

UNITED NATIONS ECONOMIC COMMISSION FOR EUROPE

**TOWARDS A
KNOWLEDGE-BASED ECONOMY**

SLOVAKIA

COUNTRY READINESS ASSESSMENT REPORT



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FOREWORD

The last decades of the 20th century have represented a turning point in the global development process. It is knowledge that has become the engine of the social, economic and cultural development in the today's world. Knowledge-intensive economic activities are now a factor of production of strategic importance in the leading countries. They have also become the main indicator of the level of development and the readiness of every country for a further economic and cultural growth in the 21st century. Taking into consideration all these factors, the United Nations Economic Commission for Europe has launched an initiative of monitoring and analyzing the development of the knowledge-based economy in all the European countries in transition and emerging market economies.

The major goal of this initiative is to stimulate the exchange of national experiences, to identify best practices and to promote region-wide and global-wide cooperation of the UNECE member States, which would accelerate the development of a knowledge-based economy in the countries in transition and emerging market economies. It envisages the preparation of country assessment reports on the biennium basis by national experts, nominated by the Governments, the creation of a High-Level Task Force on the Knowledge-Based Economy, which will consider the reports and provide policy advice and recommendations to the participating countries, and the development of progress measurements and indicators, policy guidelines and tools to assist countries in overcoming obstacles to the development of a knowledge-based economy.

We hope that the country assessment reports, showing a detailed level of the countries' potential and providing information on various approaches and solutions, will help policy-makers to take strategic decisions with regards to the challenges facing them in the development of institutions, information and innovation systems, human resources development and other areas crucial for the development of a knowledge-based economy.

*Brigita Schmögnerová
Executive Secretary
United Nations Economic Commission for Europe*

PREFACE

The industrial revolution of the 19th century and the scientific revolution of the 20th century have prepared the conditions for the rise of the knowledge-based economy. Economic activities associated with the production and utilization of information and knowledge have become an engine of economic growth in the developed market economies, increasingly transforming all the other dimensions of development and the entire societal *modus vivendi* and *modus operanti* of the humanity.

What do we mean by “the knowledge-based economy”?

It is not just the digital economy, which incorporates the production and use of computers and telecommunication equipment. It is not quite the networked economy, which incorporates the telecommunication and networking growth during the last decades and its impact on human progress.

The knowledge-based economy is a much complex and broader phenomenon. There are different dimensions and aspects of the knowledge-based economy:

1. The knowledge-based economy has a very powerful technological driving force – a rapid growth of information and telecommunication technologies (ICT). Every three – four year there appears a new generation of ICT. Today, the ICT companies are among the largest corporations. The ICT sector is among the fastest growing economic sectors.
2. Telecommunication and networking, stimulated by a rapid growth of ICTs, have penetrated all the spheres of human activity, forcing them to work into an absolutely new mode and creating new spheres. The information society has become a reality.
3. Knowledge, based on information and supported by cultural and spiritual values, has become an independent force and the most decisive factor of social, economic, technological and cultural transformation.
4. The knowledge-based economy has allowed a quick integration of the enormous intellectual resources of economies in transition into the European intellectual pool, stimulating the development of the former countries. Every country can benefit from developing a knowledge-based economy to become a more equal participant in the global development process.
5. The emerging knowledge-based economy has been affecting other areas of societal activity in every country, including institutional and innovation system, human resources development and etc. and visa versa. The knowledge-based economy has become an engine of progress in every country. If a country is developed, it has a developed knowledge-based economy, if a country is lagging behind, a knowledge-based economy constitutes just a small fraction of its economy.

The report below was prepared by a national expert, nominated by the Government, and represents an overview of the present situation and an assessment of the emerging trends in all the major areas, constituting the foundation of the knowledge-based economy, such as policy and policy instruments, institutional regime, ICT infrastructure, information system, national innovation capacities and capabilities.

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Introduction

The increasing use of information and communication technologies (ICT), together with the advantages provided by the Internet, place powerful tools within the reach of citizens and governments, as well as of large and small businesses, everywhere. As we have moved into the 21st Century this has led to profound changes in the internal organization of governments and businesses, as well as in the skills required by the creators as well as the users of technologies in evolving information societies. It is no coincidence, therefore, that new technologies are having a considerable and profound impact on the economy, society and politics of the Slovak Republic. This is especially true given ongoing integration into the European and Trans-Atlantic economic and military structures.

A dynamically developing information society as a component of the foundation for a knowledge-based economy:

- is essential for sustainable economic growth;
- is necessary for developing a country's production capacity in all sectors of its economy;
- links a country with the global economy and ensures competitiveness in the global market place of the 21st century;
- contributes to poverty reduction by increasing productivity and providing new opportunities;
- is essential for efficient public administration, social and other public services;
- reduces corruption, and improves transparency and good governance.

The main goal of this report is to assess the current state of ICT infrastructure and the availability of the Internet and ICT-related services in Slovakia. The assessment will facilitate identification of: key barriers to developing ICTs; and opportunities that can be capitalized on in this field.

The document also provides a “snap-shot” of Slovakia's e-readiness, as well as a benchmarking instrument against which the progress can be monitored.

1. National Policy, strategy and action plan

1.1. Policies, strategies and the Action Plan

In 2001, the Government of the Slovak Republic adopted the document - ‘Policy for the Information Society in the Slovak Republic’. The document is derived from ‘the e-Europe + Initiative and Action Plan’. It defines the main challenges involved in building up an information society and proposes solutions, primarily the creation of favorable conditions to unleash the full potential of ICTs for the benefit of all segments of the society. The document anticipates achieving this via a concentrated effort to bring ICTs to education (e-Learning); economy (e-Commerce); and political processes (e-Government). The document also paves the way for elaboration of a strategy for building up an information society.

- **The Strategy for the Information Society Development of the Slovak Republic and the Action Plan:**

On the basis of the Government Resolution No. 522/2001, the Ministry of Education is now preparing the document ‘Strategy for an Information of Society in the Slovak Republic’, which contains a proposal for the establishment of the ‘Agency for the Information of Society’ (AIS), which will coordinate the field of information technology.

The strategy for building up an information society is understood as a gradual realization of the following tasks:

- identification of priority areas – pillars – which are relevant for an information society, and which are derived from the evaluation of the Slovak Republic in ‘Progress Report e-Europe+’ (See Appendix 1). The three pillars, on which the information society is built, according to the strategies compiled in the *2002 UN Digital Task Force Report*, are the following:
 - Human capital and knowledge,
 - Technologies for access and connectivity,
 - Integrated digital content and applications;
- preliminary analysis and assessment of current conditions in the relevant areas based on country specific strengths and weaknesses;
- the definition of driving elements of the process;
- setting the direction of the process and distributing responsibilities among the government agencies responsible for the specific areas in an ‘action plan’;
- provide transparent criteria for the evaluation and realization of a concrete project derived from the ‘action plan’,
- risk analysis,
- systematized conceptual and methodological supervision of the implementation process.

The strategy is based on the following basic conditions:

- it is client centric, where the end client of the strategy outcome is the citizen;
- it is an open – living - document, allowing for adaptation to changing trends and conditions as well as for continuous innovation;
- it is conceptualized on the basis of a balanced approach to supply and demand in all relevant areas;

- it takes a gradual approach built on pilot projects and their continuous and objective evaluation.

The Strategy also incorporates the following Action Plan derived from the tasks prescribed in the e-Europe+ initiative:

Objective 1: A cheaper and faster Internet

Action	Actor(s)	Deadline
Achieve significant cost reduction in the Internet access towards the lowest levels by reinforcing competition	Ministry of Transport, Posts and Telecommunications	01.01.2003
High speed Internet access and intranets should be established in universities	Ministry of Education SANET	01.01.2003

Objective 2: Investing in people and skills

Action	Actor(s)	Deadline
Provide all schools, teachers and students with convenient access to the Internet and multimedia resources	Ministry of Education	01.01.2004
Give the labor force a chance to become digitally literate through life-long learning	Social partners Ministry of Education,	01.01.2004
Set up public Internet access points in public places and establish multimedia telecentres in all communities providing access to training	Ministry of Employment Ministry of Education	01.01.2004

Objective 3: Stimulate the use of the Internet

Action	Actor(s)	Deadline
Essential public data online, including legal, administrative cultural, environmental, traffic information	All ministries	01.01.2003
Promote the use of electronic signature within public sector.)	All ministries	01.01.2003
Development of e-government for all types of services	All ministries	01.01.2003
Ensure that primary and secondary health care providers have health telematics infrastructure in place including regional networks)	Ministry of health	01.01.2004
Development of a plan for an Intelligent Transport System	Ministry of Transport	01.01.2003

1.2. Legal framework

1.2.1. Access to information

Laws and regulations concerning access to information and the protection of citizens' communication rights determine to a great extent the information society's development process as well as the stability of the environment produced by this process. In this field, three separate laws provide detailed regulations on: access to public information; personal data protection; and, confidential information. These are listed below.

- **The Law on Access to Public Information** – (211/2000) was adopted in May 2000. This law defines the term “public information” and declares the principle of free and unlimited access. For practical use, however, the law in its initial form, proved to have some obstacles, and the need to revise it has been raised.
- **The Law on Personal Data Protection** – (428/2002) was passed in 2002. This piece of legislation corresponds to Directive 95/46/EC of the European Parliament and the Council of 24 October 1995 on the protection of individuals with regard to processing of personal data and on the free movement of such data. It is also considered a prerequisite for the ratification of Convention No. 108 of the Council of Europe on the Protection of Individuals with regard to Automatic Processing of Personal Data.
- **The Law on the Protection of Classified Information** – (241/2001) was adopted in 2001. A strategic government priority for NATO integration is the development of a legal and institutional framework in the field of confidential information protection. This requirement is also a key element of the NATO Membership Action Plan, adopted in Washington in 1999.

1.2.2. Telecommunications

Legal regulations in telecommunications aim to achieve a liberal and competitive market with a modern infrastructure and high quality services for businesses and individuals at competitive and, where possible, affordable prices. The market is regulated in accordance with the EU regulatory framework on telecommunications in order to create a climate that:

- ensures a common market;
- supports effective competition;
- effectively manages frequency usage;
- effectively manages the numbering space;
- ensures the provision of a universal service;
- supports user protection;
- resolves disputes.

The most recent telecommunications act is Law 195/2000 from year 2000. This act, however, does not provide solutions for the important Local Loop Unbundling provision, considered as one of the key regulations for telecommunications market liberalization. In 2002 the National Council of Slovak Republic failed to pass the new Act on Telecommunications that aimed to de-monopolise Slovak Telecom, and subsequently, to liberalize the telecom market.

According to the above-mentioned Law No. 195/2000 the *Telecommunications Office of the Slovak Republic* (thereinafter the TU SR) is the primary regulatory institution to be established. TU SR is the body of state administration in telecommunications, executing state regulation activities in the telecommunications sector. TU SR is located in Bratislava and is funded from the state budget.

The regulatory activities of the TU SR include primarily:

- regulation of telecommunication activities;
- regulation of installation and operation of telecommunication networks and telecommunication equipment, and of provision of public telecommunication services;
- regulation of limited resources (numbers, frequencies and call signals);
- price regulation;
- type approval of telecommunications equipment;
- licensing for the operation of radio-communications equipment;
- execution of state supervision over telecommunications activities.

1.2.3. Electronic Signature

The Law on Electronic Signature (215/2002) came into effect in 2002. The certification agency for the institution of electronic signature is currently under the jurisdiction of the National Security Office, but practical, widespread use of the tool is not yet in place.

1.2.4. Copyright

The new Law on Copyrights and Related Rights (383/1997) was adopted in 1997. This law includes special provisions concerning the protection of copyright on computer programmes and databases, specifying in detail the types of operations programme users are permitted to perform. Free copying of computer programmes for personal use is explicitly prohibited. Fines are envisaged for illegal possession, reproduction, distribution or use of computer programmes, and seizure of the subject of the violation is also provided for.

All these and other related and relevant acts and laws are summarized in the chart below.

ACT	ACT number / PASSED ON
Consumer Protection	634/ 1992
State Statistics	322/ 1992
State Information System	261/ 1995
Local Administration Organization	222/ 1996
Copyright Protection	383/ 1997
Telecommunication	195/ 2000
Free Access to Information	211/ 2000
Protection of Classified Materials and on Amendment of Certain Laws	241/ 2001

Electronic Signature	215/ 2002
Personnel Data Protection	428/ 2002
Intellectual Property Acts	varies from 1990 to 1998

2. The Institutional Regime

2.1.Relevant institutions for the information society development

The institutional setting in Slovakia can be viewed as highly fragmented, and lacking both in coordination and in a central institution to take formal charge of information society development. A number of bodies have some degree of competence, e.g. the departments of informatics for most ministries, the Central Statistics Office, and the data collection agencies of state institutions. However, conceptual planning, standardization and realization in the field are all missing. The Ministry of Education's Department holds responsibility for the area of information technology in the Slovak Republic for Information Society, which, in co-operation with other sectors, prepared the document "Policy for the Informatisation of Society" (Governmental Resolution No. 522/2001 of 13 June 2001). In this document, the Government declared the development of informatisation to be one of its priority tasks and joined EU candidate countries' e-Europe⁺ initiative.

On the basis of Governmental Resolution No. 522/2001, the Ministry of Education is now preparing the document 'Strategy for the Information of Society in the Slovak Republic', which contains a proposal for the establishment of the Agency for the Information of Society (AIS), to coordinate the field of information technology.

The Ministry of Transport, Posts and Telecommunications has set up the national e-Europe⁺ website to support the development of an information society. The website was tested in 2001, while the Internet was used as the basic instrument for communication with experts, the general public, institutions and non-governmental organisations.

2.1.1. Ministry of Education – Department of Information Society

The Ministry of Education's Department of Information Society, is responsible for the preparation of conceptual and strategic policies in the field of information society development, as well as for:

- the coordination and supervision of state institutional activities in carrying out strategies and programmes for the development of an information society;
- coordination of cooperation with EU initiatives and programmes related to the information society;
- assessment of international negotiating positions in respective areas related to the information society;
- State positions on drafts of legislation acts related to the development of an information society;
- implementation of modern ICTs into the educational process and development of e-skills and human capital;
- preparation of standards and benchmarks for evaluation of progress in development of an information society;

- coordination of participation in forums related to the development of an information society;
- contributing to the problem-solving related to the interaction and usage of ICTs in conformity with the law;
- evaluating and supervising the realization of projects of national importance for the development of an information society;
- supervision over the licensed software distribution in the state sector;
- completion of progress reports on the state of information society in Slovakia for the European Commission.

2.1.2. Ministry of Transport, Post and Telecommunication of Slovak Republic

This Ministry is responsible for the Telecommunications policy of the Slovak Republic. The most recent resolution of the Government, approved on 14 June 2000 (Resolution No. 440/2000), determines the strategy for the telecommunications development in line with the direction set forth in the document “Telecommunication Policy until the Year 2000.”

Among the major objectives of the telecommunications policy are:

- creation of a regulatory framework for the telecommunications sector ensuring an equal and transparent environment for competition;
- harmonization with the EU telecommunications market;
- full liberalization by December 31, 2002 (Resolution No. 438/1997 of the Slovak Government).

Liberalization is understood as the entire scale of goods and services provided in the sector, including basic public telephone services through fixed communication networks (exclusive right of the dominant Slovak Telecom until December 31, 2002), and unbundling of local loops.

The universal service provision according to Law 195/2000 comprises:

- provision of public telephone services;
- provision of emergency calls free of charge;
- provision of operator and information services;
- provision of public payphone services;
- issuing of phone directories of telephone subscribers.

2.1.3. The Telecommunications Office of the Slovak Republic

According to Law No. 195/2000 the Telecommunications Office of the Slovak Republic (hereinafter the TU SR) is the primary regulatory institution in the area of telecommunications. TU SR is the state administration body for telecommunications, executing state regulation activities in the telecommunications sector. TU SR is located in Bratislava and is funded from the state budget.

The TU SR incorporates the following important departments:

- State Inspection
- Regional State Inspection

- Supervision
- Frequency Management
- Certification
- Regulations
- International Relations

The regulatory activities of the TU SR are previously stated in this document.

2.1.4. The Non-governmental Sector

Several NGOs work in Slovakia in the area of information society development. Some of these represent civic initiatives, while others are commercially oriented to promote business in the field of IT.

Notable civic NGOs include the ‘Association of INFOAGE Project’. This was founded in 1998 and formally supervises the implementation of the INFOAGE project whose main goal is to equip all primary and secondary schools with computer labs and to establish these online. A complementary NGO, ‘Civic Association e-Slovensko’ launched in 2000 the project ‘Mesto.sk’, designed to produce local content on the Internet in all 138 cities of Slovakia. ‘Project Mesto.sk’ forms one of the important pillars of ‘INFOAGE Project’, which is making available school computer labs to local communities. ‘Partnerships for Prosperity’, is a more professionally oriented NGO founded in 2001 with its main objective to promote IT among decision makers. Finally, the ‘Association of Telecommunication Operators’ and the ‘Association of Internet Providers’ are set up to broker interests between the private and public sphere especially in the area of telecommunications. There are several more NGOs working in the field with a greater or lesser impact, but those mentioned above are, in general, considered the most relevant.

3. Present situation and trends in the country's information system

According to the 'e-Europe 2005' initiative, the availability and affordability of ICTs for individuals, organizations and society determines a country's ability to take full advantage of information and knowledge. A dynamic information infrastructure is therefore a critical component of a knowledge-based economy. This comprises telephone infrastructure, the Internet, adequate safety provisions and ICTs throughout society and the economy. A key element of the information infrastructure is hardware, but content and applications that enable effective use of new technologies are also essential.

3.1 Communications infrastructure

3.1.1. Telecommunications

The telecommunications infrastructure in Slovakia is relatively modern. Prior to transition to a market economy, Slovakia had one of the highest telephone penetration rates among the former COMECON countries and a highly developed optical fiber infrastructure. The major owner and dominant operator of this infrastructure in Slovakia is Slovak Telecom, but other operators, such as: Telenor of Norway; Slovak Energotel; the Slovak Academic Network (SANET); a couple of dynamically growing mobile operators – Orange and Eurotel; as well as about ten smaller companies, own an increasing share of the telecommunications infrastructure in Slovakia. Such competition helps to make the market more competitive and open. The statistical data given below illustrates to some extent the state of the telecommunications infrastructure in Slovakia.

As far as frequency spectrum is concerned, this is considered a limited natural resource and is managed by the state. The National Frequency Table has been prepared by the Ministry of Transport, Post and Telecommunications in cooperation with the Telecommunications Office.

Terrestrial analogue TV and radio broadcasting development in Slovakia, as in the majority of European countries, is limited due to the high occupancy rate of the frequency spectrum and there is a general shift toward a digital broadcasting system. The draft concerning the transition from analogue to digital systems was elaborated in the document "Strategy and Technical Criteria for Implementation of the Terrestrial Digital TV Broadcasting in the DVB-T System in Slovakia," and the Resolution No. 589/2001 of the Slovak Government approved it.

Information Infrastructure

- Telephone penetration: 32 fixed lines/100 inhabitants
- Mobile wireless penetration: 47/100 inhabitants, growing trend
- Total number of mobile telephone subscribers: nearly 2.6 million
- Total number of mobile telephone subscribers per 1000 people: 470/1000 inhabitants
- Wireless penetration: 47 % of total population
- Growth trend: Growing number of subscribers

- Total number of cable TV subscribers: 660,000
- Cable TV subscribers: 35,2 % of households

The graphs below show the genesis of infrastructure evolution in the total number of lines, the total number of lines per 100 inhabitants and the growing proportion of mobile phone penetration.

Table 1: Total number of lines - Evolution 1996 to 2001

Year	1996	1997	1998	1999	2000	2001
Number	1,275,129	1,592,005	2,007,713	2,586,805	2,853,430	3,731,782

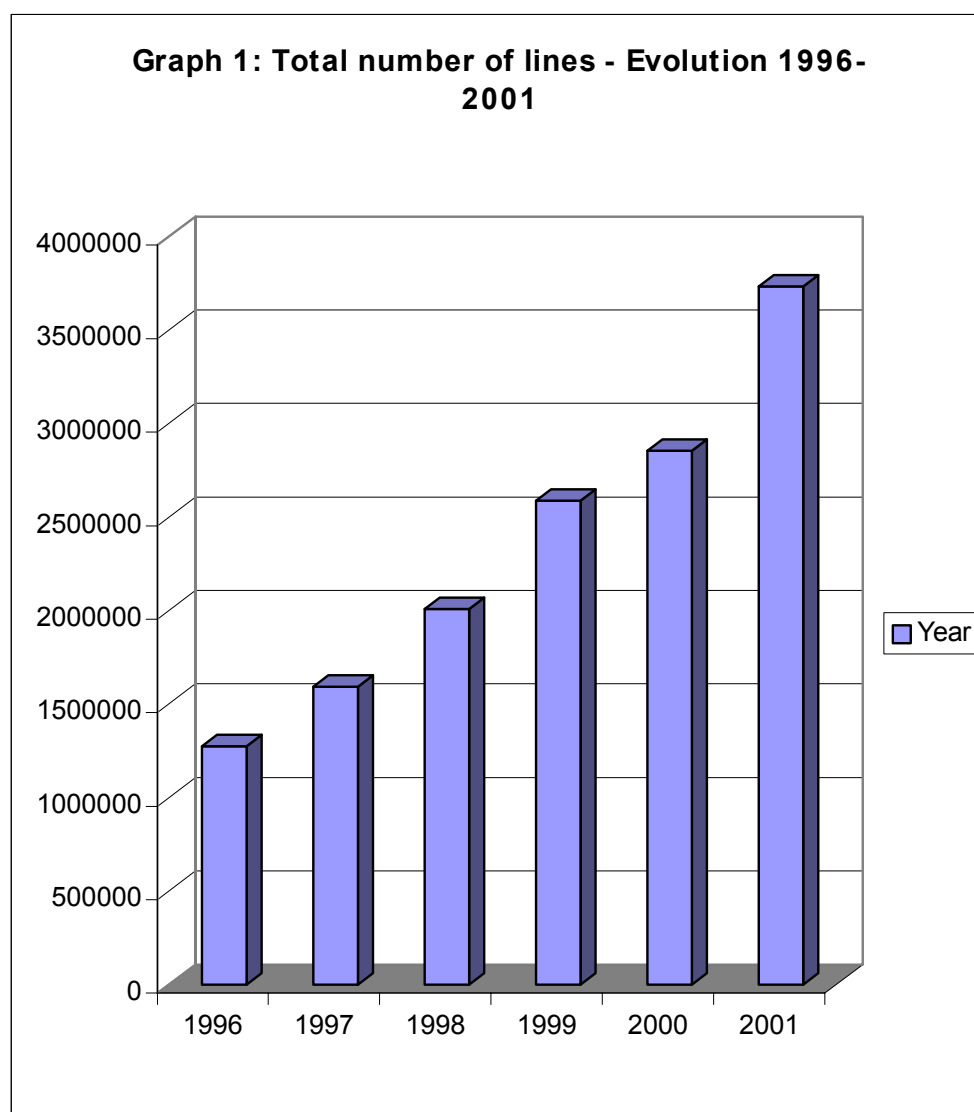


Table 2: Total number of lines per 100 inhabitants – Evolution 1996 to 2001

Year	1996	1997	1998	1999	2000	2001
Number	23,7	29,6	37,3	47,9	52,9	69,0

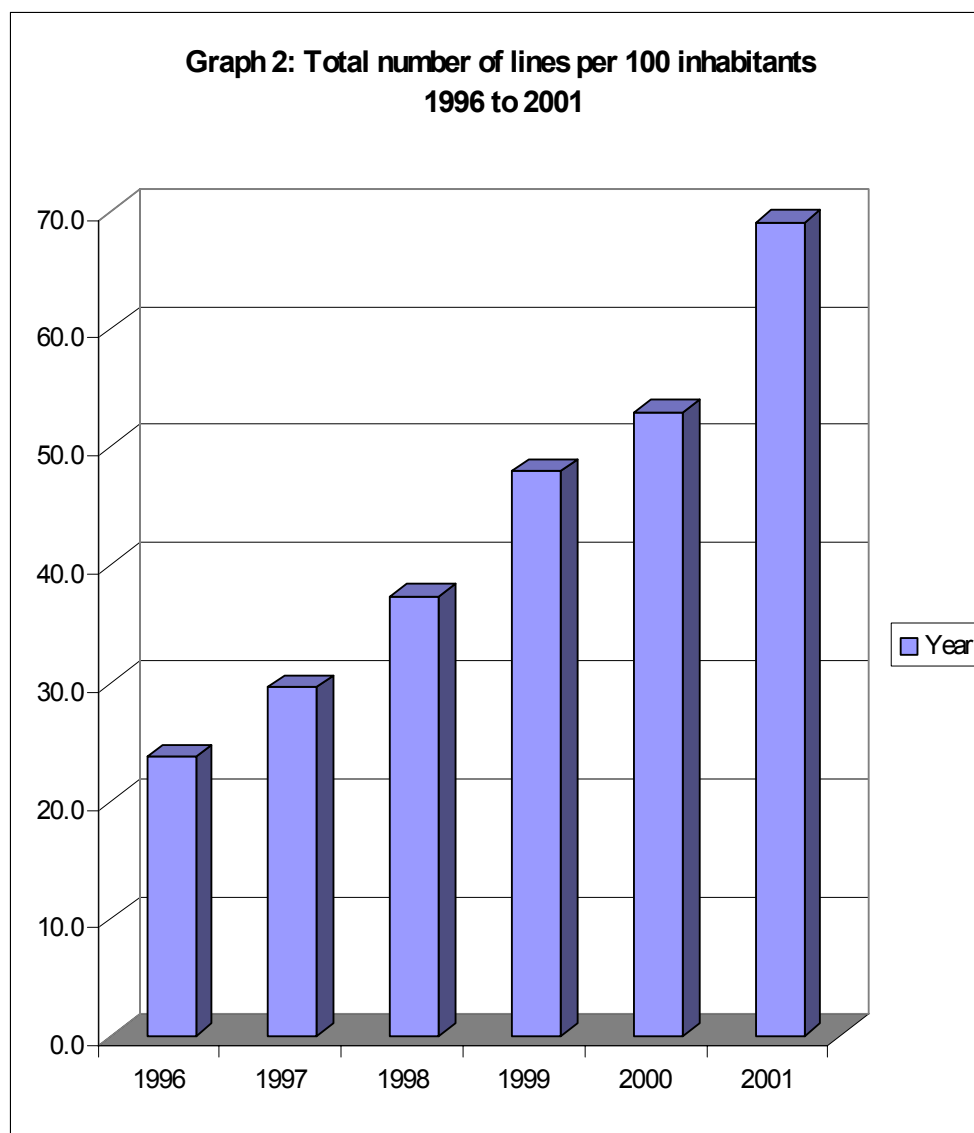


Table 3: Number of fixed lines and mobile subscriptions – Evolution 1996 to 2001

Year	1996	1997	1998	1999	2000	2001
Fixed	1,246,471	1,391,864	1,539,283	1,655,380	1,672,942	1,584,451
Mobile	28,658	200,141	465,634	918,039	1,158,000	2,147,331

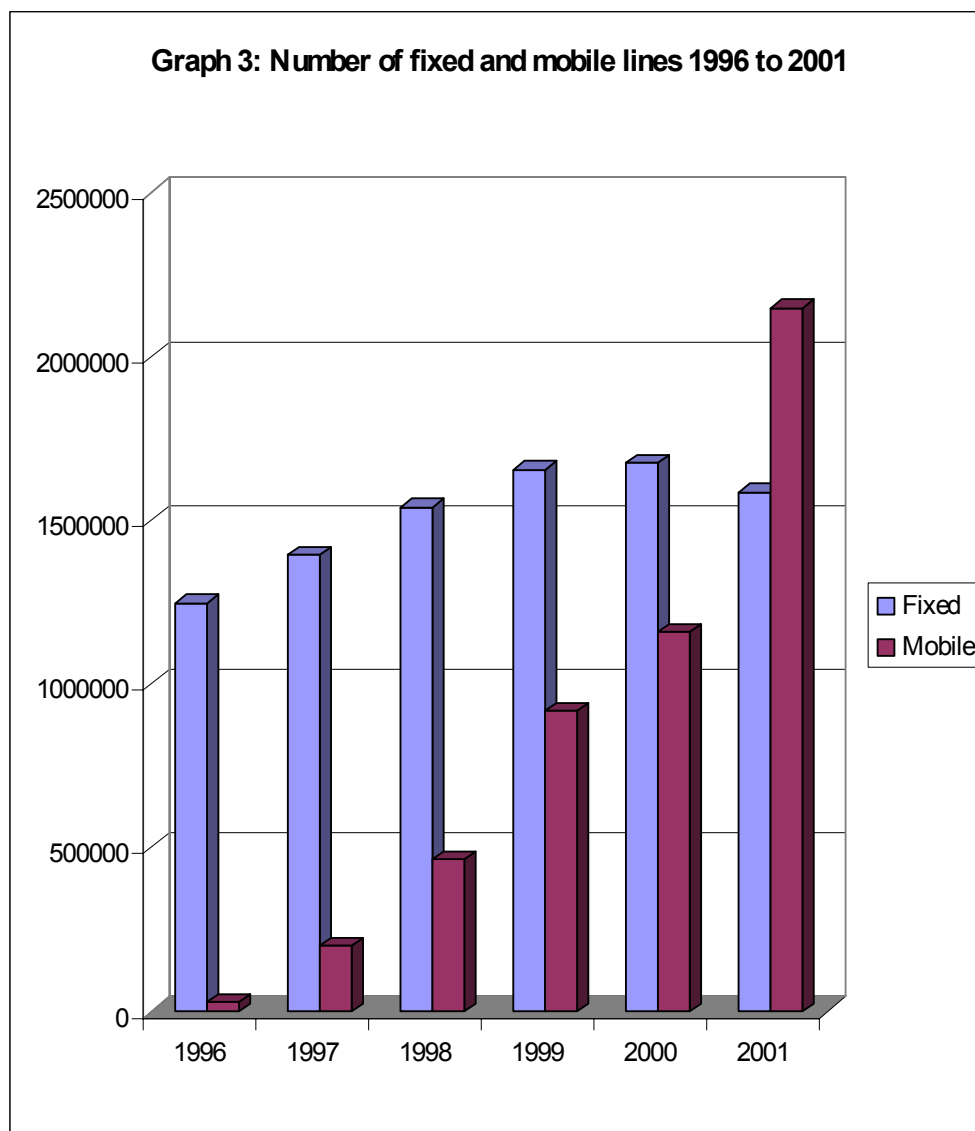


Table 4: Number of fixed lines and mobile subscriptions per 100 inhabitants - Evolution 1996 to 2001

Year	1996	1997	1998	1999	2000	2001
Fixed	23,2	25,9	28,6	30,7	31,0	29,3
Mobile	0,5	3,7	8,7	17,0	21,5	39,7

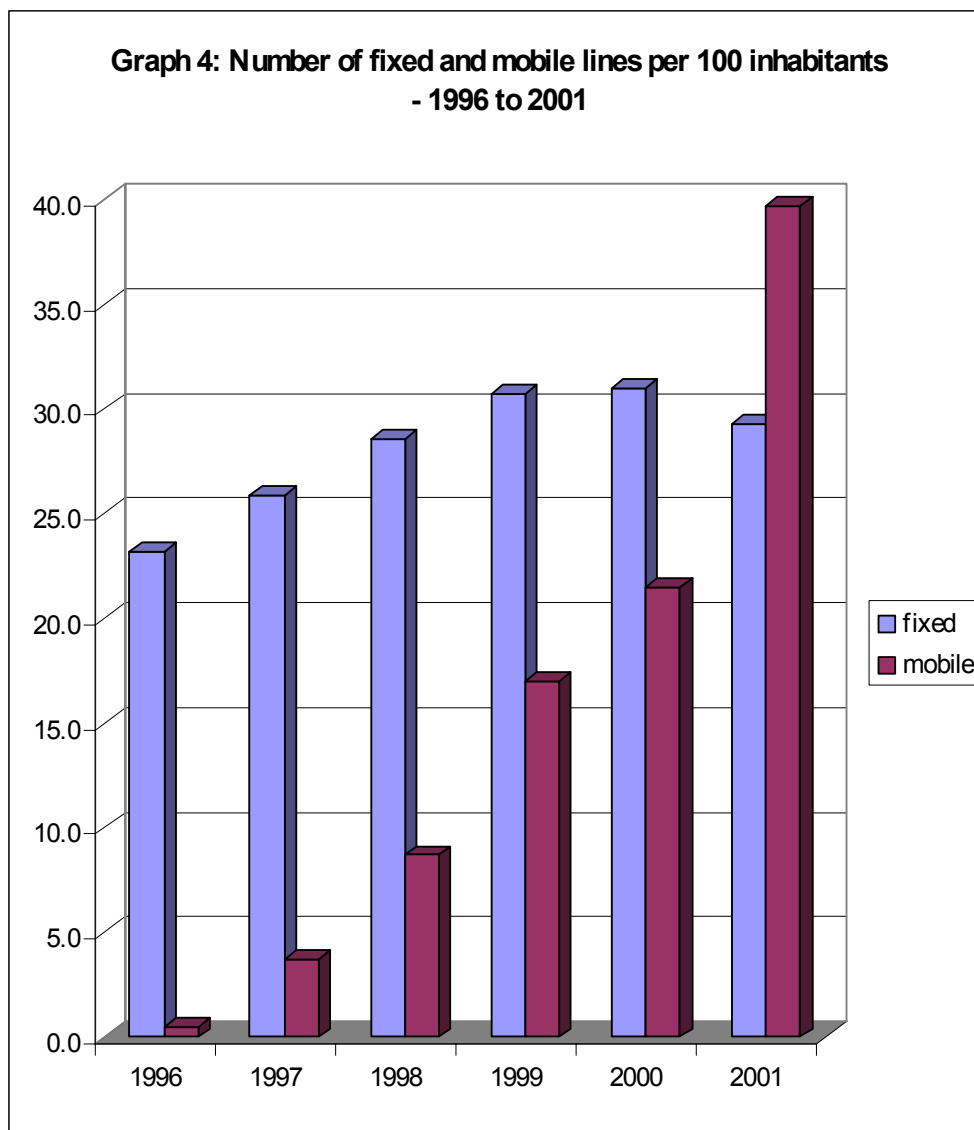


Table 5: Percentage rate of fixed lines and mobile subscriptions – 1996 to 2001

Year	1996	1997	1998	1999	2000	2001
Fixed	97,80%	87,40%	76,70%	64,00%	58,60%	42,00%
Mobile	2,20%	12,60%	23,20%	35,50%	40,60%	58,00%

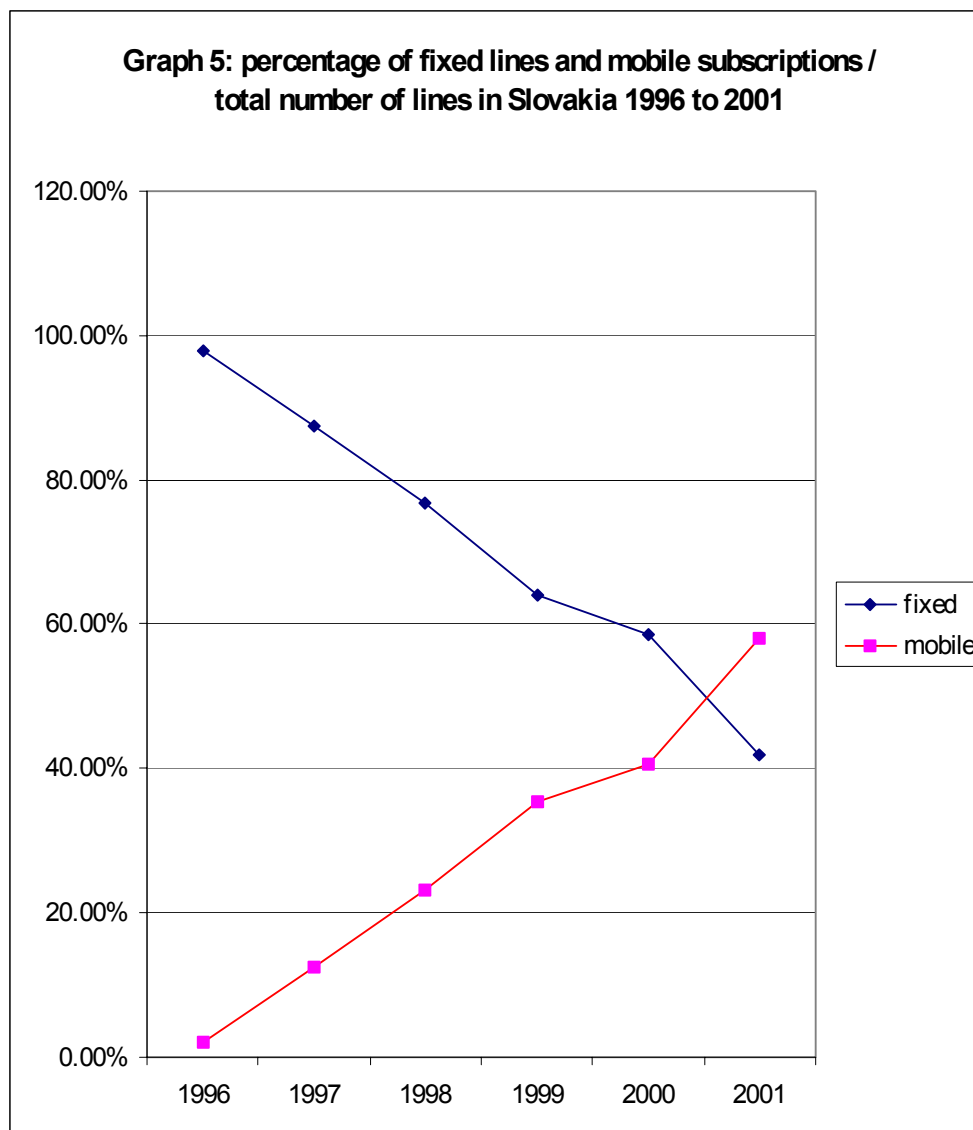


Table 12: Public payphones penetration rate in Slovakia – 1996 to 2001

Year	1996	1997	1998	1999	2000	2001
Penetration	1,9	2,2	2,44	2,54	2,66	2,8

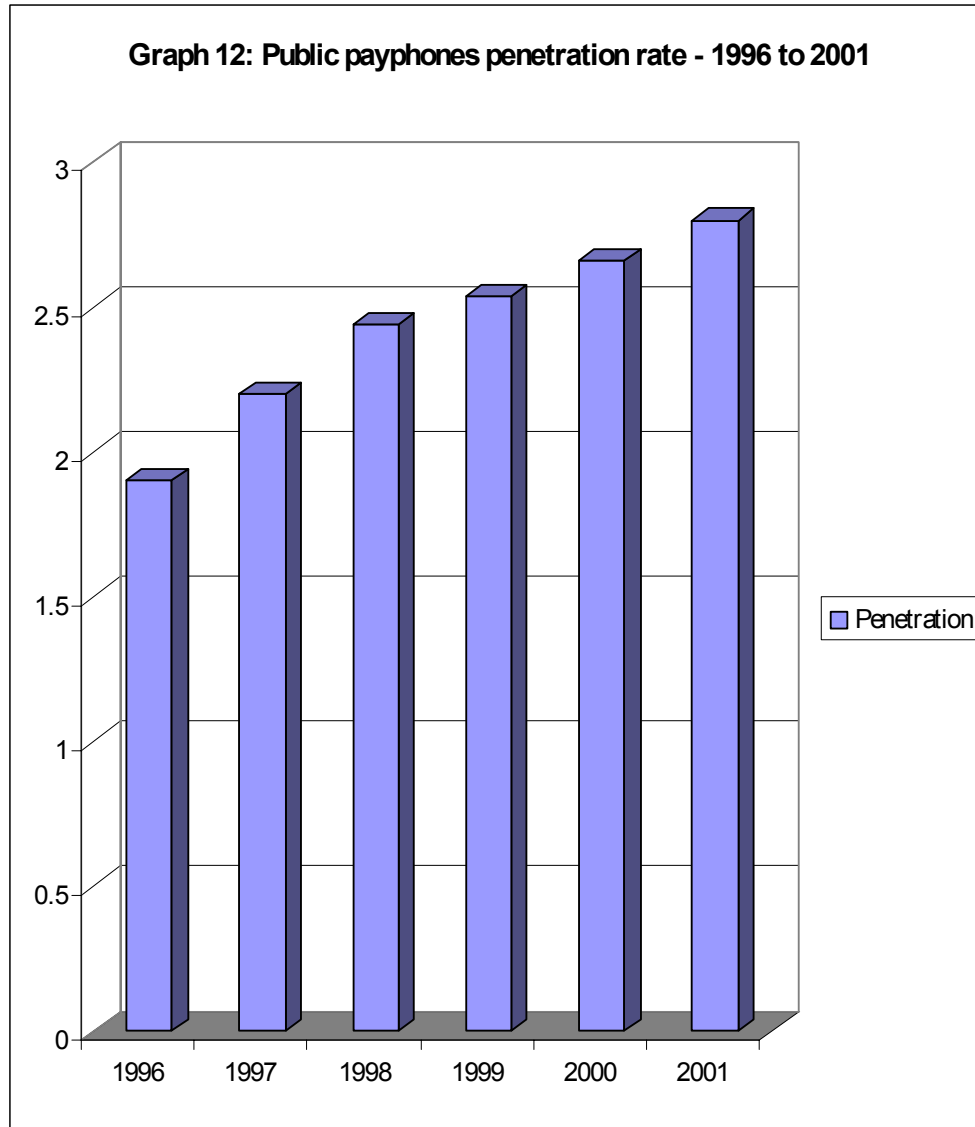
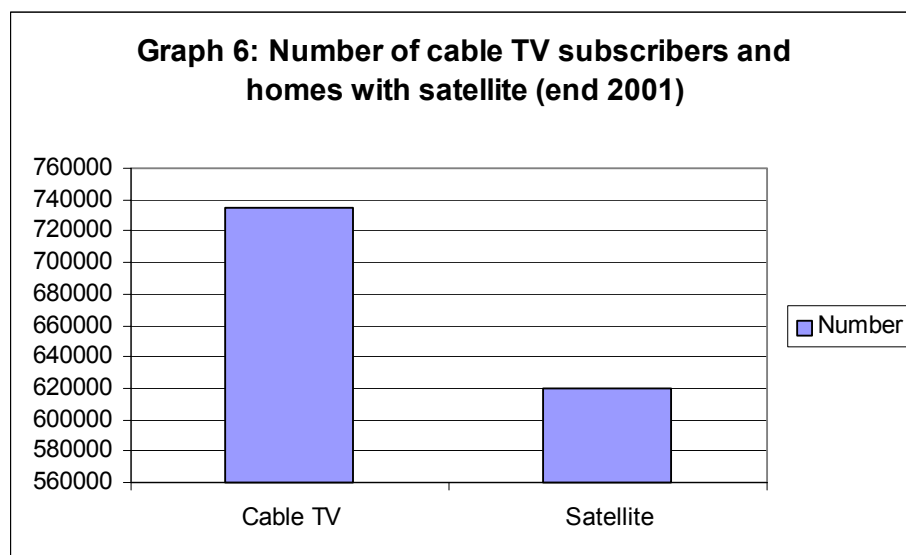


Table 6: Number of cable TV subscribers and homes equipped with satellite (end 2001)

Type	Cable TV	Satellite
Number	735395	620000



3.2. The Internet

The current communications infrastructure provides the very basic technical means for the majority of the population to access the Internet. There are approximately five large providers of Internet in Slovakia and about 20 smaller ones. This is a significant drop from the year 2000, when nearly 50 providers competed on the market. Since Slovak Telecom is the sole owner of the last mile, alternative providers have difficulty competing in the market. Major wholesalers include:

- ST Online (Slovak Telecom);
- SANET and SANET II (the Slovak Academic Network);
- INFOVEK (a state program for bringing the Internet into primary and secondary schools);
- Orange (the major mobile phone operator);
- Eurotel (the minor mobile phone operator);
- Nextra (the Internet provider of Telenor);

3.2.1. Internet availability

- Total number of ISP providers? five large providers, 20/25 small
- Prevailing types of ISP networks? microwave
- Is there competition among ISP providers? Yes, but limited by Slovak Telecom's monopoly on local loop.
- What are opportunities for public Internet access? Schools, Internet cafés

- Are there dedicated lease line possibilities? Yes.
- Are there competing lease line providers? No

3.2.2. Internet affordability

Affordability is another important factor for the growth of Internet connectivity. Since Slovak Telecom is maintaining its dominant position on the market, according to the most recent Progress Report on e-Europe+, Slovakia has one of the lowest penetration and highest cost Internet facilities among the accession countries. Recently, however, Slovak Telecom started the e-Slovakia Initiative, which offers to connect all elementary and high schools in Slovakia at below market cost using an ISDN solution.

It is expected that full liberalization of the telecom market will bring significant changes in the provision of leased lines and access at local level, resulting in a reduction in charges. Unfortunately, the most recent attempt to revise the Telecommunications Act failed to pass through the Slovak Parliament.

Internet affordability indicators are detailed in the charts below.

- What are the prices of Internet access? Base price US \$2/month
- It is affordable for a minority? limited by telecom fees and PC prices
- What are the rates for leasing lines? US \$200/month
- Are the rates affordable for small businesses? No
- And individuals? No

In spite these statistics, since the late 1990s the number of Internet users and Internet penetration in general has shown a growing trend. The majority of active users are, however businesses and educational institutions. Only one out of every seven Internet users logs-in from home. In addition, the greater proportion of Internet users is regionally concentrated in major urban centers, namely the capital, Bratislava, and in Kosice.

Proportionally, it is also evident that the growing number of special service users prefers ISDN, where the number of subscribers has grown seven times from 1999 to 2001. This growth trend is still continuing, but the pace is far less dramatic in 2002 than in previous years.

Table 7: Number of ISDN subscriptions – Evolution 1999-2001

Year	1999	2000	2001
ISDN	4,353	11,911	31,047

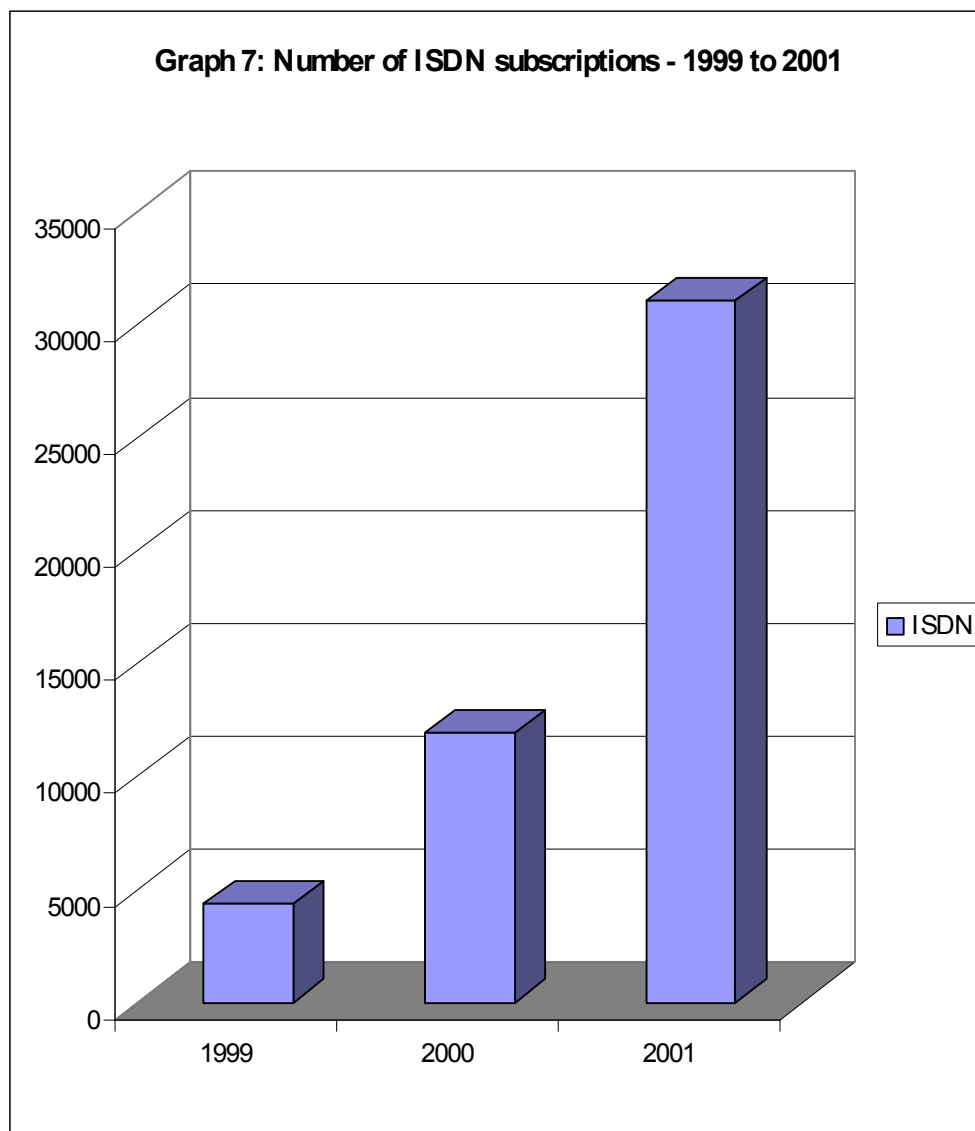


Table 8: Number of ISDN subscriptions per 100 inhabitants – Evolution 1999 to 2001

Year	1999	2000	2001
ISDN	0,08	0,22	0,58

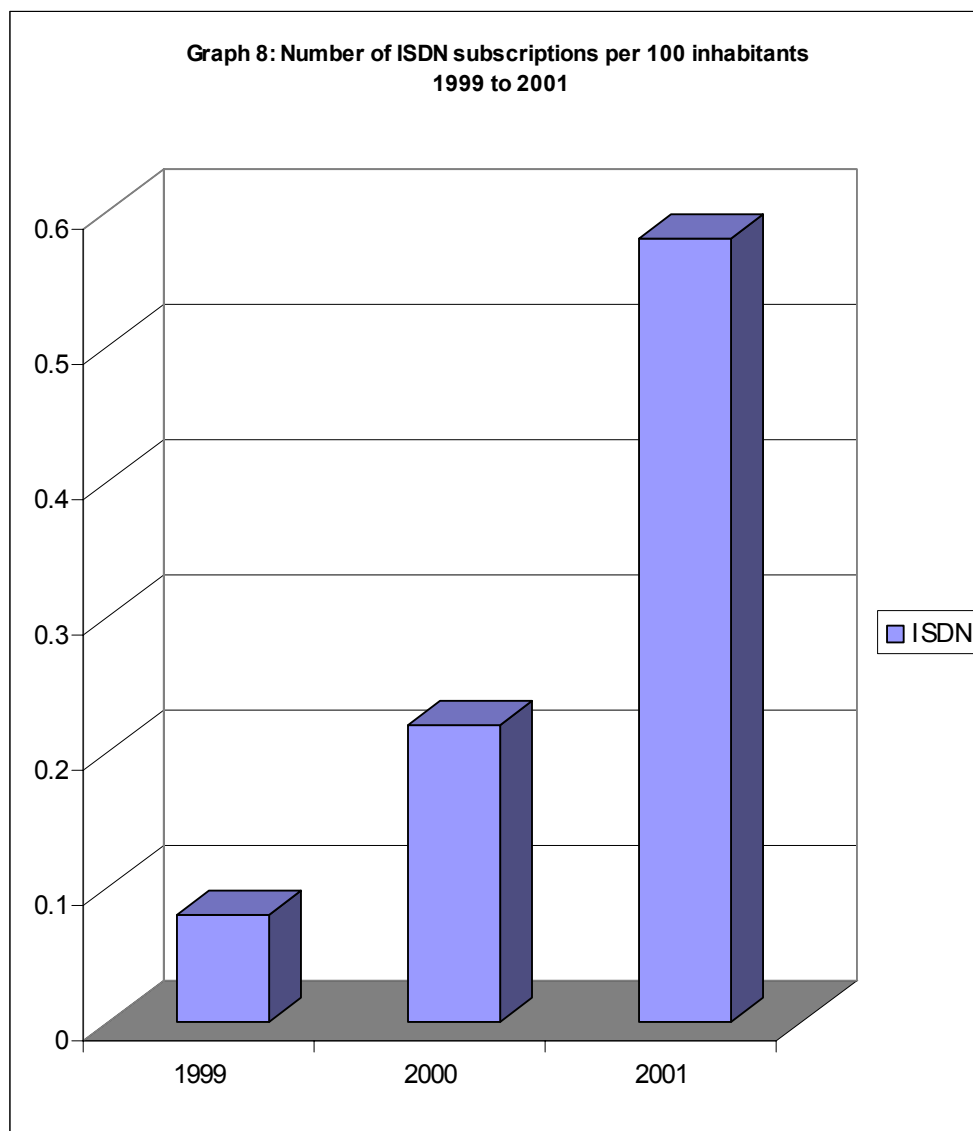
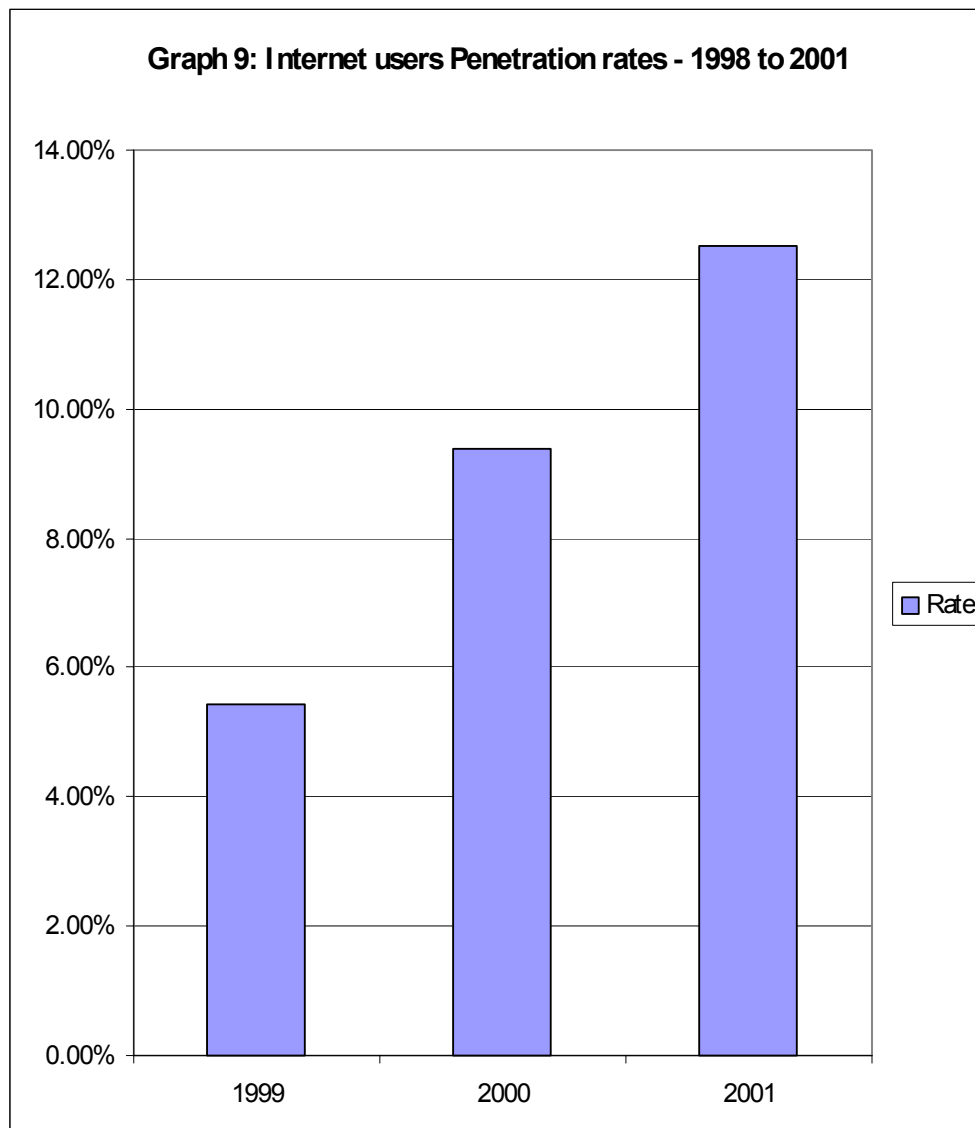


Table 9: Internet users Penetration rates – Evolution 1999-2001

Year	1999	2000	2001
Rate	5,42%	9,38%	12,53%



3.2.3. Network speed and quality

Most Internet connections, except from the 1 Gb academic network SANET and SANET II, are, by today's standards outdated modem, analogue or ISDN links with a maximum speed of 64 – 128 kb/s. This type of network quality is also implemented in the INFOAGE's network of more than 800 schools. By the year 2002, all central government institutions should be connected by 2Mb capacity lines, thereby upgrading the existing 64 kb/s connections. In this area important strategic decisions are to be made by government, namely a decision as to whether to build and own a state government network, or to have services provided by one or more service providers. Since the GOVNET Project was cancelled in 2002 in non-transparent

conditions, this question is still very relevant to the future development of telecommunications networks in Slovakia.

The data detailed below illustrates the condition of the network:

- Which services are supported by local telecommunications infrastructure? 64 - 128 kb/s modem connection, ISDN, possible upgrades of capacities. 1Gb academic network.
- Are there sufficient backbone facilities or networks? Yes.
- Even for peak demand? No

3.2.4. Hardware and software

The local hardware business is dominated by most of the major multinational companies working in the field of IT - CISCO, HP, IBM, SIEMENS, and NEC are all present in Slovakia, working either directly or through local distribution chains. The sole exception in Slovakia is probably DELL Computers, a company, which has failed, to date, to capture a significant share of the market.

Among the software firms, the Slovak market is also dominated by software giant Microsoft Corp., who signed in 2002 the “Enterprise Agreement” with the government on provision of licenses for all central government institutions for a 33% price starting in 2003. Several local software firms’ work on applications and solutions for major multinationals. For instance, SWH employs some 2000 programmers and its major customer is the German company, SIEMENS. DITEC is another local firm working in the area of applications. Local financial institutions run its MONEX system for payment processing. Datalan, PosAm, Gratex and Anasoft each employ up to 100 people and are considered to be successful in the field of software development in Slovakia.

An exception here is ESET Software, a Slovak software firm with offices in Bratislava, Prague, Rome, San Diego, New York and London, with its anti-virus system NOD 32. The NOD 32 anti virus system is currently distributed in approximately 70 countries around the world. In 2002 ESET Software signed a major contract with DELL Computers on DELL Server Virus Protectionist and strategic cooperation in software development. NOD 32 is widely considered to be the only European product in the field able to compete with success with its US rivals from Symantec and MacAfee.

The data below illustrates the state of software development in Slovakia,

- Are there local IT hardware/software sales points? Yes.
- Is the price of IT hardware/software affordable for a minority of citizens/businesses? Yes
- Is there software in local language? Yes.
- Is software imported or adapted locally? Imported. Small percentage local. The NOD32 virus protection system is an exception (75% of local market share).

- Is there a broad variety of software business application? Few
- Are the IT software/hardware retail markets competitive and vibrant? Yes

Table 10: Total number of Home and Business PCs (end 2001)

Type	Home	Business
PCs	99200	700800

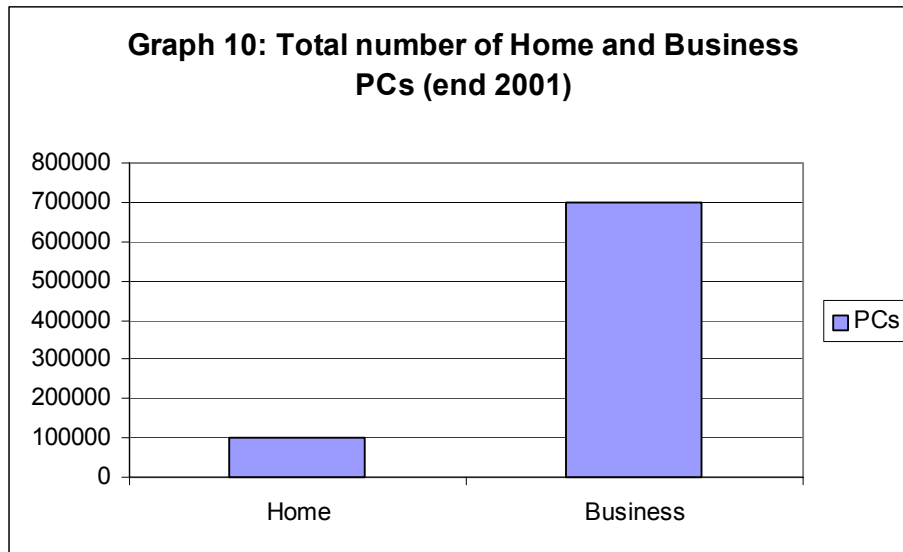
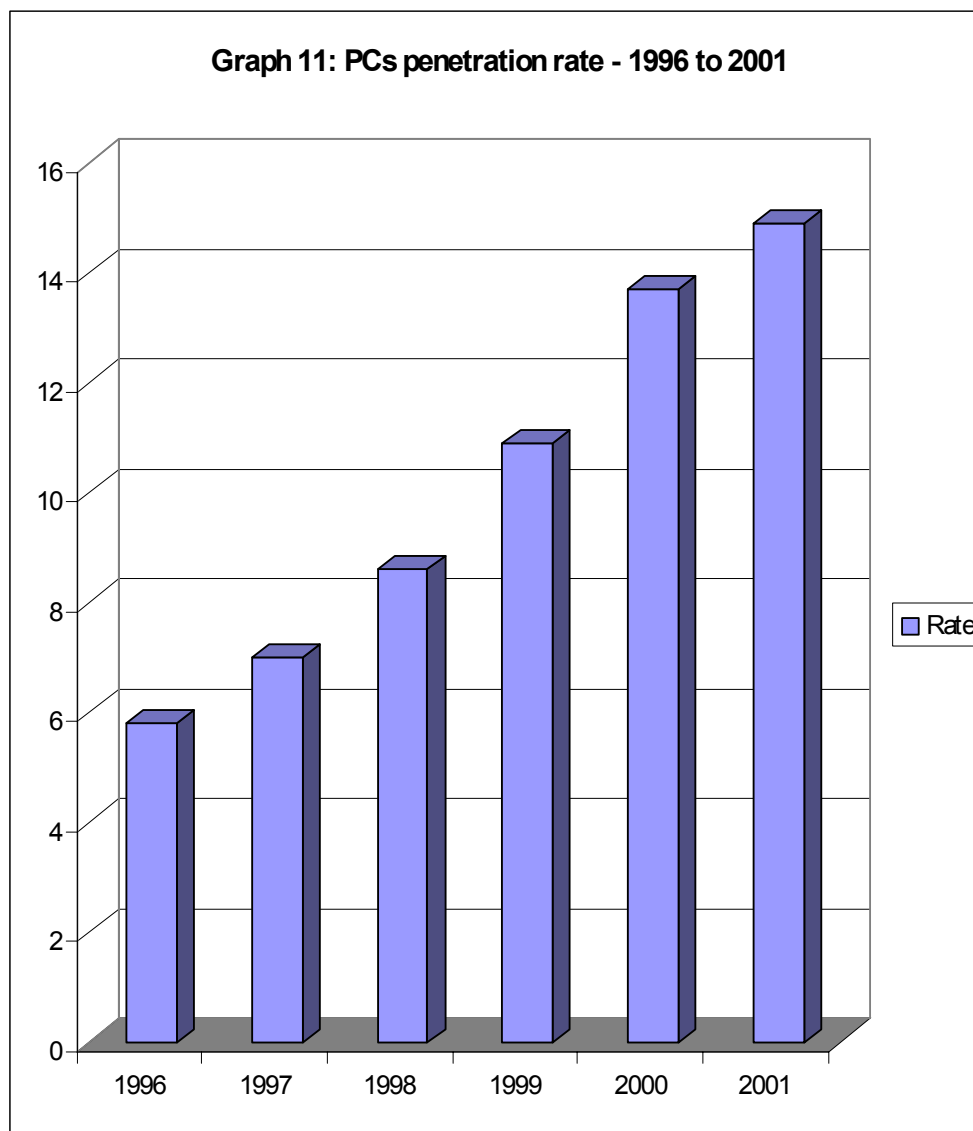


Table 11: PCs penetration rate in the Slovakia – 1996 to 2001

Year	1996	1997	1998	1999	2000	2001
Penetration	5,8	7	8,6	10,9	13,7	14,9



3.3. Content - Information and Services

Currently in Slovakia there are some 60,000 registered Internet domains, and several Internet portals. Among the most visited portals, according to May 2002 research carried out by TNS Slovakia, are: www.zoznam.sk, www.markiza.sk, www.mesto.sk, and www.atlas.sk. Of these zoznam and atlas server as standard information portals oriented towards the Slovak Internet users. Markiza is the portal of the first and, thus, far most successful commercial TV station in Slovakia. Mesto (city) is intended to focus on the 138 cities of Slovakia and provide

local content – information and basic services – on the Internet. Average daily visits to these portals are somewhere between 300,000 and tens of thousands. The trend, however, is a growing number of visitors.

News services on the Internet are offered by all major daily newspapers (www.pravda.sk, www.sme.sk, www.trend.sk), and there are also popular Internet news sites such as www.zivie.sk, and www.mobil.sk. The most visited site today belongs to SME online, where the number of visitors sometime reaches as high as 100,000.

With regards to public administration, most government institutions have their own web pages and portals. Among those most visited is the Slovak Government's web page, www.vlada.gov.sk, where official documents from government sessions are made public.

In 2002 the Ministry of Justice also started to provide online legal services through its ASPI and JASPI portal to central government institutions. Since 2001 the Internet-based Central Register of Commercial Subjects is also in its jurisdiction.

Slovakia, however, still needs a central government gateway, which makes information and services readily available to citizens and businesses. Most e-Content in Slovakia is difficult to search for, especially for the general public, and basic online services highlighted in the provisions made by e-Europe+ are yet to be implemented.

4. Human resources and innovation

4.1. Education

4.1.1. Professional education

The availability of digitally literate and qualified personnel, equipped with all necessary skills, is essential for the development of a knowledge-based economy. Slovakia has a long tradition in the area of IT education at various scholastic levels. Not infrequently Slovak students gain first place in international competitions in computer programming and in the natural as well as the technical sciences. Paradoxically, this success has continued despite the fact that Slovakia lags behind other EU countries as regards availability of IKT laboratories in primary and secondary schools. With an average of 80 students per computer Slovakia exceeds the 2001 EU average more than six times.

Moreover, digital literacy is still not officially required skills for students completing their primary education, and in 2002 Slovakia failed to implement the ECDL program in the country.

At a primary and a secondary level the INFOAGE project was launched in 1999 as a non-governmental initiative. The project gradually equipped more than 800 primary and secondary schools with computer laboratories and connected them to the Internet. Given that in 1999 only about 80 schools in Slovakia – in Bratislava and Kosice – had such facilities, the project appears to be a success. However, the 800 schools now equipped still comprise less than 30% of all primary and secondary schools in the country, when the EU average for such facilities is between 80 and 90% of schools, and more than 50% in neighboring countries.

The success of the INFOAGE project is not only in its public-private nature, but also in the structure, which rests on four basic pillars:

- Infrastructure – hardware, software and connectivity
- Educational content development – some exported, but a large proportion prepared by specialists at home
- Teacher training – the project has so far trained more than 6000 teachers
- Digital enlightenment – opening the IKT laboratories to local communities

In addition, the project follows the principle of nation wide implementation and brings new technologies to village schools even in the most remote areas of Slovakia.

Another successful public-private partnership is the launch of the Cisco Networking Academy Programme (CNAP), designed to train certified networkers. Launched in 2000, the programme today has 40 academies throughout Slovakia and has trained more than 1400 students to different levels of certification. Cisco Systems also signed a Memorandum of Understanding with the Ministry of Education in 2000 and today it has two programmes fully accredited by the Ministry of Education. The Regional Cisco Networking Academy at the Technical University in Kosice was recognized by Cisco Systems as the Best Regional Academy in the years 2000 and 2002. It is the first regional academy ever to receive this award twice in its brief history.

The Ministry of Education has also signed a Memorandum of Understanding with Microsoft Corp., providing legal software for a symbolic price of 10% for all educational institutions. In 2002 the Ministry of Education signed an Enterprise Agreement with the same firm, which guarantees legal software for all state institutions at a 33% price. This was a crucial step for the Slovak Government towards software legalization in the state sector.

The data below shows the state of ICT professional education in Slovakia.

4.1.2. Universities

In Slovakia there are 24 universities and colleges located in 10 towns throughout the country. All of these institutions have computer majors, and enrollment in 2001 was 93,649 students. Technical sciences in total comprise some 30,000 students. Of the entire populations, some 186 000 people hold a college or university degree in ICT, and approximately 565,000 inhabitants have attended some sort of computer training course.

For more than a decade the Slovak Academic Network (SANET) has operated in the country. In 2002, the SANET II network was completed, connecting via a broadband connection all universities along the East – West continuum of the country. It is planned to make a loop through all university towns in Slovakia in 2003 and 2004. All universities have several well-equipped computer labs and there is an average of more than 300 computers per school. The rate of students per computer at universities is approximately 15.

	Primary level	Secondary level	University
Number of schools	2 302	1 122	24
Number of computers in schools	7 211	11 565	6 087
Number of schools with computer labs	500	350	24
Number of computers per school	3,13	10,31	304,3
Number of students	600 885	289 118	93 971
Students per computer	83	25	15
% of schools with computer labs			100

4.2. Innovations

The development of a knowledge-based economy is characterized by a country's potential to generate innovations and utilize new technologies. This potential depends greatly on the level of research and development expenditure that is usually generated by intensive cooperation between universities and industry.

4.2.1. Research and development (R&D)

R&D expenditure is accepted as a relevant indicator of activity in the field of science and technology in general and, as it is the case in most transition economies, this expenditure has declined in Slovakia in recent years. As a direct consequence of this decline the Slovak R&D community faces a number of negative trends, for instance:

- Local R&D workplaces are unable to pay highly qualified scientists and experts, who consequently leave to work in the private sector for higher salaries. This leads to a gradual decline of R&D potential in Slovakia;
- R&D capacities are fragmented and are those in the field are forced to work on micro projects. These projects are often out of sync with European research space and criteria;
- Inadequate financial backing and fragmentation hamper integration of the Slovak R&D capacities into the European research space.

From a more positive angle it can be noted that:

- Significant scientific results have been achieved in recent years at several scientific workplaces;
- The new generation of young scientists has proven its ability to succeed in international scientific competitions. One Goedel Price was awarded to young Slovak scientists in 1995. This is the highest international award in the field of theoretical informatics.

It is difficult to make a precise estimate of the real reduction of R&D expenditure, mainly because of the effects of inflation, but also as a result of the drastic organizational changes in science. Compared to EU countries, where the average annual expenditure on R&D is 1.9% of GDP, in Slovakia this expenditure approximates only 0.9% of GDP. The expenditure is even lower, if we compare the EU average GDP with Slovakia, where the latter is 50% lower.

The situation is even more disturbing for Slovakia given the EU's intention to increase R&D expenditure to 3% of GDP in year 2010, an objective which is in-line with the aim of making Europe the world's most dynamic knowledge-based economy. Science and research are directly related to the development of a knowledge-based economy and the development of an information society is an EU priority. This fact is also reflected in the 5th and 6th Framework Programmes in which more than one fifth of the total financial budget is given over to development of technologies for the information society.

4.2.2. Science

Slovakia did not manage to escape the brain drain of skilled scientists, which took place in all post-communist countries. There is a steady decline in the number of employees in the fields of technical and natural sciences. In addition, there is a minimal influx of younger scientists into the Slovak Academy of Sciences (SAV) and the Academy is simply growing old and unable to adapt and implement innovative approaches.

5. Major national initiatives

In 1998, the Slovak Government declared that building an Information Society was one of its priorities and identified the development of communications and high-technology as a pillar of sustainable economic growth. In this field, the government policy, ‘The Policy of the Information Society Development in Slovak Republic, June/2001’, is built on the following premises:

- Enhanced competitiveness and innovation resulting from the implementation of new technologies, particularly in the areas of IT and telecommunications;
- ICT investment viewed as a stimulating factor for investment in other fields;
- Greater efficiency of commercial transactions and processes;
- Creation of new commercial opportunities to enter European and Global markets;
- Enhanced regional development with access to information and work opportunities;
- Attainment of information society development to the point where ICTs would contribute to an increased quality of life for Slovak citizens.

In addition to these Government’s intentions, it is also essential to note INFOAGE, which is one of the most successful projects in the country in the field of ICTs and the information society development. There is also a Ministry of Education initiative to transform the project into a National Development Project of Elementary and High Schools in Slovakia, starting in 2003. Due to budgetary constraints, however, this intention may not be realized.

Finally, in 2001, the Government announced an initiative to create:

- a venture capital fund for the development of SMEs in the ICT sector;
- a high-tech industrial park on the borders of the Czech Republic, Slovakia and Austria, which would attract scientists, researchers and industry to one place.

6. Conclusion

Below is a summary of Slovakia's strengths and weaknesses in its progress towards a knowledge-based economy:

Strengths

- A highly developed telecommunications infrastructure nation-wide assures easy access to the entire population.
- Slovakia has a high number of skilled professionals in the ICT sector, and still has youth with strong scientific capabilities, emerging from its institutions of higher education.
- Small and medium enterprises, especially in the area of the software development, are well developed and strong in Slovakia. Some have even achieved international commercial success in this field. These can serve as a good domestic economic base once the knowledge-based economy gains momentum in the country.
- Most major multinational firms from the ICT sector are represented in Slovakia, providing work opportunities, as well as opportunities for further development, for young Slovak professionals.
- The regulatory framework for ICTs is good, and significant parts of the relevant legislation have been harmonized with that of the EU. Internet service provision is liberalized and competitive. A recently drafted law on high-tech parks may have significant impact on future development of this sector.
- Slovakia is being pressed by the EU to make sufficient progress in the field of human capital development. This is especially the case as regards the State obligation to facilitate opportunities for acquisition of necessary skills and knowledge for all citizens to participate in the information society.

Weaknesses

- There is still an urgent need for senior government representation at a political level to promote issues related to the ICT development and to the development of the information society in general.
- The Slovak Government does not appear to be sufficiently aware of the threat posed by the inadequate pace of the information society development, and which is becoming more urgent with the coming accession of Slovakia to the EU. ICTs and the Internet today form the primary communications medium of the EU countries. Candidate countries, which fail to prepare their civil servants and citizens to use these means of communications, will remain at the periphery of all major EU processes.
- Many public servants are digitally illiterate and lack the capacity to use modern ICTs effectively. The State, as the major employer of skilled professionals, does not have standardized examination processes for the level of ICT skills of civil servants.

- While university education is of a very high level in technical fields and natural sciences in Slovakia, there is a consistent under-financing of science and R&D, leaving Slovakia depleted of young talent and human capacities.
- There is no central government institution to manage conceptually, and supervise the progress, of information society development in Slovakia. All such institutions so far were created in an ad hoc and temporary manner and therefore there is a lack of progress in the field.

Annex I - Benchmarking

Table 1.

Information Infrastructure:	Stage 3
Internet Availability:	Stage 3
Internet Affordability:	Stage 3

Table 2.

Network Speed and Quality:	Stage 3
Hardware and Software:	Stage 3
Service and Support:	Stage 3

Table 3.

Schools' Access to ICTs:	Stage 2 - 3
Enhancing Education with ICTs:	Stage 2 – 3
Developing the ICT Workforce:	Stage 2

Table 4.

People and Organizations Online:	Stage 3
Locally Relevant Content:	Stage 3
ICTs In Everyday Life:	Stage 2 – 3
ICTs in the Workplace:	Stage 3

Table 5.

ICT Employment Opportunities:	Stage 2 – 3
B2C Electronic Commerce:	Stage 2
B2B Electronic Commerce:	Stage 2
E-Government:	Stage 2 – 3

Table 6.

Telecommunications Regulation:	Stage 2 – 3
ICT Trade Policy:	Stage 2 – 3

Annex II

1. Network Access

1.1. Information Infrastructure

- Telephone penetration:
32 fixed lines/100 inhabitants
- Mobile wireless penetration:
47/100 inhabitants, growing trend
- Total number of mobile telephone subscribers:
Nearly 2.6 million
- Total number of mobile telephone subscribers per 1000 people
470/1000 inhabitants
- Wireless penetration:
47 % of total population
- Growth trend:
Growing number of wireless subscribers.
- Total number of cable TV subscribers:
660 000
- Cable TV subscribers
35 % of households

1.2. Internet availability

- Total number of ISP providers
5 big providers, 20 – 25 small
- Prevailing types of ISP networks
Microwave
- % of unsuccessful local calls
N/A
- Is there competition among ISP providers?
Yes, limited by Slovak Telecom's monopoly on local loop.
- What are opportunities for public Internet access
Schools, Internet cafés
- Are there dedicated lease line possibilities?
Yes.
- Are there competing lease line providers?
No.

1.3. Internet affordability

- What are the prices of Internet access?
Base price US \$ 2/month
- It is affordable for MINORITY
Limited by telecom fees and PC prices
- What are the rates for leasing lines?
US \$ 200/month

- Are the rates affordable for:
 - small businesses?
No.
 - And individuals?
No.

1.4. Network speed and quality

- What is the percentage of successful calls?
N/A
- What is the quality of voice connection?
N/A
- How many faults are reported per year for each 100-telephone main line?
27
- How long it takes to clear faults?
N/A
- Which services are supported by local telecommunications infrastructure?
64 - 128 kb/s modem connection, ISDN, possible upgrades of capacities. 1Gb academic network.
- Are there sufficient backbone facilities/networks?
Yes.
- Even for peak demand?
No.
- What is the percentage of packet loss by the network?
N/A

1.5. Hardware and software

- Are there local IT hardware/software sales points
Yes.
- Is the price of IT hardware/software affordable for MINORITY of citizens and businesses?
Yes.
- Is there software in local language?
Yes.
- Is software imported or adapted locally?
Imported. Small percentage local. The NOD32 virus protection system is an exception (75% of local market share).
- Is there a broad variety of software business application?
Few.
- Are the IT software/hardware retail markets competitive and vibrant?
Yes.

1.6. Service and support

- How long is the waiting period for telephone line installment
30 days
- How long is the waiting period for reported telephone line to be fixed?

Up to 14 days.

- Are there software developers, web designers, network administrators and other technical personnel?
Yes.

2. Networked Learning

2.1. Schools access to ICTs

- Are there computers in schools?
Yes.
- How many students per computer?
25 students/computer
- On which level?
All levels / average

	Primary level	Secondary level	University
Number of schools	2 302	1 122	20
Number of computers in schools	7 211	11 565	6 087
Number of schools with computer labs	500	350	20
Number of computers per school	3,13	10,31	304,3
Number of students	600 885	289 118	93 971
Students per computer	83	25	15
% of schools with computer labs	22	31	100

These data are for the year 2001, there are 24 universities at present.

- Who has access to computers?
Students, faculty and technicians. Some primary and secondary schools are open to public.
- What is the quality of hardware?
Mostly Pentium II and III, some 486.
- Are there LANs in schools?
Yes, in those with computer labs.
- Regional WANs?
The SANET academic network.
- National school network?
Yes, SANET for universities and INFOVEK for primary and secondary schools.
- Do schools have Internet connectivity?
Yes, mostly thorough leased lines.

2.2. Enhancing education with ICTs

- What is the percentage of students and teachers using computers?
Universities nearly 100%; primary and secondary schools 30%.

- What are the computers used for? What is the level of computer literacy/skills?
Mostly technical disciplines (informatics, computer science, automation, measurement etc.), computer literacy/skills - basics everywhere, higher levels also available.
- What is the level of ICT integration in the curriculum?
Middle stage

2.3. Developing the ICT workforce

- Are there training opportunities for programming, maintenance, and support?
Yes.
- Who is offering them (public/private centers)?
Both, public and private (Cisco, Microsoft etc.)
- Are they affordable for majority/minority of the population?
Majority
- Is on-line training available?
In a limited capacity
- Do employers offer training?
Yes.

3. Networked Society

3.1. People and organizations online

- What percentage of the population:
 - is aware of the existence of the Internet?
roughly 80%
 - has used the Internet recently?
22.7% of the population aged 18+ in December 2001 (using month rate).
 - uses the Internet regularly?
Approximately 15.4% of the population uses the Internet at least once a week.
- What is the structure of users by gender, age, social and educational status?
Most Internet users are young, well educated and live in large cities. Large towns (above 20,000 citizens) have approximately 60% of Internet users, middle-sized towns (500-20,000) have 37% of Internet users and residents of small towns (below 500 citizens) have 3% of the total Internet users. There are 10% more men users than women on average.
- What is the number of locally registered domain names (per 1000 people)?
As of 2002, more than 72 000 domains were registered in Slovakia, This averages out at approximately 13 domains per 1000 inhabitants.
- Is there advertising for online companies, and how common is it?
Yes, there is advertising for online companies on the Internet mostly, rarely in the press or TV.

3.2. Locally relevant content

- Are there (and how many: no, few, some, many) websites:
 - Providing local topics?

Many local websites exist – online directories; web portals; news websites, etc.

- In local languages?
Over 90% of websites are in Slovak language. Most Internet users prefer websites in Slovak.
- How often are they updated and is content static or dynamic?
Frequently updated with the exception of Government web sites.
- Are the above websites created in the community?
Yes.
- Are bulletin board systems, Usenet groups, newsletters, and/or listservs in use?
Average popularity.
- Are there opportunities for web-related training?
Limited – many on a self-learning base on a web itself.

3.3. ICTs in everyday life

- Does the population include information and communication technologies (phones, faxes, pagers, computers) in everyday life?
Phones are widely used in everyday life. Computer use is popular.
- Are there phones, wireless phones, digital assistants, and pagers, PCs and are they being used regularly? Are they used for household commerce (banking, online shopping, investing) and social and commercial interaction (bartering, online chat and etc.)
E-banking is widely spread, online shopping is not considered safe enough and therefore not so frequently used.
- Are there PCs with e-mail capability available (cyber cafés, telecenters) and are they being widely used?
Yes.

3.4. ICTs in the workplace

- Do employees have:
 - (Un) limited access to phones?
Yes, unlimited access in most cases
 - Personal e-mail accounts?
Yes
 - Internet access from personal workstations?
Yes
 - E-mail and web addresses on business cards?
Yes.
- What percentage of businesses and government offices have computers, how many of them, how many employees use them?
Approximately 90% of active companies in Slovakia use computers in their daily work. Are they networked?
Central administration has all computers networked and most of the other companies have local intranet.
- Is business mostly conducted in person or by e-mail, or is there data-sharing, enterprise, reporting, transaction, and research applications? How intensively are they used?

All of the above exist. Usage depends on the company type.

- Are there efficiency gains resulting from the use of ICT systems?
N/A

4. Networked Economy

4.1. ICT employment opportunities

- Are there opportunities for technically skilled workers within the country?
Yes, ICT employment is attractive. Average salary for ICT specialists is approximately 100% higher than average monthly salary and salary for ICT programmers is between 300% and 600% higher.
- Are companies from outside of the country investing in IT related projects?
YES
- What is the proportion of knowledge-workers and information-related businesses in the economy? (Percentage of labor force, percentage of GDP)?
N/A
- Are businesses considering IT in their strategies?
Most companies implemented IT strategies.

4.2. B2C electronic commerce

- Do local businesses have websites and how many? Is content current or static?
Yes, percentage is N/A, mostly static.
- Are there online B2C transactions, or are transactions mainly oral and/or paper-based, phone or fix-based?
Very limited.
- Is online retail a noticeable component of overall commercial activity?
N/A

4.3. B2B electronic commerce

- What are the sources of market information and are they sufficient for providing transparency?
Print and electronic media, TV, Internet. Transparency is acceptable.
- Are there online B2B transactions, or are transactions mainly oral, paper-based, phone or fax-based?
There exist online B2B transactions, but in a limited number.
- Can transactions be conducted online without paper documents? Is the process automated? Does it allow online tracking, monitoring?
No.
- What portion of B2B activity is conducted on line? Is there gain in efficiency?
N/A

4.4. E-Government

- Number of government resources online? Do they include information, hours of operation, any services? Is information current and relevant?

Every government office has a website. The frequency with which these are updated varies (most central administrates update their websites with week to day based frequency). There are 24 central government office websites, 138 websites for towns and eight regional websites, which covers 100% of central government offices, towns and regions of Slovakia.

- Is there online interaction between government and citizens, or is interaction mainly oral, paper-based, phone or fax-based?
Mainly oral/phone-based/fax-based, rarely by email.
- Is there online interaction between government and suppliers and contractors, or is the interaction mainly oral, paper-based, phone or fax-based?
Interaction is primarily paper-based. Electronic procurement platforms are not yet in use. An e-government strategy is under discussion to introduce electronic services to citizens and business enterprises.
- Is it possible to download applications from the websites?
Yes, nearly all documents are downloadable.
- Can citizens apply for permits, licenses, and taxes on line?
No.

5. Network Policy

5.1. Telecommunications regulation

- Is liberalization of the telecommunications sector planned or implemented?
The telecommunications market in Slovakia is liberalised with the exception of provision of public voice telephony (a monopoly of Slovak Telecommunications until 1 January 2003).
- Is there competition between telecommunications service providers?
*Generally, there is competition in the telecommunications market in Slovakia. However, the Telecommunications act does not permit competition in public voice telephone until 1 January 2003.
The Telecommunications act imposes carrier selection from 1 January 2003 and number portability from 1 January 2005.
There are two main companies (EUROTEL and ORANGE) competing in the field of mobile telecommunications and several providers in the field of Internet.*
- Is broadband Internet access offered?
No broadband Internet access is offered in Slovakia currently.
- Is regulation set and enforced by an independent body?
The Telecommunications Office of the Slovak Republic is a specialized state office to regulate and supervise the provision of telecommunications and postal services. The Internet is presently a part of the telecom sector that is unregulated and does not require licensing. A private Internet provider, EuroWeb, which has managed domain distribution in Slovakia since 1996, announced its intention to charge an annual fee for the use of domains starting 2003. This could impact on the dramatic increase in the number of registered domains in Slovakia.

5.2. ICT trade policy

- Do tariffs or other restrictions (technical standards, domestic regulation, etc...) exist?
N/A

- Are there restrictions in the service (including information services) sector?
N/A
- Are there disproportional taxes on electronically delivered services?
N/A
- Is Foreign Direct Investment in IT sector existent, and is it encouraged, discouraged, restricted?
N/A

6. Media

6.1. Radio, TV and newspapers

- Number of radio and TV stations, newspapers
One TV station with Public Service Broadcasting (with 2 channels); private stations number three; number of local TV stations is unknown. Number of licenses for TV networks in Slovakia is 76 (terrestrial - 8, cable - 61, satellite – 1, combined terrestrial, cable and MMDS - 6). There are 22 licenses for radio broadcasting (local, regional and multi-regional included). Total number of newspaper titles distributed and printed in Slovakia is 470 (416 are local and regional newspapers).
- The size of audience/circulation.

Majority proportion of audience in TV sector is led by TV Markiza (private), and is followed by Slovak Television (public).

6.2. Employment in the media

- Number of employees in the media
N/A
- Trend: is the number increasing/decreasing?
N/A

7. Intellectual Capital

7.1. Patents

- What is the number issued per annum?
N/A
- What are the trends?
N/A

7.2. Copyrights

- What is the number issued per annum?
N/A
- What are the trends?
N/A

7.3. Licenses

- What is the number issued per annum?
N/A
- What are the trends?
N/A

7.4. Trademarks

- What is the number issued per annum?
N/A
- What are the trends?
N/A

7.5. Scientific and/or technical associations

1. List with a brief profile

The Slovak Academy of Science has a technical branch, and several civic associations are active in the field of IT. Most of the latter associations operate in Bratislava and broker partnerships between the public and private sphere.

8. Education

8.1. Higher education

- Total number of higher education establishments (public/private).
There are 24 colleges and universities located in 10 Slovak towns. All of them have computer majors.
- Total number of students (total average per annum, in both the private and public sectors)
There are 93,649 students (October 2001) at Slovak Universities in both sectors in senior-level study.
- Prevailing specializations. (distribution of students among the fields)
High-level study can be divided as follows: technical sciences 30,253; social sciences 40,98; other sciences 22,407.
- Cumulative number of population with higher education degrees (total in the fields of both science and technology)
According to a survey in May 2001, approximately 186,000 people in the country held college or university degrees in ICT and about 565,000 have attended some sort of computer training courses.

8.2. Distance learning

- Distance learning facilities
Six universities in six towns has established distance learning centres due to PHARE project 1995-2000. The Slovak University of Technology in Bratislava, the Technical University in Zvolen and the Technical University of Kosice are the strongest in this field, with extremely good Internet tools. Another three also use web-based tools for course and curriculum management, user management,

communications, online assignments and testing. There are also facilities connected with the City University project and more in the non-state sector. A private-public initiative lead to the establishment of the Cisco Networking Academy Program (CNAP) in 1999. Some 1400 students were trained at various levels and 40 academies have since been opened.

- Number of students trained per center
N/A

9. Labor Force

9.1. Employment in science and technical fields

- Number of employees and trends in the fields
N/A
- Compensation rates in the fields (average salaries)
N/A

9.2. Employment in the electronics industry

- Number of employees and trends in the fields
N/A
- Compensation rates and trends in the fields
N/A

9.3. Employment in telecom industry

- Number of employees and trends in the fields
The exact number is not known. The number of employees in the dominant Slovak telecom is declining (currently about 6,500) and the alternative providers - with the exception of the two mobile operators where in 2001 employment increased by 15 to 20 % to approximately 2000 - are stagnate.
- Compensation rates and trends in the fields
About 65% above the national average.

10. Research and development

10.1. Research institutions

- Number of research institutions
The Slovak academy of science and most technical universities have their own, smaller research institutions. Their number is 15.

10.2. Investments in research and development

- The total amount
70 million € in 2000.
- Government and private business breakdown of total investment in research and development
68.6% in the government sector, 21.4% in the private sector and approximately 10% in the education sector.

11. Other issues

- National initiatives regarding science and technology policy, venture capital, stimuli for students, scientists, etc.
There are two projects to aid ICT profile within SME development. These are: high-tech business incubators; and the establishment of a venture capital fund.