally below the share of ICT in production, with the exception of the Czech Republic and Latvia. The low level in international comparison is also a reflection of high productivity growth in these countries, which can be seen both in the manufacturing sector in general and in the ICT production in particular.

*c. The dynamic picture*

The dynamic picture shows the evolution of the ICT labour force at absolute levels. Three countries have a big labour force in the ICT sector (Poland, Hungary and the Czech Republic), while in the case of the others the absolute numbers are very small.

The fact that Poland has ICT employment numbers close to those of the Czech Republic and Hungary sector, while its production output is much lower shows the disadvantages of the Polish economy in international comparison in attracting foreign investors and raising both the level of production and employment in these sectors.

## 5. ICT indicators: a cumulative conclusion

This brief analysis of the ICT sector in NMS & ACC-3 leads to several conclusions.

First, the data illustrates the existence of a group of countries rather at the forefront of ICT production capacities in the NMS & ACC-3: Malta, Estonia, Hungary and the Czech Republic[17]. Slovenia, Poland and Turkey show also some strength, but this sector is relatively less important for their economy. Each of those countries shows its specificities in the way it has developed an ICT production capacity.

[17] Bulgaria has also a relatively sizeable ICT sector due to the inherited legacies from the past, but the competitiveness of this sector and its expansion capacity is strongly limited.

Second, there is a more contrasted situation across NMS & ACC-3 in the case of ICT indicators than IST indicators. While in IST indicators the countries could rather be ranked in a continuum, in ICT production some countries show rather strong sectors, while others lack it. Several factors contribute to such differentiation between the NMS & ACC-3 countries, including the inherited legacies, the quantity and quality of available human and physical capital, economic policies pursued by the countries (especially with respect to privatisation and foreign direct investments), and the size of the domestic economy.

Third, the value and the market share of the ICT sector in NMS & ACC-3 is much lower than in the majority of individual EU countries and the average of EU-15. This reflects that the corporate and public sector's contribution to the ICT market is smaller and households also spend less in absolute and also in relative terms than in advanced economies.

Fourth, generally and on average for the NMS & ACC-3 countries, the share of ICT output in total is below the EU-15 levels (except for some countries with a strong FDI penetration and production in the sector). This also means that with Enlargement the NMS & ACC-3 countries' ICT sector will not change radically the size of the EU contribution to ICT-production world-wide. However, what may change is the internal division of labour in ICT production between the old and new Member States as the latter ones could be competitive enough to attract some of ICT investments from the existing Member States and Enlargement could result in a stronger reallocation of ICT production within the EU-25.

Fifth, the share of ICT-related spending and consumption is generally lower both at households and enterprises level than in the EU-15. But considering the past trajectory of EU-15 as well as the income convergence of most NMS & ACC-3 one may expect that spending and consumption levels will increase and will result in much faster growth rates for ICT production in several NMS.

Sixth, the future of the ICT sector is very country-dependent. Some countries may have the opportunity to utilise their size and develop a more competitive and stronger ICT sector partly oriented to domestic sales, utilising local market knowledge (Poland, Turkey and Romania). Others may lead structural reforms, which will bring sufficient increase in productivity and may help them in overcoming competitiveness problems and maintain their leading position in the region in ICT production (Hungary, Estonia). Finally, some (Slovenia, Czech Republic, Romania and perhaps Slovakia)may try to be more competitive by penetrating certain market niches where they have long-term competitive advantages over other producers.

Finally, and in line with the mentioned differences between ICT supply and IST demand there is less room in ICT to determine region-wide trends in sharp contrast to the evolution of IST. The position of a country in ICT production depends more on general competitiveness, supply side strengths and assets, which are more country specific than the factors affecting IST developments. Closely linked to this accumulated assets, comparative advantages matter a lot and therefore it is not likely that other than the mentioned four major producers (Malta, Estonia, Czech Republic and Hungary) will be in a position to develop competitive producer sectors.

# CHAPTER III.

## SOCIO ECONOMIC FACTORS THAT HAVE AFFECTED AND MIGHT AFFECT ICT/IST DEVELOPMENTS IN THE FUTURE

The 13 Country Monographs, used as a background to this Synthesis, identify a variety of factors that have contributed in the last decade to the development of the Information Society in the NMS and ACC-3 countries. The differences in economic structures, in development levels and in policies pursued during this period make these factors country-specific, but these factors were shared – with different timing and extent - as major common determinants of IST/ICT developments.

While in chapter II we have deliberately presented in separate sets the indicators relative to two facets of the Information Society - the demand or use-side of IST and the production or supply side of ICT-, such a strict differentiation holds less when aiming at identifying the determinant factors of such developments. Supply and demand are strongly related phenomena and their developments are influenced, unequally but simultaneously, by a set of common factors.

From the qualitative and quantitative analysis presented in the Country Monographs, we consider the following as having been the decisive determinants of IS developments in the nineties in NMS & ACC-3:

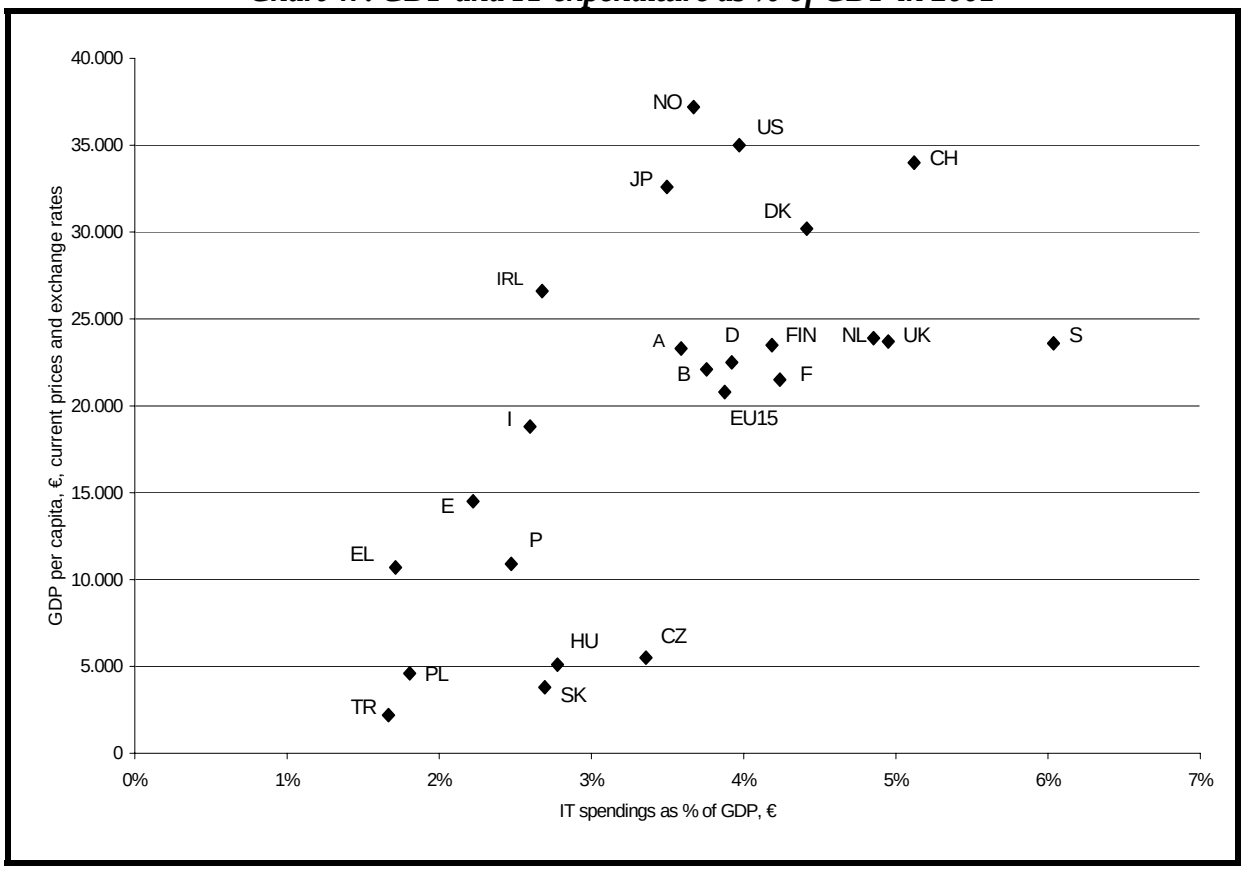
1. The dynamics of economic growth and income convergence
2. Strong restructuring and remaining structural legacies
3. Sustainability of public finances and public sector reform
4. Privatisation and regulation
5. Financial sector development and financing of the ICT sector
6. Proactive attitude of the private sector
7. Inflow of FDI and real and financial openness
8. Households consumption patterns and their changes
9. Educational levels and supply of human capital
10. Regional disparities and social divides
11. Demographic stocks and trends

This chapter reviews briefly those eleven long-lasting factors that have strongly affected the IS developments in NMS & ACC-3.

## 1. The dynamics of economic growth

The experiences of the 13 analysed countries confirm the results of international surveys (OECD (2002) for example), which show that income level and its growth strongly influence the nature and speed of the spread of information society. The chart below shows the strong correlation between the level of Information Technologies spending and that of GDP in industrial countries and the NMS.

***Chart 47. GDP and IT expenditure as % of GDP in 2001***




*Source: Slovakian Country Monograph, version August 2003. Graph quoted from EITO, 2002*

But economic growth in the transition countries was not a linear trend in the recent decade. An initial transition-related output collapse experienced in the early 1990s was followed by different recovery patterns: some countries (Poland) recovered soon and faster, while others (Romania and Bulgaria) later and much slower. In more recent years former transition economies have experienced fast economic growth that allowed them to recuperate the losses of the early 1990s, in some cases (Poland, Slovenia, Hungary) exceeding the real GDP level of 1990 and reducing the development gaps existing between them and the average of EU-15[18]. Non-transition countries had generally favourable economic growth over the analysed period: Cyprus and Malta grew twice as fast as the EU-15 average and Turkey had high growth rates notwithstanding its repeated financial collapses.

But growth has generally been fragile: both exogenous shocks (currency crises of the late 1990s, the spill-over effect of the Balkan war and recent EU slowdown) and internal problems (inconsistent monetary and fiscal policies, costly restructuring, corporate and banking sector consolidation, reversals in structural reforms, etc.) injected volatility to GDP growth. The most vivid examples have been Slovakia (1999,

[18] Especially high GDP growth has been observed in the Baltic States, followed by Poland and Hungary, and recently by Slovakia as well.

currency crisis and subsequent restrictive macroeconomic policies), Poland (2000 onwards restrictive monetary and lax fiscal policy for disinflation), Lithuania (1999, Russian crisis) and Turkey (macroeconomic imbalances, 1994 and 1999; earthquake, 1999). Such difficulties slowed down consumption and investment potentials in ICT production as well as use. While the accession to the EU for the NMS countries creates both new opportunities (trade creation and growth) and binding policy constraints (Stability and Growth Pact), these exogenous or policy driven shocks will influence IS developments in the short-term future as well. Therefore two scenarios can equally be envisaged: both the fast catch up of these countries and the muddling through case, where the exogenous and policy driven shocks continuously slow down and in the worst case even derail their catch up.

Growth and income convergence have been important factors affecting IS developments as growth increased disposable incomes and private investments allowing increased use of mobile phones, internet, growth in number of PCs. ICT spending – while having different and country-specific levels in the individual countries - started to increase in line with accelerating GDP growth in the second half of 1990s: while average ICT spending in GDP remained constant between 1993 and 1996, it increased by 55% between 1997 and 2001.

***Table 3. ICT spending/GDP (%) in selected countries between 1993-2001***

| Country | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | Avg. |
|---|---|---|---|---|---|---|---|---|---|---|
| Bulgaria | 2,23% | 2,88% | 2,32% | 2,71% | 2,97% | 3,11% | 3,60% | 4,12% | 4,17% | 3,12% |
| Czech Republic | 5,56% | 5,34% | 5,95% | 5,80% | 6,44% | 6,56% | 7,85% | 9,10% | 8,73% | 6,81% |
| Hungary | 4,17% | 4,32% | 3,88% | 4,28% | 4,46% | 7,50% | 8,23% | 8,93% | 10,02% | 6,20% |
| Poland | 2,06% | 2,08% | 2,16% | 2,28% | 2,57% | 4,59% | 5,43% | 6,06% | 5,95% | 3,69% |
| Romania | 1,07% | 1,09% | 0,93% | 1,03% | 1,28% | 1,39% | 2,09% | 2,32% | 2,41% | 1,51% |
| Slovak Republic | 4,23% | 4,18% | 4,04% | 4,02% | 3,89% | 5,55% | 6,78% | 8,12% | 8,78% | 5,51% |
| Slovenia | 3,02% | 3,03% | 2,92% | 3,08% | 3,39% | 3,72% | 4,42% | 5,26% | 4,72% | 3,73% |

*Source: Polish Country Monograph, June 2003 version, p.36. Quoted from: WITSA (2002)*

In general GDP growth, disposable incomes and resulting expenditure patterns (the share of GDP on ICT expenditure is higher in countries with higher GDP) explain partly the positioning of "better-off" countries (as Czech Republic, Hungary) in terms of impacts on the IS developments. But other factors have been equally important in explaining the spread of information society. Further explanatory variables should be incorporated when considering Estonia's position (low GDP per capita level / high IS development), the comparatively low ICT-related spending in Slovenia notwithstanding its highest income level among the NMS, or on the contrary the high ICT expenditure in Slovakia.[19]

[19] In Estonia and Malta, information society developed due to early policy recognition and the desire to catch up with advanced countries. In Slovenia low ICT-related expenditure was due to the sector being less exposed to external and market driven adjustment, and the private households' consumption patterns differing from other NMS. In Slovakia, the ICT expenditures higher than justified by income level were caused by income and price convergence, and by strong demonstration effects (Austria, Germany, and Czech Republic).

## 2. Restructuring: expanding service sector and reindustrialisation with remaining structural legacies

IS developments have been positively influenced by two structural changes that took place in the recent decade in the NMS and ACC-3: the expansion of the service sector and industrial restructuring (de- and reindustrialisation).

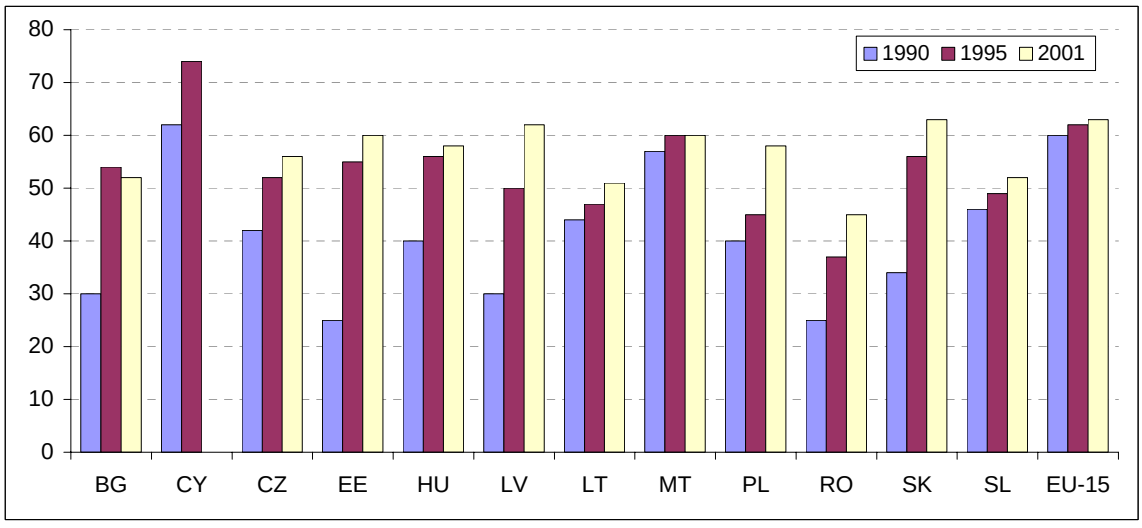
The expansion of the service sector has been driven both by supply- and demand-side factors. The former stems from the fast expansion of the formerly neglected service sector (banking, retail trade, logistics, etc.) due to the privatisation-opening-FDI inflows mix and the relatively easy expansion of several services due to their lower capital intensity and higher return on capital.

Demand factors are linked to income convergence, related changes in consumption patterns from primary towards tertiary consumption, and to the existing differences in the speed of price convergence in the tradable and non-tradable sectors. While tradable prices are basically equalised, the catch up of non-tradable (and service) prices is slower, making services cheaper, and leaving further scope both for their expansion and increase of prices.

The growing share of services has increased the demand both for ICT as some segments of the service sector are more ICT intensive than others. This is quite observable for example in Slovenia: services such as telecommunications, transport and storage, wholesale and retail have grown the fastest in the period 1993-2001. Together with financial services, those are the first sectors to invest in ICT solutions.

While the share of services grew fast everywhere, stock figures show that some countries still have slightly weaker shares, most notably the Czech Republic, Lithuania, Slovenia, Bulgaria and Romania. In these countries the full potential impact on IS developments of the shift towards service sector is only to be seen in the near future.

***Chart 48. The share of services in total output (%).***




*Source: European Competitiveness Report, 2002*

Industrial transformation and remaining structural legacies have been other important factors influencing IS developments. Restructuring started with de-industrialisation under changing market conditions, but in several countries (Estonia, Czech Republic, Hungary and with delay in Slovakia) it was followed by reindustrialisation and expansion of modern industries like chemical, machinery industries and ICT

sector[20]. Altogether only some of the analysed thirteen countries (mainly Estonia, Hungary, Malta and the Czech Republic as seen in Chapter II) have developed during the late 1990s such ICT production capacities, whose performance is relevant to the economy wide productivity, GDP growth or export share.

However, these developments have been dependent on FDI inflows and the technology and know-how transfer associated with it. Due to this and investments occurring initially in low value added activities (assembling for example) based on wage competitiveness, the resulting ICT production capacities have been exposed to continuous restructuring challenges. Countries that have a sizeable ICT-producing sector need continuously to compete with low wage middle income economies both to keep the established production facilities and to provide the necessary human and physical capital for the increase of value added content of their ICT production.

FDI had an observable and measurable effect on the overall economy, within it the competitiveness of the ICT sector, in countries with comparatively small size[21]. In the three larger countries (Poland, Turkey, and Romania) similar developments have been observed at a much smaller scale[22], partly due to their disadvantages in attracting FDI and to the presence of a vivid local ICT-producing sector. Their case shows that size matters and some of the larger domestic or foreign owned ICT companies located in these national markets may show a stronger growth on the longer term than the ones presently active in the smaller countries[23].

Besides the structural changes linked to the expansion of the service sector and reindustrialisation, the growth of ICT sector in some countries is indirectly affected by the presence of industrial and agricultural legacies. In the industrial sector countries as Poland or Romania need to restructure their giant and highly inefficient public sector based industries (as steel, shipbuilding or mining), while others (Hungary, Czech Republic, Baltic countries) need to speed up the restructuring from labour towards capital and technology intensive sectors. Moreover, big countries face the problem of the adjustment of their agricultural sectors, reduction of agricultural employment and streamlining of agricultural production, which is a serious structural and - considering the level of employment in these sectors- long-lasting social problem.

These legacies represent a serious problem for IS developments. First, above the general economic costs they deepen regional and social divides and thus digital ones: regions with collapsing industries or countries with disproportionately high agricultural population may find it difficult to commit resources for IS developments amidst these tensions. Second, the restructuring of these areas will be costly and will be financed by general governments constraining the amount of public funding provided for IS developments. Third, and closely linked, these structural problems may divert attention of policy makers from IS developments as governments may not weigh proportionately the short-term costs of structural problems versus the long-term gains from IS developments.

[20] In the three non-transition economies of Cyprus, Malta and Turkey the "creative destruction" effect of the transition was certainly not felt, and there restructuring was more gradual and balanced. On the other hand other trends of 1990s (increasing globalisation and openness of middle income economies, inflow of foreign direct investments, and privatisation of state-owned enterprises) were equally present and influenced industrial restructuring. In Turkey the recent decade brought significant upgrading of industrial potential and in Malta the huge investments in the ICT sector were one of the driving forces in reshaping the economic structure. In Cyprus however the structure did not change too much with a strong focus on services and agriculture.

[21] This is particularly clear in a case of Estonia.

[22] The dispersion of FDI and the relative size of ICT production do not allow to generate such an impact on the industry profile or the national economy as the "replacement" of old industries by ICT productive or intensive using ones is more "discrete" phenomena.

[23] Still, those large companies will never impact the national economies in a comparable way.

## 3. Sustainability of public finances and public sector reform

The public sector generally played a negative role in information society developments partly because its reform and the establishment of sound public finances have been one of the most difficult policy issues. First, governments generally lacked the needed financial means to support information society initiatives, because of continuous fiscal pressures and inability to restructure expenditures and revenues. Lack of IS-related funding weakened ICT penetration in household and public sectors: the need to maintain high tax rates reduced tax credits and concession for ICT investments, which could have supported the broader access of the population to information and communication technologies and high tax rates reduced investment rates in the corporate sector.

Second, the inadequate or missing reform of public services resulted in provision of public services and goods in an inadequate structure, efficiency and quality. The institutions in these areas have little incentives to modernise themselves and to proceed with a broad application of information society applications.

Finally, as governments were constrained by other priorities they did not pay adequate attention to IS developments at all levels of general governments. This has been reflected in two major weaknesses: in inadequate funding devoted to IS policies and in poor quality of content development in the public sector.

While these features characterize most of countries, there were differences among them: more attention has been devoted to IS policies in Estonia and Slovenia than in other countries. The governments' approach to IS developments has recently improved somewhat as more funding and more adequate programs were launched in several countries (Hungary, Poland, Romania and Slovakia for example).

The Country Monographs show that the contribution of the public sector to IS developments will be mixed in the forthcoming years as well. On the one hand, the amount of public funds devoted to IS development may increase and will be predominantly directed to two major areas. First, IS developments necessitate to mobilise public resources in eGovernment, eHealth, eLearning, etc. Second, more domestic sources will be devoted in the co-financing framework to EU funds (such as the Structural Funds), which could accelerate regional development and reduce regional and social divide, including digital one.

Second, while these investments are likely to happen, several factors will create problems for governments and strongly influence the speed of IS developments. Most countries face serious and structural fiscal imbalances, while according to several recent studies (Deutsche Bundesbank (2003), ECB (2004), Kopits-Székely (2004)) accession per se worsens fiscal balances by 1,5-2% annually in the NMS. As a result, the sustainability of public finances will require strict fiscal policies, which may constrain and make the availability of funds for IS developments more volatile.

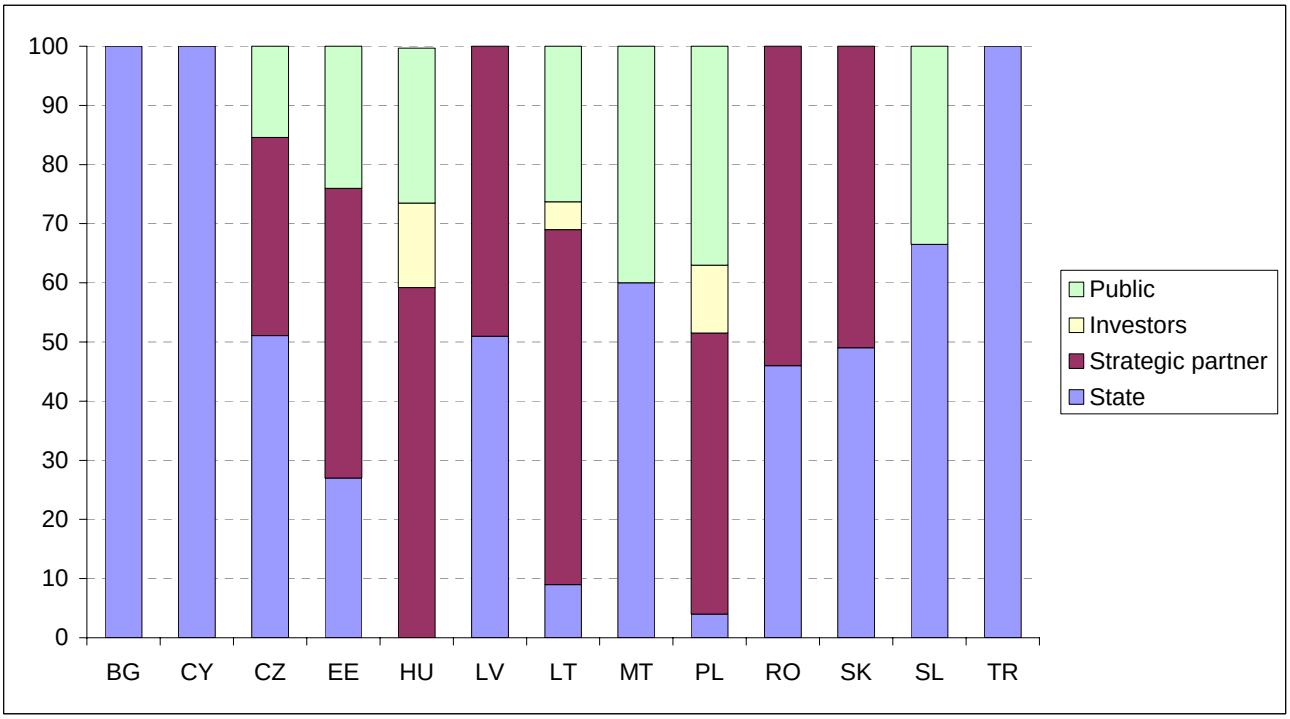
Third, countries are expected to reform the provision of and the principles of access to public goods: while these reforms will streamline public expenditures, initially they will lead to increased costs and might worsen fiscal balances. There is a trade-off between the speed and sustainability of reforms: fast public sector reforms worsen fiscal balances, may reduce the amount of public funds spent on IS developments. But the medium term outcome should be positive in case of well-managed and credible reforms and consistent policies. Moreover, the lack of public finance reform represents a serious threat to IS developments, as the financing of the current redistribution levels may divert resources from them.

## 4. Privatisation and regulation

Among general purpose government policies, which indirectly influence the development of the ICT sector, privatisation and regulation played a special role. In the former case the sale of the incumbent operator and other segments of the ICT sector were decisive, while in the latter case the competition policy on the telecommunication market and regulation of privacy and security issues, e-commerce, and digital signatures mattered the most. The divestiture in the incumbent operator was essential: the date and timing of privatisation has had an observable influence on technical upgrading, quality and tariffs.

There were three different "models" in terms of privatisation of the incumbent operator. First, in countries (Hungary, Romania and Bulgaria) where the incumbent operator was privatised mainly to foreign operators, divestiture was followed by new investments, which increased penetration and quality of services. Privatisation was carried out without deregulation and establishment of competitive markets as public monopolies were transformed to private ones. Privatisation required new owners to invest heavily in technical upgrading and services and financing of depreciation neglected prior privatisation, while on the other hand it generally provided guaranteed profitability for investors. The outcome of privatisation was mixed: the quality improvement and better access for fixed lines was accompanied by price increases to cover costs and guarantee the granted profits. The costs of privatisation without appropriate regulation came later when the presence of monopolistic supplier weakened price and non-price competition.

***Chart 49. The diversity of incumbents' ownership structures at the end of 2003.***

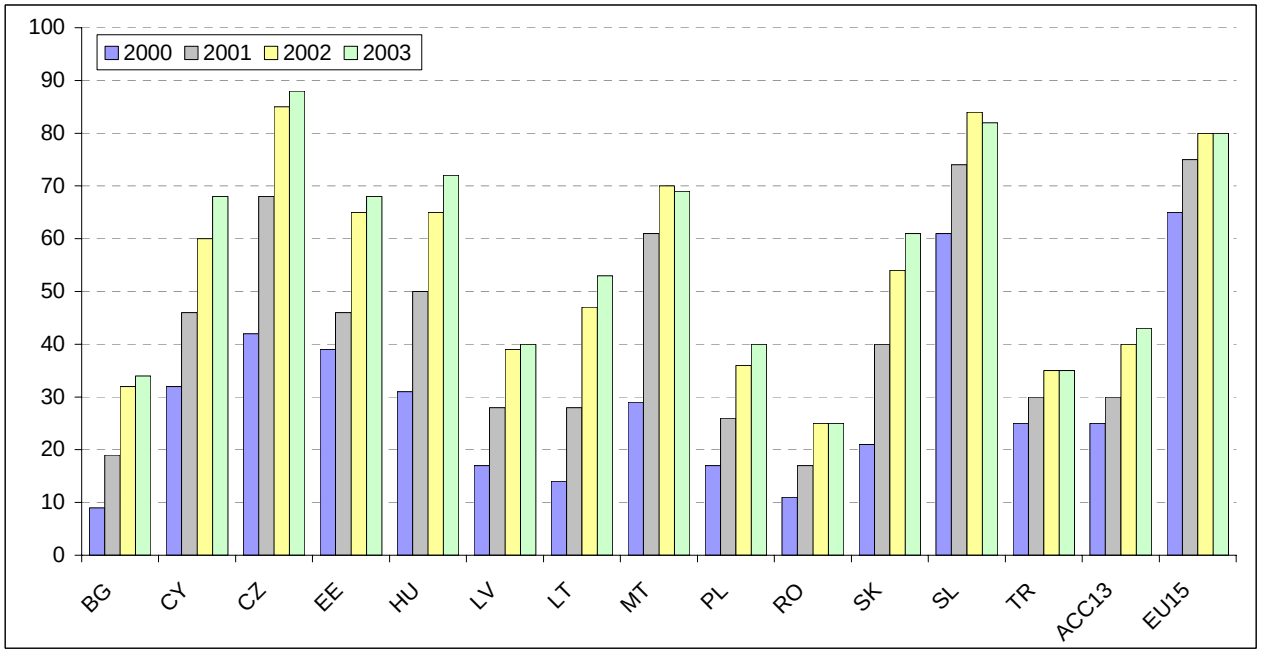



*Source: IBM, 2003. 4th Report on Monitoring of EU Candidate Countries. Based on NRAs data.*

Second, countries late in privatisation (Poland, Czech Republic) lagged behind in the qualitative and quantitative development of the telecommunications sector. Fiscal constraints, corporate problems, under-capitalisation of the incumbent operator, low level of technical development prevented fast modernisation of this sector. The slow privatisation of the incumbent operators had mixed effects on the telecommunication sector at large: while it slowed down the growth of fixed line market, it simultaneously increased mobile penetration, generating substitution from fixed to mobile access. While the country differences in mobile penetration are also the outcome of various other factors (income

growth and level, presence of alternative service providers, etc.), high penetration rates in Slovenia or the Czech Republic partly reflect the diversion from fixed line operators.

***Chart 50. The fast increase in mobile penetration rates (%) in NMS & ACC-3 between 2000 and 2003.***




*Source: Eurostat 2003 and Country Monographs.*

The third model (Turkey) was a mixture of the first two, where the ownership of the incumbent operator remained in public hands but heavy public funding in infrastructure developments was directed to catching up in fixed line penetration. The major drawback of this solution (besides the questionable efficiency of public ownership) is the dependence of financing on the state of public finances, which is a problem, among others in Central European NMS and Turkey[24].

Altogether privatisation was helpful for ICT development as it brought fresh capital needed for new investments, led to quantitative and qualitative improvements in the telecommunication sector. But the benefits were fully utilised only in those countries, where competitive markets were maintained and regulation was appropriate. However, the number of these countries was limited, as contrary to privatisation, regulation policies had a negative effect on ICT and within it telecommunication sector developments.

The major problem for regulatory authorities was the restriction of the market power of the incumbent operator. At the same time National Regulation Authorities were often kept in weak position and incumbent operators utilised all efforts to preserve their market positions by influencing the regulators. The major problems have been the inappropriate competition policy, lack of price regulation and measures against unfair competition and abuse of monopolistic powers.

Moreover, liberalisation of services typical in the 1990s for advanced economies did not occur and the pressure of lobby groups prevented the development of competitive markets, with the exception of mobile

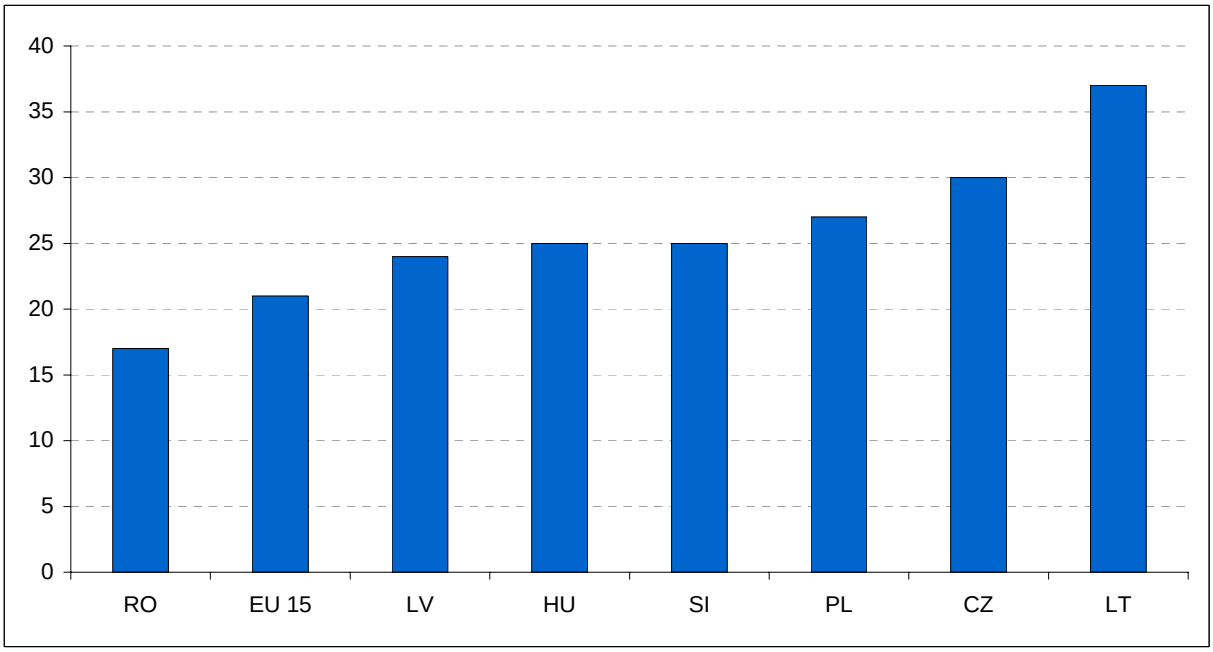
[24] In countries, where public finances are fragile, governments frequently have the incentive to improve the sustainability of the general government balances by postponing or reducing investments and financing of state-owned enterprises, which is reflected in the worsening quality of publicly provided services.

telecommunication[25]. The lack of competition resulted in low access rates, comparably high prices, and weak quality of services needed for the spread of ICT.

Besides the regulatory capture, the presence of serious loopholes in existing regulations and laws has been another regulatory weakness. In many areas, most notably in security, electronic commerce and electronic signature the legal background has been either inadequate or insufficient to establish the required level of confidence. Either the related laws have not been adopted in time, or their legal background and implementation have been weak.

One main reason behind these regulatory weaknesses has been the strong lobbying power of the incumbent operators, which prevented the adoption of appropriate regulations. In some cases privatisation was also responsible as it frequently explicitly limited the scope for competition and regulatory policies.

***Chart 51. Tariff rates in selected countries, measured by monthly off-peak access charges in Euro, 2002***




*Source: Eurostat, 2003*

## 5. Financial sector development and its financing capacity for the ICT sector

The financial sector in the analysed countries has gone through significant changes. Transition countries have created a private banking sector from a monobank system, with majority of assets in private banks, strong discipline effect of foreign owned banks, appropriate institutional, supervisory and regulatory framework. The three non-transition economies have also proceeded with strengthening the stability of their banking sector, improving the access to financial services and making their financial sectors more competitive.

Notwithstanding the fast catch-up of financial sectors and its close link with growth, the contribution of the financial sector to the development of the information economy has generally been weak. First, the financial sectors of NMS & ACC-3 are still considerably underdeveloped compared to those of EU-15 Member States: all major indicators of financial development (M2/GDP, banking assets/ GDP, stock

[25] There is still very little effective competition in the fixed line segment of the telecommunication industry in most of the analysed countries.

market capitalisation/ GDP) are only 25% to 40% of the EU-15 level, limiting financial intermediation of the banking sector and capital markets. A related weakness is the strong reliance on banking sector financing and the underdevelopment of capital markets and equity financing. This is an outcome of the German-type of financial development in the NMS and ACC-3 countries. The lack of capital market financing hampers venture capital and equity financing, making the ICT sector more dependent and vulnerable to banking sector shocks.

Second, the banking sectors of the analysed countries do not provide all financing instruments available in advanced ones with the most striking example being the financing of small and medium sized enterprises. Even in those countries, where increased competition for primary clients forced banks to seek new and more risky market niches, the general level of SME financing is very limited compared to advanced economies. A related backlog is the household lending, which until recently has remained generally insignificant notwithstanding its recent rapid growth in many countries. But banks do not have appropriate monitoring and financing capacity, they are risk averse and strongly under-finance household sector preventing it from consumption smoothing and increasing their ICT-related investments.

Third, long-term financing is still limited or is available mainly as foreign currency financing, bearing the exchange rate risk. The lack of long-term funding is due to low and declining saving levels, the weak ability of the banking sector to perform adequately maturity transformation, which leads to dominance of short and medium term assets. This creates problems for ICT investments, which are long-term, when the funding sources are shorter ones.

## 6. Proactive attitude of the private sector

In most countries and in particular in the few ones that have developed stronger ICT sectors during the period (Hungary, Estonia, Slovenia, etc.), the private sector has taken a major role in the development of the IS.

The most visible engine of IS growth has been corporate FDI, often targeted in ICT intensive and ICT producing sectors of the economy[26]. Another important actor for ICT sector growth has been the group of bigger domestic ICT producers, whose core business is at the heart of IS developments focusing both on producing these technologies, and delivering the accompanying services. In most countries, a notable lobby of ICT industrialists has been voicing for years in favour of further and more rapid absorption of those technologies.

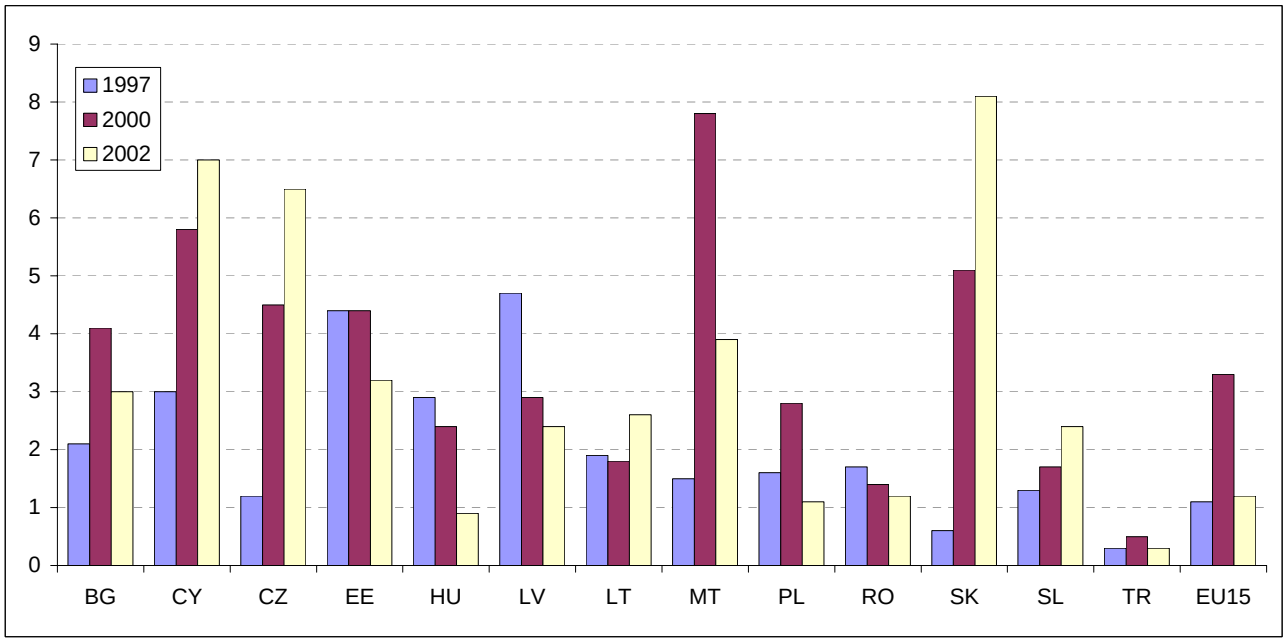
Finally, the new ICT-using entrepreneurs, - often leading small and medium sized companies - have to match and compete with other foreign and domestic companies: ICT are in some cases a solution towards productivity and competitiveness. However, empirical evidence in the analysed countries suggests that the take-up of ICT and their relevant use in these companies is not massive because of the lack of financial resources and of managerial and technical know-how which constrain the opportunities offered by such technological catch-up.

[26] In particular Telecommunications, the banking sector and insurance, wholesale and retail.

## 7. FDI and the economic openness of the countries

The expansion of the IS was heavily influenced by FDI inflows driven by the real and financial openness of the majority of analysed countries, by the price and quality of physical and human capital and by the political commitment towards foreign investments. Before assessing the impact of FDI on ICT several caveats need to be mentioned.

***Chart 52. Inward FDI as % of GDP in selected years***




*Source: Eurostat,2003*

First, besides the differences in statistical methods[27] there have been significant differences in foreign capital inflows in the individual economies because of the country-specific approach to FDI and the evolution of their cost competitiveness. Timing of privatisation was one of the key factors explaining Hungary's leading position between 1995 and 1997 followed by Poland and the Czech Republic between 1998 and 2001. On the other hand increasing competitiveness and attractiveness for foreign investors resulted in huge recent increases in FDI inflows to Slovakia and Romania. In Bulgaria, full privatisation of real and financial sectors to foreigners explains the high level of FDI, while in Slovenia a generally more negative approach was behind the observed low shares. Second, total FDI inflows have been volatile because of their close link to the timing of structural reforms, while green-field related FDI flows have been smaller and more stable. Finally when considering the role of foreign investments in the ICT sector it is more important to look at FDI stocks rather than flows. In terms of stocks the main recipients of FDI inflows (Poland, the Czech Republic and Hungary) have high values, but FDI/GDP or to population ratios show that there has been a strong dispersion among the countries.

The inflow of FDI significantly contributed to IS developments through three major channels. The first is the impact of FDI on ICT production as in several countries (Hungary, the Czech Republic, Estonia and Malta) the vibrant ICT industry and its high share in the national economy reflects foreign ICT-targeted investments. This positive effect of FDI was realised also through embodied technology effect as foreign investments accelerated the modernisation of ICT production. The second contribution of FDI to the IS came through the upgrading of industrial and service sectors through the restructuring of ICT-using

[27] Some countries do not account reinvested profits as FDI, while others also include in the foreign direct investment statistics commitments besides the actual disbursement, which makes the comparison between the countries sometimes difficult.

industries. This was followed by increasing demand for information and communication technologies. Third, in some countries foreign direct investments in ICT production gradually evolved from wage related assembly-type investments towards more sophisticated ones including regional distribution, logistics, research and development centres, which allowed the establishment of a more diversified investment portfolio and the keeping of ICT-related FDI. However, in many cases, the input of FDI in terms of human and technical know-how transfer was either limited or disputable: some investments have not been accompanied by major know-how transfers, and harsh competition on limited financial resources (FDI) might have led some countries to improve attractiveness by lowering constraints on R&D or training facilities.

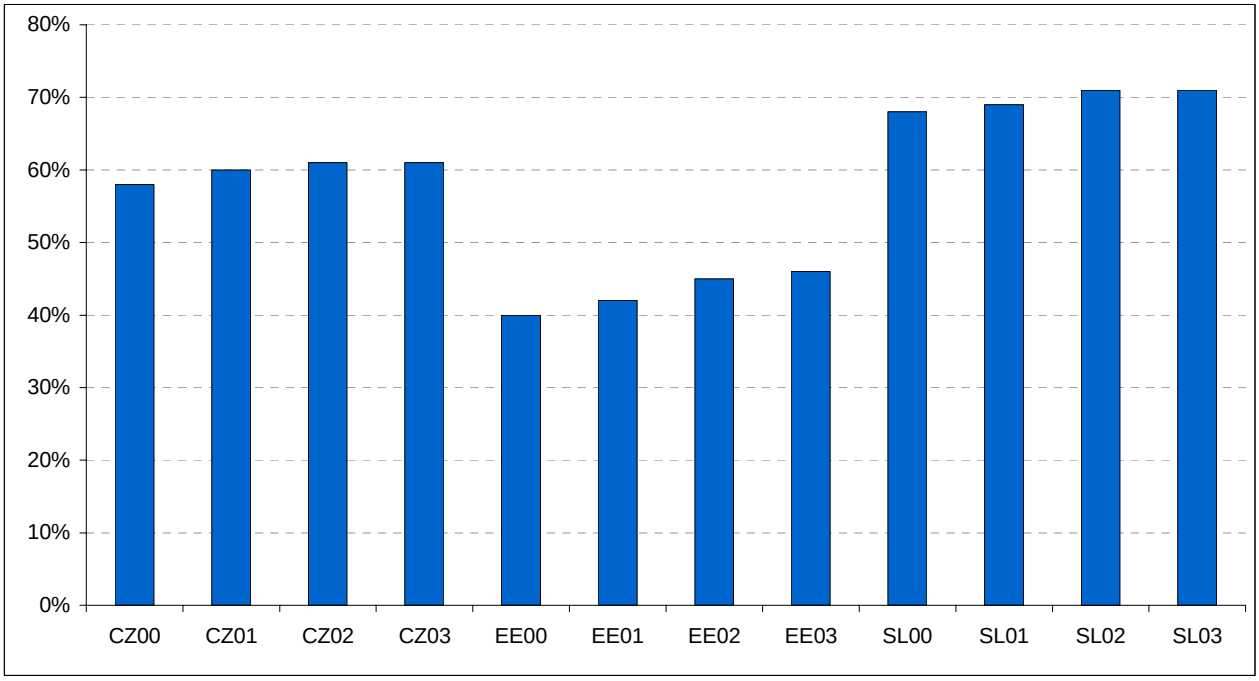
The accession of ten out of the analysed thirteen countries to the European Union puts the evolution of FDI in the ICT sector into a different perspective. In general, the entry of these countries into the European Union will not increase the amount of FDI inflows, as most of accession-related inflows have already materialised. On the other hand, it is likely that the new entrants will utilise their comparative advantages within the Single Market and their cost benefits will result in progressive redeployment of ICT related facilities from former to NMS. Some of the existing production facilities and some new outside investments may be brought to the NMS after the enlargement. While the increase of such investments is likely, their structure remains uncertain: it strongly depends on the evolution of the competitive advantages of NMS as well as on the changes in labour and capital costs, supply and quality of human and physical capital. If the NMS are able to keep the improvement of the quality of human and physical capital with its expected price increase, then new investments will increasingly be directed towards higher value added segments of the production scale.

Finally, it is expected that the inflow of FDI will concentrate on those countries which have so far been the major recipients of ICT-related foreign investments: their advantages in terms of local knowledge and links, knowledge of local markets, production advantages and concessions. Therefore it is expected that new FDI will be focused on those countries that have already received most of it. As a result no “flying geese” effect of ICT-related investments is likely to occur in the region.

## 8. Households consumption patterns and their changes

Closely linked to income growth, the evolution of purchasing power and consumption patterns have been important factors explaining IS developments. The purchasing power in NMS & ACC-3 is well below the EU-15 Member States both at absolute levels and in relation to price levels: measured both by the actual and long run equilibrium exchange rate, it remains generally below half of the average of the EU-15.

***Chart 53. Purchasing Power in the Czech Republic (CZ), Estonia (EE) and Slovenia (SL) in % of EU average in PPS, in Euro, 2000-2003***




*Source: Eurostat, 2003*

Linked to this difference in income and purchasing power, consumption structure is also different in NMS & ACC-3, as still a higher share of incomes is devoted to primary consumption: The income and composition effects simultaneously reduce the amount of disposable incomes available for IST services and products. But recent increases of purchasing power[28] and institutional developments led households to change slightly their consumption patterns devoting increasing shares of the disposable incomes to non-primary expenditures, including leisure or telecommunications.

This pattern is expected to prevail in the future considering the recent rise in consumption and incomes devoted for information society goods and services. First, all major forecasts project that – with country-specific speed - income levels of NMS & ACC-3 will converge towards the average of EU-15. Second, besides the level of consumption and incomes the evolution of real consumption is important, which considers price developments. Currently in most of the analysed countries price levels are closer to the average of the EU-15, than wage levels (WIIW (2004)) and, assuming catch up, it is likely that wage growth may outpace price increases.

Moreover, what counts for real consumption of information society services and goods is the evolution of their prices. While in general the prices of services (as well as of non-tradable goods in general) are

[28] This can be seen from the chart where – at least in comparison to EU-15 average – a low income (Estonia), middle income (the Czech Republic) and high income (Slovenia) country reflects the catch up of income levels and reduction of the still existing huge income gaps.

expected to increase faster than other prices, this is not likely in case of information society-related ones as their prices are expected to decline in line with global developments. As a result, the affordability of information society goods and services will improve and together with the increase of incomes and consumption will strongly contribute to the growth of their demand.

Third, besides its nominal and real level, income growth also has a compositional effect on consumption: its rise leads to substitution of primary consumption by more sophisticated consumption patterns (services, durable consumption goods). The increase of incomes and consumption will bring a shift towards consumption structures with higher services and IS content. The currently weak and fragmented middle classes are expected to expand and this will lead to a broader-based growth of information society related consumption.

Finally, the growth of private consumption is supported besides income growth by structural and institutional changes: the banking sector increasingly finances households and the share of consumption credit has been increasing, the extremely low level of households' debt started to grow, and the wealth effects on consumption should also be considered. These factors will also increase household consumption and the share of IS applications in total consumption.

## 9. Educational levels and supply of human capital

These countries have a good and relatively equally supplied human capital, well-trained labour force and highly skilled population. The stock of human capital (though in some cases there are structural differences between skills supplied and demanded) as well as the share of GDP devoted to education is high compared with other European countries and countries at the same income level.

There are several areas, where some of the countries are especially strong (like natural sciences and engineering in Central Europe) and ones where they have been particularly weak (language capabilities). The supply with good human capital is related not only to white but also to blue collar workers and in case of IST applications to the absorptive capacity of technological developments by the society.

The supply of human capital has also been influenced by recent efforts to improve the quality of education, the progressive introduction of ICTs in education, or the commitment to reach the European targeted 3% spending on R&D. First, educational reforms in the recent decade had a particular emphasis at increasing enrolment rates: as the main result a much higher share of the young generation is enrolled in tertiary education than in mid 1990s. These changes have also produced difficulties, as quantitative growth frequently has not been accompanied by qualitative one due to the lack of sufficient resources.

Second, information and communication technologies have been emerging in the educational system, but mainly as equipments and specific subject for studying, rather than tools for learning or teaching. The first steps towards their integration in the educational system have mainly been achieved: hardware and internet access show growing penetration rates in schools and universities and initiatives such as the Computer Driving Licences adopted by several countries are useful steps forward. Nevertheless, all actors agree that much is to be done to integrate ICTs in the education process.

Finally, studies show that ICT skills at professional level - an essential ingredient for delivering the necessary products and services in the domestic market - have also shown important growth, both at tertiary level and in long life training initiatives. The NMS & ACC-3 do not seem to be confronted that far to any serious skills shortage, notwithstanding the recent complaints in some countries about the mismatch of acquired skills.

While the current stock figures of NMS & ACC-3 are favourable in international comparison, educational systems have several loopholes and problems, which may spill-over in the mid term to the Information Society. First, educational systems spend important amounts on tertiary education but spending on primary and secondary ones declines proportionally. This is also accompanied by the worsening quality of education and poorer educational results at primary and secondary levels, which is a serious problem as its costs emerge with delay and it is time consuming to reverse the trend.

Second, educational systems have generally been underfinanced in the analysed thirteen countries: in relation to GDP or government outlays the share of education expenditures has been either smaller than in advanced economies or it has gradually been declining. Without adequate funding the negative spill-over effect of education loopholes will affect the quality of education system and feed back to information society indicators. Finally, while most countries have embarked on reforming their educational systems, these reforms were of limited extent and did not fully cover the financing, institutional and ownership structures.

Investment in human capital and associated changes in its quality and structure are a long-term phenomenon and fast changes are not expected among the countries. While all countries are relatively well supplied with human capital, the Central European and the Baltic States have the best starting position and may expect the most positive feedback from human capital on the Information Society. But even in these countries, governments still could accomplish major investments and devote more public funding to education. Educational reforms need to complement these additional funding sources by putting higher emphasis on primary and secondary education. They also need to invest on ICT literacy and skills to avoid skills mismatch.

Finally, the educational sectors (especially the tertiary one) are weakly connected to the national innovation systems. This means both institutional separation of public or private educational units from public R+D programs and that the links with the private sector (which still play a smaller role in national R+D efforts) are limited, mainly linked to some domestic or multinational big enterprises. Another problem is that the local government/development agency- educational units-corporate sector triangle does not function appropriately and thus the education units are disintegrated from this innovation circle. The costs appear in terms of underfinanced research and education and as a consequence brain drain.

## 10. Regional disparities and social divides

*10. a. Regional disparities*

The analysed and particularly the larger countries show significant disparities in terms of geographical dispersion of their economic activities. Capital towns usually, as in advanced economies, concentrate a major share of GDP, higher proportion of services, and serve as headquarters for major companies, as well as R&D centres or educational institutions. Besides the usual dominance of capital cities, the proximity to major market matters: in the Central European economies, in Romania and to a lesser extent in the Baltic region, western parts of the countries closer to major markets and sources of financial inflows are more developed than other parts.

Economic growth and new investments also shape regional disparities as regions with adequate public infrastructure supply and new private investments generally outperform those ones that lack such assets. This leads to a vicious circle as regions with better infrastructure tend to attract more capital, more flexible and qualified labour, which feeds back to new domestic and foreign investments, while the laggards generally accumulate the disadvantages.

Regional differences in the analysed thirteen countries, measured by income or employment/unemployment rates dispersion, are generally more important than those observed in EU-15. Moreover, income and employment gaps have widened compared with the situation a decade ago: the increase of regional disparities is a natural outcome of economic trends shaping the development of these countries. The regional divide reflects the legacy of earlier specialisation (i.e. industrial legacies, size of the agricultural sector) and how they have been affected by transition: some regions did catch up due to the presence of relevant skills, good geographical position, neighbourhood of potential markets, etc. while others lacking these assets fell back.

While regional disparities are an observable phenomena related to growth trajectories, several factors make them an acute and important point for the information society development. First, in the ten Eastern European countries, transition had a deep effect also on social disparities besides economic structures. The structural changes started with downgrading the existing economic structures in the early 1990s and increased the gaps among the regions. In majority of cases, "the winner takes all" development trajectories have maintained (or even broadened) the gaps even under higher GDP growth.

The extent and speed of structural reforms as well as the downgrading of "negative value adding" activities had long-term implications for regional disparities and for the availability of supply-side capacities relevant for the information society. While some factors (geographical location, traditional backwardness) are hard to overcome in a short period, existing market rigidities, social and structural problems (lack of appropriate housing, low labour mobility and also weak intra-regional capital mobility, etc.) maintain regional disparities.

Second, NMS & ACC-3 have several social and economic features, which magnify regional disparities. Among them the low mobility of the labour force, housing problems and the lack of rent market, the infrastructure (mainly transport related ones in that respect) weaknesses, the significant gaps between skills demanded and supplied, the low level of foreign language literacy make regional divide more difficult to handle.

Third, there has been inadequate attention and funding provided by general governments to mitigate regional divides. The lack of appropriate finances for compensating the necessary mechanisms to reduce regional divides, and the weak and unstable institutional background significantly weakened the ability of governments to handle regional disparities.

The impact of regional disparities on the development of the information society is both direct and indirect. The implications of several social divide indicators are serious, indicating the risk of emerging vicious circle of growing social disparity: unemployment rates and low revenues concentrate in areas with little training opportunities, little labour force mobility, lack of basic – and of course of high-tech – infrastructures, etc..

The lack of economic potential of lagging regions – especially inefficient industrial and service capacities, under skilled labour force, missing transport and lagging technological infrastructures - discourages the launch of new economic activities by the corporate sector. These regions do not attract FDI and consequently do not benefit from the related innovative dynamics.

Identically, the lack of skills and revenues, and even more, the lack of clear interest in ICT tools, refrain households from investing in new technologies. Additionally, lagging access to basic telecommunication infrastructure makes such investments either very costly or in extreme cases useless. As a result, the access and use indicators in such regions are usually drastically low.

Considering both the European objectives of an inclusive Information Society, as well as the necessity to develop a skilled labour force for the sustainable demand for emerging domestic businesses, such regional disparities seriously constrain the development potential of the IS.

*10.b. Social divides*

The existing social differences and gaps are other factors affecting information society in the analysed countries. First and foremost the difference in income distribution, as measured among others by the GINI coefficients in NMS & ACC-3 is generally above the EU-15 levels, reflecting a more uneven income distribution. Such measurements confirm earlier statements about the potential doubling of disparity indicators in the enlarged Europe, as compared to the EU-15 average.

High GINI coefficients and the income divide bring two further factors that weaken the spread of the information society. One is the much higher share of poor people and the vicious circles related to it, if appropriate social policies are missing. Second is the presence of weak middle classes, which would serve the base of the demand for information society services and products.

Besides income inequalities greater social divide is reflected in unemployment levels of NMS & ACC-3, which is – with the exception of some countries – generally above the average of EU-15. While some countries have lower unemployment levels, even there the structural features are unfavourable, as low unemployment coincides with higher long-term and youth unemployment. Unemployment in most countries is a structural phenomenon and while some countries (Slovakia) have recently been able to reduce it with structural reforms, in the majority of high unemployment countries (Poland, Romania, the Baltic region and Turkey) it remains a social problem. Moreover, NMS & ACC-3 have much lower employment and activity rates than older Member States.

Income and employment differences lead to differences in access to opportunities affecting the spread of information society. Certain strata of these societies fall back in access to education, to skill developments, to better employment opportunities and this reduces their ability to be integrated, striking back at the development of information society. School enrolment rates are much lower among the lower income and excluded group of the society, health problems are sharper and relatively more costly to solve. Besides that almost each country has an important minority group (usually identified on an ethnic basis) which has generally worse social indicators (including poorer access to information society).

*10.C. The growing social, regional and digital divide*

The mentioned widespread disparities in income levels, regional and some cases gender gaps are not expected to decline fast in NMS countries following their accession to the EU: just to the contrary, broader disparities are likely to emerge.

First, accession in the short-run will require serious adjustments from most countries, which will serve as another selection mechanism for catching up and lagging behind regions, professions and social groups. Accession is burdened by the existing structural weaknesses and legacies, which results in further social divides and gaps.

Second, accession will be costly in fiscal terms with the burden falling disproportionately on certain, mainly disadvantaged social groups and regions: in the short-term it will lead to increasing social disparities.

Third, even convergence is not expected to bring the reduction of regional or social divides. Considering the validity of the trade-off theory, which states that national convergence in the EU has been

accompanied by regional divergence, one may expect that successfully catching up countries will increasingly see broadening social and regional disparities.

Fourth, one should not forget that several countries have very poor initial social indicators in terms of employment, long-term unemployment or GINI coefficients and it will be difficult to make the necessary adjustments from their current level of disparities.

The country monographs have documented that perhaps with the exception of Cyprus and Malta the regional and social disparities have been recently increasing in the analysed countries. Due to the presence of structural problems, reform and streamlining of public services and the inequalising effect of EU accession, it may be expected that most NMS & ACC-3 will face a period of increasing social disparities. The extent of this depends on the speed of structural adjustments and the ability of countries to absorb external funds, both private and public ones.

## 11. Demographic stocks and trends

The overall demographic picture of the NMS & ACC-3 is quite close to the one of the EU-15, with the notable exception of Turkey. Most countries have an ageing population, but the first wave of impacts is expected to come a little later than in Western European countries, as today these countries still benefit from a broad young generation entering the labour force. [29]

However, the financial and social consequences of an ageing society will impact these countries in the mid-term in a way similar to the former Member States. The opportunity for NMS & ACC-3 is the time-window between now and 2010/2015: taking advantage of the emerging young and competent labour force to build up the economy and public finances, while solving the longer term issues of pension and health care through adequate reforms.

Pension schemes and exploding health costs have to be put under control, while the shrinking size of the labour force contributing both to production and to public finances needs to be handled too. These problems of ageing have to be tackled before they impact these countries, and indirectly their capabilities and resources in terms of IS developments.

Finally, the demographic data also have to be looked upon from a regional point of view. The emergence of rapidly ageing regions may weaken the social cohesion of countries and be reflected in related IS indicators. The apparent low mobility of populations and the strengths of their traditional networks (family, friends, village, church, etc.) may counterbalance positively the risks related to the concentration of wealth and activities in capital cities.

While still having an acceptably young profile, most of the analysed countries share with the EU-15 the challenge of being confronted to overall ageing of their societies. Among the analysed countries the Central European ones with their ageing societies show the biggest challenge on reforming the health care and pension systems. Some structural reforms have been delayed or only partly implemented up to now, but such delays may be paving the way towards a major crisis of public finances.

[29] Its obvious competence for technologies is a major asset in comparison to former Member States, where the re-training of the older generation to new production processes is seen as an important difficulty.

## 12. Summary and conclusions

The reviewed factors have affected information society developments in the individual countries in a variable and country-specific manner during the previous decade. But during this period, the NMS & ACC-3 faced the process of transition and accession shaping their policy priorities, while simultaneously they have been challenged by past legacies. As a result, high growth and changing consumption and investment patterns have neighboured painful economic restructuring and growing social divides.

Transition itself created a specific group out of the 10 Central and Eastern European countries with its own characteristics: privatisation trends, strong reshaping of institutions, changing markets, macro economic difficulties. After initial and country-specific years of transformation-related recession, all countries have witnessed GDP growth within the overall but slow process of real convergence. This in turn transformed consumption and investments patterns, bringing them closer to the pattern of advanced countries and fostering increased spending on ICT.[30]

The size of the country may have also mattered. As FDI and the accompanying know-how have played an important role in ICT sector development and in the technological modernisation of other sectors, its relative size compared with the size of the domestic economy gave it an opportunity to generate strong transformation, or remain limited to specific sectors, geographical regions, etc. Education levels have influenced FDI attractiveness and overall take-up of technologies by the corporate and household sectors.

Policies and public administrations have not always been able to follow the trends: regulatory arrangements were too weak to create competitive telecommunication markets, while public IS developments remained underfinanced and of low priority on the governments' agenda, both for access and content.

Legacies are also country-specific and might be industrial or agricultural, regional and social, or may be linked to the lack of diversification of products or markets. While the shift towards services has been general, there remain many differences among economies with questionable outcome: they may either become a source of specialisation or of a burden.

All such elements have, at least indirectly, influenced IS developments and they emerge as an "explanatory context", relevant for explaining the circumstances of IS policies. They can also help understand how and why some countries are today better positioned than others when considering IS indicators (See chapter II). In the case of the Czech Republic the strengths of IS indicators is partly an outcome of the relatively well-developed industrial and services sector inherited in the early 1990s. This good heritage was strengthened by the qualified labour force, which helped increase ICT production when the privatisation and other policy preconditions were met. On the other hand, the Czech Republic had a more balanced income distribution across its regions than the majority of NMS, which allowed a more equal and broader access to IS applications and use.

In the Estonian case the presence of very liberal policies and the recognition of the importance of the information society were the major driving forces. While the country has certainly inherited mixed assets (low level of development, Russia-oriented economy, but good geographical location, macroeconomic stability, adaptive labour force), the pragmatic approach to liberalisation, opening, and privatisation created the background for integration to the "Scandinavian industrial cluster" and the generation of a vivid ICT sector. On the other hand centrally driven IS policies supported and drove the broad-based access and spread of IS technologies.

[30] Notwithstanding this convergence even the NMS remain a heterogeneous group on this aspect, with very variable available financial resources

In Hungary the inherited assets (earlier economic reforms, well trained labour force, and presence of certain industrial legacy) were important together with a very pro-active investment and FDI oriented policy. The competitiveness advantages led to huge increases in ICT production and the country was able to maintain its advantages even recently, notwithstanding the growing competitiveness problems. On the other hand, economic disparities and insufficient policies prevented the use of information technologies and services from spreading as fast as their supply and production.

In Slovenia the high and relatively equally distributed incomes, the milder social problems have been the factors explaining the good performance with IS indicators. The country has been able to manage better the social and income divide and to proceed faster with the reform of the public sector, and recently took a more open approach towards privatisation and other structural reforms.

Malta has utilised its advantages in terms of incomes level and similarly to Slovenia smaller social and regional divides (due as in the case of Slovenia to the smaller size of the economy as well). The country has been open towards FDI and with skilled labour force this resulted in an increase of ICT production.

Linking the analysis of Chapter II with the strengths and weaknesses presented above leads to several conclusions concerning the role of certain factors in fostering IS developments.

The analysis of the factors shows that there have been real differences between the 5 “leading” countries above and the other ones, which explain the better performance of the former group. The major differences are the following:

- better inherited structural, economic legacy which resulted in less costly (except Malta, Turkey and Cyprus, which were not transition countries) structural reforms, smaller social and regional divide, smaller social costs
- positive approach to privatisation, liberalisation, acceptance of foreign direct investments (except Slovenia till recently)
- location has also been important: all five countries are close to major markets and sources of FDI inflows and therefore they have been better integrated than others to the European production networks,
- early policies more focused on IS developments played a distinctive role
- Less social and regional divide was also important on the demand side of the story.

While these factors have been important per se, country experiences show that besides inherited or acquired assets, there is a room – and necessity - for information society policies to make a difference in IS developments. Estonia is a good example as the country had bad assets at the beginning of the transition, but well designed policies, and specific measures in IS developments allowed to transform itself to one of the leaders in IS developments. But the number of countries that has identified in time and applied appropriately the needed policies is limited: one can say that assets have so far contributed more than IS policies to the development of the information society in most of the thirteen countries.

# CHAPTER IV.
# INFORMATION SOCIETY POLICIES IN NMS & ACC 3

Information Society policies have been developed at national level in all NMS & ACC-3. Still, there are several common elements that can be highlighted following two dimensions: the content of policies and their institutional setting.

The content dimension can also be divided into two major parts: the Direct Information Society policies, which directly affect the development of Information Society: awareness-raising actions, measures supporting ICT access to infrastructure and equipment, government programs on digital content development or improvement of the ICT knowledge base; the Indirect Information Society policies which influence Information Society developments by improving their framework conditions: telecom privatisation, regulation and competition policies, taxation schemes and investment promotion, R+D and education policies. One could say that direct policies influence mainly the demand side of the Information Society , while indirect policies generally rather impact the supply side (the ICT sector).

On the other hand, the institutional setting relates to the organisational framework in which policies are developed and implemented: it implies government coordination, presence of local or regional institutions, involvement and cooperation with the private sector through public/private partnerships (PPP).

## *1. Direct IS policies*

The general features of direct IS policies in NMS & ACC-3 can be summarised in the following points.

**1. Shifting importance of IS related policies.** There has been a gradual shift in the importance attached to Information Society developments on the political agenda. The first half of the 1990s was characterised by a relative unawareness of IS policies at government levels. Four factors diverted in the last decade the attention of governments from coherent and unified IS policies: the structural and macroeconomic problems of transition to market economy accompanied by the strong lobbying power of interest groups, the continuous pressure from public deficits, the slow progress with public finance, institutional and human capacities reforms, and the strong priority given to the implementation of the *Acquis* reducing the amount of funding available for ingenious IS developments.

As a result, with some exceptions (Estonia, Slovenia) most countries started to develop independent and coherent IS strategies with delays and only some elements of Information Society development can be found in the programs of functional/branch ministries. In some other countries programs were present but governments either did not pay enough attention to them (Slovakia, Lithuania) or they were of less relevance to IS developments (Hungary).

But the process of enlargement, the effect of IS-related EU programs and the accession itself mobilised governments to increase the weight given to Information Society issues. In more recent years, governments started to record the existing gaps, while the pressure from structural problems eased and more attention was directed to IS policies.

As a result, in the last 5 years more was implemented than during the whole decade and a much more comprehensive approach was taken. This increased awareness was reflected in more specified programs: governments defined IS policy targets and priorities, established programs outlining future IS developments and determined their ways of implementation. These documents and policies reflect the

revised attention devoted at government levels to IS policy as they have become an integral part of government policies. Moreover, the strategic documents have been followed by direct and concrete policy measures assigning specified targets, tasks and also budgets for the implementation of the programs[31].

***Table 5. A summarised view on early IS policies across the NMS & ACC-3***

| | First IS policy | Year |
|---|---|---|
| BG | National Strategy for the Development of IS (name) | 1999 |
| CY | Information Systems Strategy | 1987 |
| CZ | National IS policy | 1999 |
| EE | The Estonian Way to the Information Society | 1994 |
| HG | Informatics Infrastructure Development Program | 1986 |
| LV | Long-term Economic Development Strategy of La | 2001 |
| LT | Lithuania 2000 | 1992 |
| PL | Proclamation on Information Society in Poland | 2000 |
| RO | National Strategy for the Information Society | 1997 |
| SK | Concept of Communications Development in the Slovak Republic | 1993 |
| SL | Blue Book | 1999 |

*Source: Country Monographs*

**2. Mobilising effects of EU Accession in the NMS.** The accession to the EU has generated its own impact, influencing part of the national policies or at least facilitating the decision-making processes on some subjects. In several countries, beyond the effects of benchmarking and exchanging experiences initiated by the eEurope+ action plan, national IS policies have taken on board the objectives, actions and indicators developed in the successive eEurope Plans, initially designed for the EU-15 Member States.

The participation in and demonstration effect of EU programs and goals (eEurope, Lisbon target) became more pressing and more attention was directed to developing appropriate IS policies. The mobilising effect of EU accession was felt in the adoption of regulatory changes, in harmonising the rules affecting Information Society developments and in aligning policies with the EU ones.

**3. Close reflection of eEurope initiatives in government policies.** In the analysed countries the goals of national IS policies reflect the eEurope initiative and are in compliance with general European trends both in terms of targets and instruments of implementation. This allows policy makers to develop policies in line with the European trends, and strongly facilitates EU compliance and the full participation in benchmarking exercises.

There are two problems with these goals however. First, there is still a simplified understanding of IS policy among political and administrative bodies: for example the major driving factors towards IS developments, as growth potentials or digital divide risks, are sometimes ignored or misunderstood. Second, even with goals coherent with European ones, policy makers need to understand the special features of their countries in terms of level of development, private sector activity, structural features and driving forces of economic growth. With similar long-term visions, policies should be targeted and adapted in countries with different development levels, specific penetration rates, and in general, IS use standing at a fraction of EU-15 average levels.

[31] However, some of the Country Monographs still note the absence of such action plans for IS, backed by specific budgets and implementation provisions.

**4. Generally limited public funding for IS initiatives.** Public sector IS initiatives could have played an important role in the expansion of IS, but in comparison to the private sector, their contribution have been low due to fiscal pressures, general lack of political and managerial awareness about the potential benefits of IS developments and IS policy weaknesses. The lack of public funding is observable in various areas. First, governments both at the central and local levels did not attribute sufficient resources for content developments in the public sector: the digitalisation of public services is low, the content on online services is weak, ICT penetration rates in the public sector are low and the ability to handle administrative procedures is constrained.

Second, the low availability of funding to upgrade existing human and physical capital in the public administrations contributed to the differences in IS development. Where more funds were devoted to the expansion of human capital, infrastructure and equipment, ICT use could flourish much more rapidly, when comparing across countries and administrations.

Finally, the lack of funding reduced the scope for public initiatives which could have additionally boosted ICT investments (and thus domestic companies, including through public procurement), encourage use among households and companies and improve internal efficiency of the public administrations.

**5. Fragmented direct IS policies.** As IS policies have never been on the top of policy priorities they were generally treated as a residual and governments generally lacked an appropriate and coherent policy strategy. IS policies remained fragmented and dependent on other policy outcomes: detailed action plans have sometimes been missing or remained incoherent, general policies and priorities have not been co-ordinated with the targets of functional/branch ministries. Fragmentation is costly in terms of lost funding, conflicting goals and reflects the usual tensions between spending ministries themselves, spending ministries and Ministry of Finance, and if the government has centralised bodies (Prime Ministers Office or any other high ranking authority) responsible for IS developments between them and other branch ministries.

Furthermore, there is still an obvious lack of appropriate funding sources both at national and especially at regional levels and a relatively low priority given in the budget discussion to IS developments needs, as compared with other ministerial budgets. Governments have generally been unable to link structural problems (health care and education, local governments, public administration, etc.) with IS solutions that could have helped both in the reforms of public finances and in spread of IS applications.

**6. Gradually improving attention to access.** Until the late 1990s most governments did not devote much attention to access to Information Society services and technologies. Access means two simultaneous things. First, that governments support indirectly the demand for Information Society technologies by stimulating the access of households to hardware and software: examples include tax deductions or supported lending in case of IS related investments, direct support to specified target groups (teachers, disadvantaged groups, etc.). Second, it also means that besides private sector initiatives, governments are actively involved in creating the supply side of these services: investment in public access points is one good example. In those cases governments act through financing and providing these services. They also have a role to play as regulators as they can influence market conditions, competition, price setting behaviour, market entry and exit conditions, which directly feed back to the promotion of access to IS services and technologies.

There have been government programs in the aforementioned areas, most notably in the Czech Republic, Estonia and Slovenia, but these measures did not form a coherent strategy and several other obstacles (weak regulation of incumbent operator) neutralised the government policies. In recent years this neglect has been revised and more attention is devoted to access.

**7. Poor results with content policies.** Information Society policies have little targeted and developed initiatives towards the digitalisation and use of public sector content. With the exception of Estonia and Slovenia, eGovernment initiatives remain rhetoric, and only few measures have been implemented to accelerate their emergence. Both the NMS & ACC-3 have significant gaps in eHealth, eTax, eLearning areas as compared with the EU-15 countries, as in this case even the development of programs, the establishment of legal background has frequently been missing. As the foundations are inappropriate, the content of online information provided by public authorities is scarce, and most applications have passive structure and design.

With some exceptions government policies did not devote enough attention to this both at the central government and local/municipal government levels. The reasons of this insufficient public sector content are partly financial, partly managerial (lack of awareness and skills) and partly due to the lack of critical mass of users.

These areas would however be very important for development, as digital content improvement and reform of public services could be connected with positive spill over effects. In NMS the access to EU funds may accelerate this development, as eGovernment and content development have been determined as one of the key priorities in their National Development Plans, and more external funding may also overlap with more domestic sources given for this purpose.

Summarising the direct IS policies the following conclusions can be made:

1. There has been a shift in time in preferences devoted to IS policies: initial neglect has been replaced by rising awareness in recent years
2. EU accession had a mobilising effect on NMS
3. IS policies have been increasingly driven by and aligned to EU policies and goals
4. However, policies remain fragmented and under-resourced
5. There has been a change in access policies as governments increasingly support it
6. However, content development in the public sector remains very limited.

## *2. Indirect IS policy measures*

Indirect policy measures are mainly linked to the production of ICT: privatisation, investment promotion, tax policy, and innovation and R&D policy. Similarly to the differences in size of ICT sectors, policy performances of countries differ too: some have implemented more radical policy measures, while others lag considerably behind, which reduces the scope of general conclusions. Some indirect measures are related to access to IS technologies and services: regulation and education are two important policy elements in this area.

**1. Investment policies:** all countries benefit now from liberal and stimulating policies in the area of investment. This refers not only to foreign direct investments but also to investment by local enterprises, particularly in the SME sector. This is embedded in the tax regulations, and aims at providing as much as possible public support and aid for local investments, while keeping them in compliance with EU regulations. It has also boosted competition to attract foreign direct investment, in general and in the ICT sector in particular.

**2. R&D and innovation policies:** the case of R+D policies is more complex. Funding is lagging behind both in case of private and public sectors, the necessary policy measures stimulating private sector R+D

expenditures being absent or insufficient. In many countries the existing R+D budgets seem to be rather allocated to insufficiently productive research institutions, and the co-operation between public and private research, in particular in market oriented applications is scarce. The R+D sector needs to be restructured in line with rethinking the innovation policy, a trend which is slightly observed in most countries. The role of technology in the economy, in particular of ICT, has still to be defined in terms of improved competitiveness.

**3. Regulation and Competition policies:** regulation and competition policies would have been the most important instruments but they have given insufficient support to IS developments in NMS & ACC-3. . The major problem has been the lack of appropriate regulatory power to reduce the market power of incumbent telecom operators, who have been able to utilise their strong lobbying power to keep their market positions and prevent competition on their markets. This has been a major weakness in government policies and affected strongly IS developments in basic access indicators.

**4. Education policy:** Finally, the analysed countries have generally inherited well-developed and competent education systems, whose benefits are still observable, while there are numerous emerging problems, which gradually feed negatively back. First, funding for education is declining in relative terms as compared to a decade ago. Second, in many countries, there is an unfavourable shift towards more funding provided to tertiary education at the expense of primary and secondary ones, which creates mismatch in labour supply and demand. Third, curricula developments lag behind current requirements, reflected in worse results of students in international comparisons. In all three aspects, these affect directly the potential for essential IST developments in the educational system. Beyond these general trends, specific issues are also observable in terms of ICT skills mismatch , insufficient introduction of technologies in Education, etc.

Summarising the indirect IS policies the following conclusions can be done:

1. ICT production has been favourably supported by strong investment promotion (FDI and domestic)
2. Further spread and especially increase of higher value added ICT production depends on R+D expenditures, innovation policies, which are far from the required levels. Support to the future competitiveness of other sectors of the economy also depends on a better setting for innovation.
3. Weak regulation and lack of competitive market structures have been major weaknesses undermining the developments of better access rates
4. In the education system, lack of funding, emerging imbalances and qualitative problems also weaken IS developments.

## *3. The institutional setting*

**1. Coordination and commitment:** In the 1990s there was a lack of coordinated public and coherent strategies in most countries, with some exceptions (mainly the Baltic ones). Recently, this institutional setup for IS policy changed towards the establishment of independent institutions (a ministry or a high level committee) being given the task to co-ordinate and lead the work. Moreover, in some countries IS policies have also been delegated to higher governmental levels including the Prime Minister's Office or another institution that has the ability to co-ordinate IS-related policy issues at the inter- ministry level. The creation of these new institutions is a positive step compared to the previous situation, when nobody was the "committed owner" of IS policy. Still, those bodies have often been established with low budgets and scarce staff, their voice within the government remains weak compared to the strength of other spending ministries. Due to the absence of a competent and legitimate body to represent the IS challenges

and goals, IS initiatives always were devoted rather small shares in national budgets, or large shares that were later not committed.

**2. Regional policies:** Another institutional weakness has been the absence of regions in the formulation of IS policies. This is indirectly linked to the state of public finances and the lack of consensus in many countries on how to reform public administration and manage the relationship between the different levels of government. Consequently, the absence of relevant regional-level IS policies is a major issue with broad implications. National governments do not have always developed visions and policies for regional IS developments, while regional authorities (even at the NUTS-2 level) do not necessarily have the appropriate power and means to prepare those regional IS policies. Together, authorities have not allocated relevant budgets for their own policies and for co-financing of IS regional programs linked to Structural Funds. Last but not least the issue of national/regional co-ordination is often unresolved.

**3. Domestic cooperative settings:** Another serious institutional weakness is the weak co-operation between government institutions and the private sector or the civil society. While the private sector has generally been actively supporting IS policies and programs, most governments have so far been unable to establish a well functioning relationship with it. There has been an increased reliance on public-private partnership programs (PPP) in many public services (health care, education sector among others). While these programs have their drawbacks and need many institutions and elements to be in the right place (appropriate regulation, procurement rules, transparency of decision making and operation, continuous monitoring and oversight, etc.) which are not always present in these countries, they may involve more funding from the private sector, more control over public spending. So far IS programs have benefited less from the PPP initiatives.

**4. International Cooperation:** At international level, the accession to the EU, together with the eEurope+ action plan and benchmarking exercise, have been important factors driving to the adoption of national IS policies. With the accession in the background, governments have acknowledged that the future development of IS will crucially depend on the way EU regulations are adopted in their country and EU funds are absorbed and therefore they have taken several pro-active measures to prepare to those changing conditions.

But, little has been achieved in terms of other multilateral international cooperation. Some initial trials among NMS (at Visegrad, as well as at Baltic level) have until now reached little achievements. The benefits of cooperating to gain economies of scale, test international solutions and voice as a group in international institutions are still not at hand. On the contrary, the Scandinavian/Baltic alliance is an obvious example of shared goals and achievements and might pave the way for other similar settings.

Summarising the institutional set-up, the following conclusions are the most relevant:

1. As an outcome of enhanced attention of policy makers to IS policy issues there has been an emergence of IS co-ordinating and legitimate bodies at national level

2. There has however been a general lack of co-ordination with regional authorities

3. The private sector and the civil society are rather neglected or under estimated in national or regional cooperation settings; there is also a lack of PPP initiatives,

4. There are little efficient co-operative agreements at international level

# CHAPTER V.

## FUTURE SCENARIOS, POLICY TARGETS AND INSTRUMENTS FOR IS DEVELOPMENT

This last chapter gives some thoughts on the most likely development trends in information society developments in the NMS & ACC-3, which shape the future policy targets and instruments. While the current level of economic and IS development, legacies and structures as well as the future catch up potential are country-specific, there may be certain common trends that shape IS developments, in terms of use and of production, in the analysed countries. First these commonalities are presented, followed by the assessment of those policies that may be required to achieve a visible progress in the information society indicators.

## *1. The likely scenarios of IS development in NMS and the ACC-3*

**1. Lisbon convergence.** Before assessing IS trends, it is important to make assumptions about the likely scenarios in Lisbon indicators, as they directly or indirectly affect in the IS development in the NMS & ACC-3.

It is expected that the gaps in most Lisbon indicators will narrow between the new and the former Members States, but the speed of convergence will be country-specific. When looking at the indicators, it is likely that GDP per capita, labour productivity, business investments, R+D expenditures and spending on human resources will be the indicators where most of convergence is likely between now and 2010.

Ongoing structural changes and the remaining institutional weaknesses prevent from a fast convergence in other indicators, including employment and older aged workers unemployment rates, long-term unemployment and regional cohesion. In these domains, slow or no convergence is expected, moreover, in some cases – like the regional cohesion – fast catch up of countries may coincide in broadening regional differences within the catching up economy. Convergence will be conditional in most indicators depending on the country-specific features.

**2. ICT sector:** The following major prospects regarding the ICT industry in New Member States and Candidate Countries by 2010, might be expected under a “business-as-usual” scenario (all equal conditions):

A. Looking at the trends in the production of information and communication technologies, it is likely that the current inter-country differences will remain, as economies with solid ICT production will maintain their advantage over others: spill-over effects, presence of well established producers and other factors may stimulate this process. The “polarisation” in ICT production is thus expected to remain and grow within the overall logic of “first movers” advantage. While there might be some countries, which may attract more foreign direct investments in this area (Slovakia and Romania are two recent examples) and will increase their ICT production, it is likely that others will not catch up and the Estonian, Hungarian, Maltese and Czech leading position will remain unchallenged .

B. The enlargement of the European Union brings new restructuring within the ICT sector, and the unified enlarged markets will see changes in the geographical composition of production de pending on the evolution of factors of competitiveness. One could already identify the fact of the ICT industry moving from Western Europe to Eastern Europe beginning the process of re-location of European ICT industry. These moves have primarily been linked to manufacturing activities but in some cases services

did appear too. In the longer run, the internal division of labour in ICT production between the former and new Member States may change significantly as the latter one could be competitive enough to attract some of ICT investments from the former fifteen Member States and the Enlargement could result in a stronger (even if provisional) reallocation of ICT production within the EU-25.

C. A related expected development is the increasing cost competition between Central and Eastern European and other middle income countries, which will increasingly force this region to change the composition of ICT production towards higher value added product niches.

The simultaneous with intra-European reallocation changes in production are identified in moves from Hungary, Estonia, Malta or Czech Republic to Ukraine, South-Eastern Europe and to Asia (mainly China). While those moves present potential challenges which should be assessed as a possible restructuring of global division of labour under market conditions, the "flying geese" effect of IT production in the NMS & ACC-3 is unlikely to happen. Either wage based production will completely loose ground in these countries and will be deployed to other regions with competitive wages or higher value added capacities will be established in the leading NMS & ACC-3.

D. The consolidation and development of the ICT sector will strongly depend on the general macroeconomic and structural conditions and on the development strategy chosen by the individual countries. Consistently with the previous chapters it is likely that three different patterns of ICT development will emerge in these countries.

a) In some cases, the consolidation of domestic ICT companies could take place in niche (services) markets at global or at least regional level. This refers to certain companies and countries which have special advantages (like the Slovenian or Bulgarian producers) over the others due to their production skills, economic, linguistic and other advantages.

b) The small open economies, which derive their economic growth form the expanding ICT sector will keep an ICT sector relatively more relevant to their national economy, compared to the eight other countries, which have ICT producing sectors of small relevance. Ongoing FDI, structural upgrading, serious external competition will keep the pressures on these countries to maintain their relatively good position.

c) The large countries in the sample are expected to develop along their own markets. Poland may depend on the stability of some of its local advantages of natural, geographical, etc. factors. Romania might build up its role as software developer, and Turkey will maintain its important consumer electronics manufacturing plants (exploiting the huge potential of its local market, which at the same time, act as a buffer during cyclical crisis of the export markets), but the progressive rise of the wages might help in the evolution towards the production of other type of more added-value products.

E. The creation and maintenance of a local and a foreign owned production capacity, delivering mainly if not exclusively (telecommunications, software and computer) goods and services to the domestic market, will be observable in all countries, closely linked towards their market sizes and their average revenue growth. The ICT trade balances are expected to remain negative, due to important imports of ICT manufactured goods and slow upgrading of the existing production facilities.

***3. ICT Use.*** Analysing ICT use is a much more difficult task than observing the ICT production, as the latter can be approached as a sector of the economy. ICT use requires a quantitative and qualitative analysis of ICT penetration rates, access and use. It needs also to take stock of the different behaviours of the households, the businesses and the government institutions, and has to consider both content

production and human capabilities. The national reports, having covered such scope, allow drawing some conclusions.

First, time series data show positive developments. The speed of the expansion of both the use and supply of ICT has significantly increased in recent years in most NMS AND ACC-3. Moreover, the still low levels of ICT consumption, investment and output have been rising faster than in the second half of 1990s, and in relative terms, ICT spending compared to GDP is higher in these countries than in the former EU member States. Relatedly, governments devote increasing attention to such investments as compared with late 1990s and this should also contribute to a continued increase of ICT use.

In the next years it can be expected that the gaps between the NMS and the former EU-15 Member States in IS indicators, mainly in terms of access to information society technologies, will decline. Income convergence, structural changes, societal changes and also government programs putting more funding and new approaches at increasing access rates will contribute to the decline of existing gaps.

Moreover, it is likely that gradually all countries may reach or approach the critical levels needed for an accelerated IS development, which - as a side effect - will accelerate growth further (penetration rates, use of broadband, access to higher quality private and public sector content, regular use of eServices, etc.).

Second, notwithstanding these developments, stock figures reflect significant gaps inside, among and between NMS and ACC-3 and the EU15: all NMS and ACC-3 have most ICT penetration rates at a lower level than EU15 average. The convergence towards EU15 average is taking place, but the process will remain highly dispersed as existing gaps may not always be narrowed in the future, moreover they may significantly widen.

While the NMS & ACC-3 as a group may converge towards the EU-15 averages, it is less likely that the inter-country differences between them will significantly decline. As in the case of ICT production, some countries may progress faster, but leaders in this area (such as Slovenia, Malta, Cyprus, and to a lesser extend Estonia or the Czech Republic) will maintain their advantages over others in the future too. In most of IST indicators it is more time consuming, costlier to reach a real breakthrough than in ICT production due to the fact that societal attitudes and government policies need to change too.

Macroeconomic developments, structural changes and dynamics and composition of economic growth will further widen the gaps existing within each country, between different IS users (age, education and income levels), organizations (different sizes), regions (rural and urban). While social divides are widening linked to economical and social factors, the development of new technologies adds an additional complexity to these divides due to the purchasing power, infrastructure, skills, etc. that require accession and benefit from ICT services.

## *2. The shifting targets and instruments of IS policies*

### 2.1. The targets

Based on the current level of and likely patterns of development presented by the country monographs, there are some key targets that policy makers should consider as top priorities. These priorities and the progress in indicators measuring their status are of key importance to achieve faster progress in information society developments. Five main targets are identified, the role of which differs in the individual countries due to country-specific features.

***1. Making broadband a key priority.*** One of the key areas is broadband development, which is at a very low level in the NMS & ACC-3, reducing the quality of access of households and broad segments of society to information society services. Currently in the NMS & ACC-3 the most popular way to access the Internet is still through dial-up connections. In terms of policy issues the main challenge for governments is to help proceeding from narrowband to broadband networks, providing high-speed and always-on access to the Internet. In the NMS & ACC-3 this switch has been very moderate at the corporate, household and public sector level.

This shift is important as access to broadband promotes the use of the Internet and spills over to eBusiness, eLearning, eHealth and eGovernment, improving the functionality and performance of those services, and further extending the use of the Internet.

***2. Improving supply and content of eGovernment services.*** The second priority area for government policies in the NMS & ACC-3 could be the increased emphasis laid on improving both the quantity and quality of eGovernment. While in case of public institutions and services, access also remains a key problem, content development lags considerably behind the private sector. Governments therefore need to devote more funds to increase the scope and availability of online public services, need to spend more on improving the quality of content of their eServices and should set these developments as a key priority for their policies. In the case of central government institutions this can be done directly, while in case of regional and local governments through fiscal and other support.

***3. Supporting broader and easier access of households and SMEs to IS services.*** A key priority for the development of the information society in the forthcoming years should be to increase the access of household and SME sectors to online services considerably. The major problem for them is the price of access in terms of computer, Internet access and phone charges costs. Government policies need to address these three problems and to increase substantially the number of households online and the number of SMEs actively providing services and managing their businesses through the Internet.

***4. Increasing public and private sector spending on information society.*** Currently both the public and the private sector (both at the corporate and households level) spend much smaller fraction of their incomes on ICT than in advanced countries. A key priority is to increase spending on ICT services and goods in order to stimulate local markets and to improve access conditions. Governments as described below should increase their spending at general government, but within that especially at local and regional government levels. The corporate sector should be encouraged to spend more on IT developments, purchases and online business activity, while households need to increase the share of their disposable income devoted to IS applications. Many factors can influence this shift towards higher ICT spending: price developments, income convergence, regulations, content development, etc.

## 2.2 The policy instruments

In order to achieve the set targets, governments need to apply appropriate policies. These policies are divided into three sets of instruments: direct policies influencing information society, indirect ones with similar orientation and ICT related policies.

*2.2.a. Direct IS policy instrument.*

***1. Prioritising spending on IS development.*** An important priority for direct IS policies is the double task of increasing funding available for IS developments and prioritising better the resources spent on

information society initiatives. The policies so far have concentrated on too many targets with few resources and the outcomes were below the expectations. The sources of more funding stem from the shift of the structure of public sector from current expenditure structure towards resources spent on information society applications and areas that could stimulate their use (R+D, eLearning, education, etc.). Due to the already high and distortive level of public spending the only possibility to increase national funds is to progress with public sector reform and reduce spending on current items.

On the other hand, the NMS should make more effort to increase the amount spent from Structural Funds on IS applications and policies. While the amounts are given under current budget cycle, the countries may increase spending in the forthcoming one. New Member States should broaden spending on IS policies and ensuring greater territorial cohesion through the use of Structural Funds. On the other hand, all NMS worked out their National Development Plans, which – at least according to the available information – target other priority areas (environment, regional cohesion, highway construction, etc.) more than information society. Therefore a sharper focus in development plans is needed to utilise more co-financed resources for IS developments.

With more resources governments need to focus on certain critical areas to achieve a breakthrough and to provide the synergies between these targets, which can allow them fast progress in several key indicators. More funding for broadband, for increasing digitalisation of public services and improving their content, supporting access to Internet and IS applications in the households and SME sectors should be the driving forces of spending and others should be limited.

***2. Shifting the focus of IS policies.*** In the area of direct IS policies, governments have several policy instruments, which may depend on the sectors they target (government, households, business). Among them governments need to change the focus of their IS policies and the institutional settings from pro-business to pro-consumer one. In the majority of the NMS & ACC-3 information society policies were influenced by the preferences given to major business groups, incumbent providers or alternative operators. They are no longer sustainable and government policies should be oriented at consumers by improving their access to ICT, reducing the barriers and cost of access.

As described below governments have two alternative sets of measures to achieve this goal. First, they should use incentives more broadly to reduce the costs of access: deregulation, tax credits to households for ICT investments, supply of public access points, coherent regulation of amortisation expenses could be the major instruments. Second, governments should directly promote eGovernment services, improve the quantity and quality of content in the public sector.

***3. Providing more funding for regional and local governments.*** There is an important policy issue related to lower levels of general governments in the NMS & ACC-3: more power and spending priority should be provided for local and regional governments. They should make more extensive use of their access to local issues and support local initiatives in order to counterbalance the dominance of central government policies. Local and regional policies could have a stronger equalising nature to reduce the existing social, income disparities, which are the major reasons of the digital divide. More resources devoted from central government budgets to regional cohesion could also help counterbalancing those divides. Regional policies on the other and, and especially ones co-financed by the European Union should have a much stronger focus on IST related developments and funding.

***4. Strengthening – through training and close oversight of progress – administrative capacity of local governments to utilize EU funding.*** A related priority is to strengthen the administrative and coordinating role and capacity of local governments to utilise the available EU Structural Funds. While there is a shortage of appropriate personnel at various levels of general governments, which is capable of administering and managing the inflow of increased funds, this problem is especially acute at the level of

local and regional governments. An important priority for IS policies is to improve the quality and increase the quantity of available administrative staff at the lower levels of general governments. Fast technical and administrative upgrading for broadband, improvement of public sector eContent (much broader applications in eGovernment) and increasing access of households should be the main targets for policies and the resources should be concentrated on these issues. There is also a related need in most countries to adjust the available organisational and management structures, which besides decentralising funding possibilities and responsibilities to local and regional governments requires the strengthening of administrative and coordinating role for the implementation of IS policies in the respective branch ministries.

**5. Developing and implementing forward-looking and "aggressive" broadband policies and strategies.** Governments in the NMS & ACC-3 link their policies to the targets of the eEurope 2005 Action Plan which asked 'widespread availability and use of broadband by 2005' an important objective for IS policies. Governments have developed their national broadband strategies, which determine the main areas of development and try to connect it with the available funding sources. Now they need to proceed with the implementation of these policies and effectively increasing the amount of spending devoted to them.

According to the principles laid down in eEurope 2005 Action Plan the availability of broadband can be stimulated by supply-side policies based on greater competition and handling of market failures, while use is encouraged with demand-side policies targeting the development of applications, content and services.

In the area of availability governments need to make several steps. First, they can support in the short-term the upgrading of the existing technologies over which the access to broadband is provided, including telephone copper network using ADSL technology, and over cable TV networks using cable modems. These technologies in the NMS & ACC-3 require the upgrading of existing networks. On the other hand, governments should stimulate competition and allow a faster access of users to such new infrastructure as fixed wireless access, third-generation mobile systems or satellite. In these areas the main role is to create and afterwards to maintain competition between different suppliers of the mentioned services.

The second policy instrument is to promote the deployment of broadband by various incentives and funds. This is especially true in less densely populated areas, where either there is no supply side incentive to provide the services, or the market sustains one provider of infrastructure. In this case and linked to the provisions of eEurope 2005, governments could devote an increasing share of their national funding, and use Structural Funds or regional support to increase infrastructure availability. While some of these funding from Structural Funds depends on the expected review of Structural Funds, governments in the NMS & ACC-3 could spend more from their resources for these purposes.

On the usage side most governments could act through the development and digitalisation of public administrations and public institutions (including but not limiting to hospitals, education units and schools). This aim is also in line with the provisions of eEurope 2005, which targets this goal to be reached by the end of 2005. To reach this target, more public funding, a forward-looking and implemented national strategy, and respect of the principle of technological neutrality, will be necessary, with the selection of projects being carried out through open tender procedures.

*2.2.b. Indirect IS policy measures*

Besides direct measures, governments may apply in the future other indirect policy measures to support IS developments, aimed primarily at reducing disparities in access and digital divide.

1. ***Providing balanced and sustainable economic growth.*** The provision of stable economic growth and macroeconomic conditions is a *sine qua non* for the spread of the information society. While the causality between growth and IS developments is two-sided, fast and sustainable economic growth creates the demand and supply side factors for higher investments and resources spent on ICT. It increases disposable incomes, improves the affordability of ICT services for a wide segment of users, and if accompanied by competitive markets, raises the demand for ICT investments in the corporate sector.

2. ***Public finance reform and restructuring of fiscal expenditures.*** An essential indirect IS policy is the acceleration of the restructuring of public sector called public finance reform. In most of the analysed countries it means a change in the institutional, ownership, structural framework of the existing education, health care, local governments, and public administration structures. These reforms should reduce the scope of public sector, make it more efficient and reduce the current level of tax burden required to cover these expenditures. Public finance reform may accelerate information society developments in three areas.

   First, the reform should reduce public spending and tax burden and thus leave more funds at the private sector. Second, it may be expected that after the learning period the quality of services in education, health care and the quality of public management will improve, which may accelerate economic growth, provide more social cohesion and more equal access to public services. Third, these reforms should be loosely linked to ICT related innovations in the public sector, which may increase the scope for content development in public entities. Two critical areas in that respect are health and education reform. Health reform could be closely associated with the spread of eHealth services, while education reform could put much more emphasis on the supply of ICT-skilled graduates as well as on the demand for ICT-related services (eLearning, etc.).

3. ***Increasing and shifting the composition of public R&D.*** One weakness of the NMS & ACC-3 is the low level of GERD and the high share of public R&D in total. However even if public R&D is high in total compared to EU-15 its share in GDP is lower. Therefore the NMS & ACC-3 should devote more from their public spending to research and development than earlier. This should not be done by increasing taxation of private sector, but by restructuring public expenditures. Besides, public R&D funding should also be used in a better targeted framework and resources should be shifted from non-applied to applied research. These funds should also stimulate - through financial incentives - cooperation between public R&D and research institutions and the business sector.

4. ***Providing better regulation to stimulate competition in the telecommunication market.*** One major weakness of IST related policies in the NMS & ACC-3 were inappropriately designed or implemented regulation policies, which rather weakened competition in the telecommunication market. The NMS & ACC-3 need to completely adopt the EU legislation and efficiently enforce the existing competition policies in order to create competitive markets in fixed line and also in Internet services.

5. ***Promoting competition in the product markets.*** Competition policies and an appropriate regulatory framework are needed besides the telecommunication market also in the product markets as they could stimulate ICT investments of the private sector. More competition will bring more investments and more emphasis laid by the corporate sector on increasing its competitiveness through ICT related

investments. Entry to the EU of the NMS will strengthen competitive market structures and will provide more pressure for corporate sector, but regulatory measures may also be needed in certain areas.

6. ***Broader scope for public/private partnerships - PPP programs.*** The reform of public sector and the streamlining of fiscal expenditures resulted in many NMS in the spread of public-private partnerships. Countries have adopted the appropriate legal background for PPPs, started to implement PPP programs and plan to increase their use in order to match better private and public funding and if possible to reduce the scope of the public sector. While the appropriate and beneficial application of PPP depends on several factors (existence and observance of public procurement rules, determination of those areas where PPP can be used efficiently, etc.), several social and economic conditions in the NMS & ACC-3 may hinder their broader use (corruption, high inertia and resistance from public servants, etc.) Still, it could be a framework through which the private sector is involved in the improvement of access and content in the public sector. PPP programs could be used in border projects linking IS development and public sector reform, including eHealth, eTax and eLearning programs.

7. ***Continued reforms in the education system.*** An important element of the support of the information society is the reform of the existing education structures. This involves among others increased emphasis on reducing functional illiteracy, increasing opportunities for lifelong-learning and prioritising ICT-related education of teachers and students. It would be essential to increase the extent of ICT-related education in the curricula and to start this education earlier than currently. The reform of the education system also means changes in the priorities given to professional training, lifelong and tertiary education, an issue which is only indirectly linked to the information society.

   Special emphasis needs to be devoted to increasing the ICT related literacy of the older generation and marginalised or disadvantaged social groups. In both cases these measures would provide economic and social benefits with better social cohesion, improved access of these social groups to ICT services and improved employment opportunities.

   On the other hand, those countries which are strong in ICT production and are expected to maintain their position should increase the attention paid to the training of engineers and professionals for ICT sector. As emphasized earlier, these countries can maintain their position in global ICT markets only if they move to production with higher value added. In order to reach this they need to increase the quality of labour force and become more competitive in production with higher human capital content. This requires more funding and more graduates with better skills adjusted to the expected changes in labour demand in the ICT sector.

8. ***More emphasis on reducing digital divide.*** The presence of social disparities is affecting IS development: inequalities in income distribution, high level of long term and structural unemployment, low level of employment and activity rate are all factors, which indirectly increase the differences in access to IST services and products. An important symptom of regional disparities is visible in unemployment rates, which directly weakens the spread of IST. Unemployment rates lead to cumulative social disparities, reduce the number of those who could afford access to information society technologies and generally preserve the existing social disparities. As long-term unemployment rates in these economies are also above the usual European levels, this is a significant factor hampering the spread of IST in accession countries. Appropriate functional and regional policies of governments could handle the growing economic and social disparities and this could indirectly help in increasing the affordability of and demand for IST applications.

*2.2.c. Policy instruments related to the ICT sector*

The final set of policy measures is related to those which could improve the competitiveness and attractiveness of the ICT-producing sectors in countries that are strong suppliers of information and communication technologies.

***1. Improving general business conditions by reducing and simplifying regulations, lowering taxes and spelling out laws.*** Besides providing adequate physical and human capital, governments may stimulate competitiveness of ICT sectors by providing a good regulatory framework. The recent problems with biased regulation, maintenance of monopolistic market structures, slow progress with telecommunication liberalisation stroke back at IS developments. In case of ICT production, governments could implement a coherent regulation policy aimed at reducing existing market failures, monopolistic market structures and uncompetitive behaviour. Price regulation, competitive entry and exit conditions, growing competition between telecommunication suppliers, competitive markets in fixed line and Internet service providers are key issues for policy makers. Competition fosters expansion of ICT and their applications and should be one of the crucial elements of regulatory policy.

In many areas the NMS & ACC-3 are more flexible than the EU-15 (labour codes and regulation, speed of structural adjustment, etc.) but with respect to many other factors their economies are inflexible. High production site costs, inefficient tax systems, in many countries high public sector redistribution, monopolistic market structures, etc. seriously constrain efficiency and flexibility. This in turn reduces investments, slows down income growth, with harmful consequences for IS developments. If these essentially structural weaknesses are addressed better than in the past, this could initially boost ICT production but afterwards it could also positively contribute to IS developments in general.

***2. Removing disadvantages for private R&D.*** One critical area for ICT development and increasing value added of ICT production is the growth of the currently very low private research and development spending. Research and development expenditures have increased only very moderately in recent years in the NMS & ACC-3 and they are much lower than in EU-15 countries. Government policies may stimulate private sector research and development in three areas.

First, as mentioned before the provision of competitive market structures and appropriate regulatory policies keep the pressure on the corporate sector and force it to increase spending on R&D to remain competitive. Second, governments could provide more funding and programs to involve private sector in public sector related innovation and research activities. These should include support for start-ups, provision of technological and innovation centres, more extensive cooperation between public universities and private firms, completion and management of research and development related programs in the private sector. Third, they may give better tax and depreciation treatment for research and development related expenditures of the private sector, linking these stimuli with R&D activities.

***3. Supporting further inflow of FDI.*** While FDI is necessary for ICT developments, the positive spill-over effects crucially depend on the way FDI is integrated into the economy. While there were several good examples of integrating FDI into the local economies, currently in the NMS & ACC-3 a growing division between FDI and local companies can be observed. This division, a sort of dual economy, can endanger solid ICT developments: this makes ICT production and partly use dependent on exogenous factors and weakens the positive spill-over effects from the spread of ICT.

In countries which have developed ICT production two main challenges are ahead. Where this production was built on costs advantages linked to low wages the main challenge is not to improve wage competitiveness, but to shift production in ICT sectors to market niches with higher value added. The process has already begun with a bias towards deployment due to increasing wage levels and now many

of these countries (notably Hungary, Estonia and Poland) will need to provide further direct and indirect incentives to accelerate the shift towards higher value added activities.

The second policy task is reduce the narrow base of ICT production and strengthen domestic ICT producing sectors, which has in certain niches (software production in Poland and Hungary e.g.) developed relatively favourably. The policy tasks are to strengthen the links between foreign and domestic producers, to incorporate more domestic producers to international production networks and thus to reduce the fragile character of ICT production in these countries.

***4. Increasing the quantity and quality of available human and physical capital.*** Specific policy instruments may improve the growth of ICT sector, among which the provision of human and physical capital are the most important for two reasons. First, the NMS & ACC-3 countries are small ones with low scale efficiency and lack of domestic capital, and they can be integrated to global ICT production only with foreign investments. Second, new member states are decreasingly wage competitive and can compete better in middle or high value added ICT products.

In order to broaden these sectors and increase average value added of ICT production, governments need to improve the quality of physical and human capital by expanding R&D and public investment expenditures. Increased public R&D expenditures stimulate private R&D expenditures, while public investments in infrastructure weaken supply side bottlenecks and improve productivity of ICT investments. They can improve the attractiveness for FDI in ICT sectors and stimulate a better integration of the local SME sector into global production chains.

In the area of human capital governments need to increase the level of tertiary enrolment and reach universal secondary one: in these two indicators the NMS & ACC-3 are still behind the EU-15 levels. Second, they need to address the broadening functional deficiencies in the education sector, which result in growing gaps between the quantity and quality of the supplied and demanded labour. These are related to financing, ownership and institutional structure of the education system, to the curricula of education, to lifelong learning, to continuous retraining of employees.

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