

UNITED NATIONS ECONOMIC COMMISSION FOR EUROPE

**TOWARDS A
KNOWLEDGE-BASED ECONOMY**

LITHUANIA

COUNTRY READINESS ASSESSMENT REPORT



UNITED NATIONS

UNITED NATIONS ECONOMIC COMMISSION FOR EUROPE

TOWARDS A KNOWLEDGE-
BASED ECONOMY

LITHUANIA

COUNTRY READINESS ASSESSMENT REPORT



Geneva and New York, 2003

ECE/TRADE/311/12

Copyright © United Nations, 2003

All rights reserved
Printed at United Nations, Geneva (Switzerland)

UNITED NATIONS PUBLICATIONS
Sales No.
ISBN

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.

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. 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.

The report was published by the Coordinating Unit for Operational activities under the guidance of Ms. Larissa Kapitsa with assistance of Ms. Tatiana Apatenko and Mr. Mitja Jarh.

Introduction

Lithuania is the largest country among the Baltic States and has common borders with Latvia, Belarus, the Republic of Poland and Russia. It is a democratic parliamentary republic with a President as the Head of the State. Lithuania has one of the fastest growing economies in Central and Eastern Europe, with the private sector now producing over 80% of the country's GDP. Natural resources are scarce. Of its land, 70% is arable and 27% forest. Major cities include Vilnius (543,000 inhabitants); Kaunas (381,300); Klaipeda (194,400); Siauliai (135,700) and Panevezys (122,300).

After the liberation the Lithuanian economy suffered a dramatic decline during its transition from a planned to a free-market economy. Following the restoration of independence, Lithuania embarked on a massive transformation of its largely State-run economy. In short, the government launched a nationwide privatization drive, which laid the foundations for the rapid growth of the small and medium-sized enterprise sector, and private agriculture. While the 1991-92 economic reforms were introduced quickly enough, economic recovery lagged behind because financial stability had not yet been achieved in an environment of frequent changes of government and rampant inflation.

The main macroeconomic indicators for 1993-2001

	1993	1994	1995	1996	1997	1998	1999	2000	2001
Growth of GDP %	-16.2	-9.8	3.3	4.7	7.3	5.1	-3.9	3.8	5.9
GDP per capita, US\$ thousand	0.7	1.2	1.7	2.2	2.7	3.0	3.0	3.2	3.4
Unemployment, %	5.8	6.5	6.1	7.1	5.9	6.4	8.4	11.5	12.5
Inflation (end of the year)	188.7	45.1	35.7	13.1	8.4	2.4	0,3	1.4	2.0
Foreign direct investment, US\$ million (end of year)	0.2	0.3	0.4	0.6	1.0	1.6	2.1	2.3	2.7
Current account balance compared to GDP, %	-3.2	-2.2	-10.2	-9.2	-10.2	-12.1	-11.2	-6.0	-4.8

Sources: *Statistical yearbook of Lithuania, 2001; Economic and Social Development in Lithuania, 7/2002*

Country Profile – Lithuania. Basic data

Population (2002. 01)	3,4756 million
Area (sq. ²)	65,300 sq. km
Per Capita GDP (2001) (US\$)	3437
GDP (% change2000/2001)	5.9%
Agriculture	6.4%
Industry (incl. construction)	30.7%
Services	62.9%
Merchandise Trade 2001 (US\$ billion)	
Exports (2001)	4.58
Imports (2001)	6.35
ICT in Merchandise Trade (in US\$ million)	548
Official Reserve assets (US\$ in million) end of 2001	1669
Currency Units (Litas)	1 Euro = 3.4528 LTL
Penetration of ICT	
TV sets per 100 households	122
Telephones per 100 population	33
PCs per 100 households	12
Mobile Cell Phone per 100 population	45
*National information infrastructure	Being developed
*National IT Policy	In progress

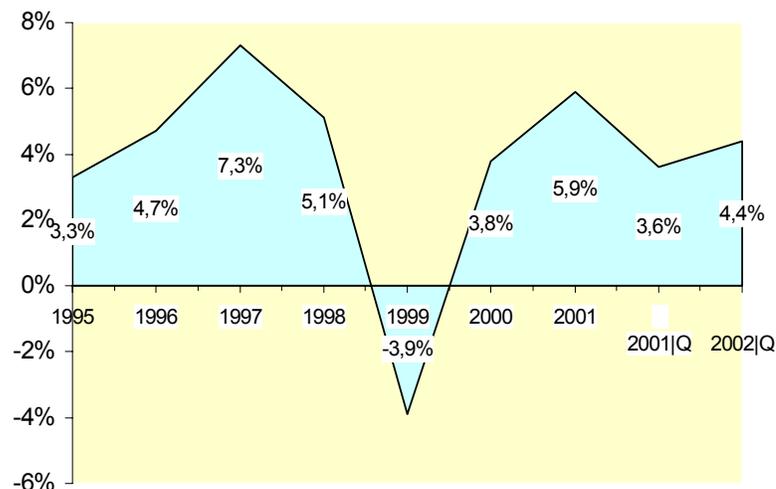
Source: Department of Statistics, Lithuania

The most developed Districts in Lithuania

	Population (10 ³)	Population from total population (%)	Proportion of national GDP (%)	Capital investment (% from total investment)	Distribution of SME's (%)
Vilnius	894	24.2	33.1	40.7	30.1
Kaunas	754	20.4	19.6	17.1	21.6
Klaipeda	416	11.2	12.2	11.2	12.3
Overall	2064	55.8	64.9	69.0	64.0

Source: Department of Statistics (1999)

Growth of Lithuania Gross Domestic Product 1995 - 2002 | Q, %



Source: Statistics Lithuania, 2002 Economic and Social Development of Lithuania 8/2002

Sector-wise Distribution of GDP (%)

Sector	1995	1998	2000	2001
Agriculture & forestry	11.8	10.2	7.7	7.0
Mining, quarrying, manufacturing, electricity, gas and water supply	26.1	23.9	25.8	28.4
Construction	7.1	8.6	6.1	6.1
Services	55.0	57.3	60.4	58.5

Source: Department of Statistics, Lithuania

It may be noted that there was negative GDP growth in the initial period of economic reform. Factors contributing to the decline were the low technology base of industries, the dramatic shrinkage of the previously well-established Soviet market and some injudicious use of companies' assets and energy capacities.

The ability of society to acquire and use knowledge is a key factor in determining the competitiveness of a country's economy. The importance of knowledge for economic development is likely to grow over the years to come and may well mean the difference between prosperity and poverty, both between but also within countries. The ability to acquire and use knowledge includes, amongst others, access and ability to use information and communications technologies (ICT). This ability, however, also requires efficient education systems, new approaches towards innovations which bring together researchers and entrepreneurs, as well as an economic and institutional framework that support the use of

knowledge to bring about new and competitive products and services. Lithuania's ability to acquire, develop, disseminate and apply knowledge to products and services crucial to sustain high rates of economic growth and productivity increases which will assist the country in meeting the competitive pressures in a globalizing world in which cheap labor will not continue to be a sufficient advantage.

Lithuania has successfully completed the transition agenda from plan to market, and has largely adopted the *acquis communautaire*, thus bringing the country to the threshold of EU accession. Economic growth has been strong over the past years, based on a growing and broad-based SME sector, and increasing shares of manufacturing exports, based largely on labor cost advantages (an advantage that is, however, likely to erode with increasing wage levels). Lithuania has also started to make progress on many of the dimensions of a knowledge-based economy, through participation in the Union's research programs, the preparation of a White Paper on Science and Technology, the e-Europe + Action Plan, and the adoption of various information society and e-Government strategies.

In spite of this significant progress, considerable challenges, new and old, will mark the way for Lithuania towards a Knowledge Economy able to compete with other EU candidate countries and the current member states in the Single Market and to find its place in the global economy. Data from the various institutions and results of different surveys (WB, EC) completed during 2000-2002 suggest that while Lithuania has made some progress since 1995 across key dimensions of a Knowledge Economy, technological innovations are lagging behind. The World Economic Forum (WEF) ranks Lithuania's current competitiveness as being 49th in the world, or in the lower third of the group of candidate countries expected to accede the Union in the near future. The WEF also ranks Lithuania in terms of technological abilities (41st), readiness for the information society (42th), business environment (48th) and sophistication of company operations and strategies (47th), all in the lower third of the group of aforementioned candidate countries. The results from the e-Europe + benchmarking exercise point to Lithuania lagging behind on building an Information Society; for instance, at around 15 percent, Lithuania has one of the lowest internet use rates amongst the Candidate Countries.

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 Lithuania. 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 Lithuania's e-readiness, as well as a benchmarking instrument against which the progress can be monitored

1. National Strategy, Policies and the Action Plan

1.1. Long-term economic strategy

A free-market economy, membership of NATO and accession to the EU in 2004 provides Lithuania with new opportunities and challenges. In order to seize the opportunities with the full consensus of the political, business and civil communities, a long-term national development program has been evolved with the aim of achieving significant economic and social progress by the year 2015.

The priorities of the development program are to:

- ensure that Lithuania's economy becomes a competitive, knowledge-based economy, providing an abundance of knowledge-consuming jobs;
- adapt the system of education and science to a knowledge society and to the European system of higher education and research;
- overcome poverty and social isolation;
- restructure rural areas by creating competitive agriculture, a modern infrastructure and active business opportunities; and,
- reform the country's government by putting in place the prerequisites for implementing the clear priorities.

To achieve the priority objectives, integrated action plans were being evolved, aimed at:

- identifying breakthrough sectors;
- ensuring the conditions necessary to develop the high technology industry;
- ensuring the formation of a cluster economic policy for the breakthrough sectors; creating the information and knowledge infrastructure corresponding to the needs of a knowledge-based economy; and
- establishing institutions in charge of shaping a national policy for high technologies.

The priority sectors identified included:

- biotechnology and pharmaceuticals;
- information technologies and telecommunications technologies;
- laser technologies; and,
- electronic components and mechatronics.

In traditional industry, the breakthrough sectors where Lithuanian companies exhibited core strengths in terms of competitiveness, rapid growth and increased exports, were:

- wood processing and furniture manufacturing;
- the textile and apparel industry;
- the chemical industry;
- the transport sector (transit services in the West-East, North-South directions);
- manufacturing of foodstuffs (dairy and meat products); and
- the construction industry.

To develop the Lithuanian economy, a Long Term Economic Development Strategy of Lithuania until 2015, with the primary focus on EU accession and membership of NATO, has been adopted. The salient points of this policy are as follows:

- By 2015, Lithuania will increase its GDP by 2-2.5 times to reach 50% of the average level of the GDP per capita level of the EU, compared to its current level of 33%.
- To adopt an EU economic order with a smooth operating system of market mechanisms.
- To increase the labour market by 10% by improving the system of education and implementing a system for the improvement of professional skills and re-training.

- An economy based on knowledge will be among the priorities of Lithuania. This will require a strong intellectual and political will, to arrive at a consensus between political forces, business and industry and the civil society.
- To enhance public-private participation by way of closer co-operation between local and foreign players; involve young, specialist, university diploma holders in economics and management issues; and use business consultation services.
- Integrate Lithuania's economic activity by adopting and using processes that are in use in European economic, digital and information systems.
- Inject the necessary thrust into the communications and informatics sector.
- Provide a legal and institutional environment favorable to SMEs and a system of co-operation with specialist educational institutions.

The Lithuanian government has thus identified national priorities for the development of the economy, with an emphasis on integration with the EU. The main features of these policies affecting information technology, international trade, telecommunications and industrial development in particular, are detailed below.

1.2. Information technology policy

The Government of Lithuania has declared the development of information society a top priority, as the creation of the conditions necessary for the development of information society is one of the key factors of a modern country's welfare.

The main policy documents on Lithuanian Information Society are the Conceptual Framework of the National Information Society Development of Lithuania, passed by the Government on 28 February 2001, which sets the key objectives and priorities in processes of the information society development, and Lithuania's Strategic plan for the Development of Information Society, passed by Government on 10 August, which defines concrete goals and institutions responsible for implementation of priorities set in Conceptual Framework for years 2001-2004. Conceptual Framework and Strategic Plan sets 4 priority areas for Lithuania's information society development:

- Competence of Lithuanian population in IT
- Public administration
- Electronic business
- Lithuanian culture and language

The Strategic plan is implemented through annual Detailed Action Plans, which are prepared by Information Society Development Committee under the Government of Lithuania on the basis of suggestions provided by respective governmental institutions. The Detailed Plans define concrete measures, detailed timelines and budgetary allocation for implementation of strategic goals.

Policies were developed through an industry and government consultative mechanism where INFOBALT expressed the industry's view. In addition to INFOBALT, input was also provided by the Chamber of Commerce and Industry and by the Association for Small and Medium-Sized Enterprises.

The long-term economic policy document, the Long-term Economic Development Strategy of Lithuania until 2015, approved by the Government in 2001, is aimed at making information

and communications a dominant sector accounting for 25% of Lithuania's GDP and not less than 50% of its IT product exports by the year 2015. It also visualized the use of IT in the economic structure of the country to stimulate development of other sectors and improve productivity. The main thrust of the policy was to establish Lithuania as an e-society, by developing the infrastructure and the regulatory framework, as well as enhancing the capability and competence of IT users.

In more detail, the Information Technology Policy aimed at achieving:

- Improvement in the production of information technologies, telecommunications and modern products based thereon.
- Encouragement of the provision of services to meet the needs of Lithuania and its exports.
- Modernization of the management work of the State and industry sectors based on wider application of information technology
- Liberalization of trade by drafting laws eliminating curbs on competition within the sphere of telecommunications; encouraging a shift towards e-commerce and e-business projects;
- A boost to trade in intellectual products and services, both internally and externally, and making them priorities in the State investment programme.
- The creation of a system of development for IT competence and the deployment of IT.
- The creation of pre-conditions for IT training, irrespective of age, sphere of activity or residence.
- The development of competence among users of information technologies and telecommunications at schools and universities;
- Reorganization of science and studies in the sphere of information technologies and telecommunications, adapting it to the solution of practical tasks;
- Computer literacy among public officers and the use of information technologies and telecommunications in the sector of administration.
- The universal provision of a basic minimum level of information technology and telecommunications services - telephony, computer networks, etc., the modernization of an information technology and telecommunications infrastructure and the provision of public services in the provinces.
- A system to develop competence in information technologies and telecommunications in the provinces.
- Creation of the terms for the development of innovative businesses in the provinces.
- Reorganization of public services to provide information on the development and economic activities of residents through computer networks.
- Reorganization of the work of public and self-governance institutions to establish the use of information technologies and telecommunications, in particular, electronic documents.
- Modernization of the information technologies and telecommunications infrastructure through shifting to broadband computer networks and creating a uniform State system of data accumulation.

1.3. Telecommunications policy

Lithuania is a signatory to the WTO's Basic Telecommunications Services Agreement. Under its WTO obligations, it is expected to have competitive regulatory principles in place by January 2003. International services are to be opened up to international competition by January 1, 2003. The basic telecommunications Agreement has been ratified by the Seimas, the Lithuanian Parliament.

The new amendments to Law on Telecommunications have been adopted in July, 2002 to establish the telecommunications regulatory framework in line with EU laws and the Conventions of the International Telecommunications Union (ITU). The law will regulate: relations between telecom operators; users; management, the use and control of radio communications; imports; the manufacture, use and maintenance of equipment radiating electronic waves; ensure effective use of radio frequencies and telephone numbers; and, set forth conditions for promoting competition in the telecom sector. The new Law on Telecommunications provides for the *de jure* end to a telecommunications monopoly in Lithuania from 1 January 2003, as it formally liberalizes the market and creates real opportunities for new operators, including small ones, to enter the market.

The institutional framework necessary for development of the telecom sector has been prepared. An independent regulatory body for telecom activities has been established – the Communications Regulatory Authority (CRA) – whose functions include management of the spectrum, standards, licensing, control and monitoring. In the interests of developing the sector, the CRA will initiate secondary laws to provide transparency, competition and fair play amongst operators. It will also decide market prices, based on details of costs provided by various operators.

The government will develop and implement its State strategy and policy program in the telecommunications sector and develop a broad-based policy for investment, frequency allocation, co-operation with foreign countries, quality requirements for universal services and any other areas affecting the national interest.

Lietuvos Telekomas, the monopoly basic-telephony service-provider achieved a fixed-line penetration level of 33.1% in the year 2001. Almost two-thirds of the customer base were provided with digital connection. Digitization of the communications network in Vilnius and Kaunas was completed. Lietuvos Telekomas plans to reach a digitalization ratio of 90% by the end of 2003. Lithuania supported the liberalization of the telecommunications market but many policy-makers felt that it was unlikely that a second operator would invest in Lithuanian fixed telephony because of small size of the market. A consensus was emerging on utilizing the available resources in the government and other public-sector agencies, such as those of the railways and the gas industry, to provide an alternative to the monopoly operator, Lietuvos Telekomas. This would at least ensure the availability of one alternative service provider, otherwise the monopoly of the present service provider will continue and prices will not come down.

In 2000, the telecommunications market in Lithuania was valued EUR 660 million. According to INFOBALT, it grew by 26% in 2001 and reached EUR 836 million by the end of the year, corresponding to 3.7% of GDP. It is the largest market in the Baltic States. There is no competition in fixed telephony, leased lines and broadband, which will remain under the control of Lietuvos Telekomas until 2003. Lietuvos Telekomas operates the only

broadband network, and its monopoly prevents the establishment competing networks. However, the NRA and the government are considering a tender to award 10.5 GHz and 26 GHz fixed wireless access licenses that would open the doors to real broadband competition. In any case, Lietuvos Telekomas' exclusive rights expire in the end of 2002.

The demand for mobile telephony services is continuing to grow in Lithuania: in June 2002, the penetration rate was approximately 35 %. There are two major operators (Omnitel and Bite), making the recent entry of a new competitor Tele2 quite difficult. Although the number of subscribers of Tele2 has been rising, it is still far from reaching Omnitel and Bite's levels. The situation suggests market saturation, creating a natural barrier for new entrants. Quite a few operators provide cable TV access. Although the market is not as developed as in some other Central and Eastern European countries, the easiest entry for a foreign company will probably be an acquisition of existing operators.

Lithuania completely liberalize its telecommunications market in January 2003. The new Law of Telecommunications has been adopted, but a number of secondary legislation has still to be introduced. This process has been realized under time pressure, therefore with an implicit risk that some decisions are inappropriate or legislation ill-adapted. Moreover, the current legislation will be valid only for a limited period, since it will soon (in 2003) be necessary to implement a new EU regulatory directive. The Lithuanian National Regulatory Agency (NRA), which lacks experience, adequate equipment and CCNM/TD(2002)12 qualified staff, also needs better financing to be able to deal with its increasingly complex and demanding tasks.

1.4. Industrial policy

The main objective of Lithuania's industrial policy has been to enable companies to become competitive at an international level by the year 2015. The policy is also aimed at aligning the structure of industry and business, as well as the share of national product created by industry and business, as closely as possible to EU indices.

To achieve the policy objectives, the government's aim has been to implement the following:

- A stable macroeconomic and legal environment favorable for business;
- An infrastructure to encourage investments in the development of modern industry;
- The strengthening of factors that aid industry's competitiveness and balanced development;
- An efficient national system guaranteeing favorable conditions for the integration of science with manufacturing, creation, innovation and the distribution of new technologies and methodologies;
- A strategy to attract investment in industry and to encourage green-field projects;
- Conditions of equal competition for domestic and foreign companies, the assurance of fair competition and protection for the domestic market against low quality products;
- A strategy for the creation of industry clusters;
- Improvements in the competence of heads of companies and specialists, by employing economic and other measures;
- Favorable conditions for obtaining market intelligence and other key business information;
- Improvements in corporate industry management, encouraging cooperation between companies and special interest groups;

- A favorable legal environment and infrastructure for the development of small and medium-sized enterprises, including companies providing business services for industrial enterprises;
- Alleviation of the effects of restructuring, bankruptcies of companies unable to compete, procedures for the establishment of new companies and the liquidation of enterprises;
- Improvement in conditions and opportunities for self-financing resources needed for companies;

Priorities of the strategy for industry development have been:

- Those activities creating significant added value, which are based on science, knowledge and high technologies in any branch of industry, including the traditional industry sectors.
- The trends in industrial development that are knowledge-based, and have been recognized as priorities in the course of creating and developing policies in line with the EU's in the areas of science and research. This would draw the structure of Lithuanian industry closer to that of developed countries.
- The balanced development of industry, assuring a more rational use of energy and natural resources, a reduction in the impact of waste and pollution, a more coherent development of the regions and the better employment of their potential.

The strategy for implementing the policy will be coordinated through government programs in the areas of:

- Development of small and medium-sized enterprises.
- Social development and economic factors of employment.
- Development of external economic relations.
- Economic factors of environmental protection.
- Development of science and technologies.

Future government programmes would be based on this strategy and an all-out effort would be made by the government to achieve the objectives. Current programmes for innovation in business, development of high technology industries and industry clusters and the national quality programme would all receive attention.

1.5. Concept of e-Commerce

In Lithuania, the “National e-commerce strategy: blueprint for action” details the agenda for developing a coordinated and effective national response to the e-commerce challenges and opportunities facing Lithuania's industries. The following objectives have been set:

- National e-commerce vision
- Improved export performance and international competitiveness
- Pervasive use of e-commerce
- Overcoming e-commerce obstacles
- Encouraging a strategic approach to e-commerce
- Ensuring a stable and conducive e-commerce environment
- Supporting the local Internet supply industry
- Management education and training in e-commerce

- Participation in emerging international trade 'hub' sites
- Increasing public use of the Net.

Action plans to achieve national e-commerce objectives are recommended in the areas relating to setting targets, the e-vision team, e-commerce taskforce partnerships, e-business advisers, e-commerce awareness, e-commerce education and training, developing a 'hub' website for e-commerce, supporting the local internet supply industry, an e-business accreditation scheme and infrastructure development.

The e-commerce revolution presents major challenges to Lithuanian companies. They need to design, develop and implement effective Internet marketing and e-business strategies. E-commerce in Lithuania is presently in the early stage of development. It was observed that in 2001 out of the total population of Internet users (15% of the total population) only about 3% were regularly shopping on the Internet. Although the number of e-commerce customers was growing, it remained rather small. It was also revealed that the majority of e-customers were non-resident Lithuanians and the residents living outside Vilnius.

At B2C level e-trade was used mainly for sale of books, computer equipment, mobile communication services and products, banking services and ordering food. There were approximately 10 active and popular e-stores in Lithuania. Among the most popular was muge.lt, an e-trade portal run by Omnitel, the largest GSM operator. Muge.lt offers a wide range of products from CDs to perfume and watches. www.one.lt, a pan Baltic portal, marketing pictures and music tones for mobile handsets became popular in a rather short time. Super.lt and patogupirkti.lt., two book stores, also operate in the market. In the period of 2001 – 2002 the number of companies that introduced ordering and paying for products and services via the net has witnessed an upward trend. Recently, the largest restaurant chains Cili and Pizza Jazz, which have expanded to Latvia also, launched www sites where customers could order meals. In B2B sub-segment one of the most successful e-trade operations was UAB Alnos Biuro Sistemose, which accounted for 4.7% of total e-trade turnover. The company's e-store Office1 is a typical B2B service provider offering all kinds of office equipment, computer parts, software, furniture, paper, etc. Most of its customers were corporations. The six largest distributors of computers also sold through the Net. IT distribution has become the first business sector to be dominated by e-trade B2B services. GNT Lietuva generates about 60 % of its turnover (EUR 54 million) from sales out of its e-warehouse. TechData Lietuva and Acme Computer Components provide similar services to the retail market.

The main impediment to the development of e-commerce is payment as the law on signature authentication is yet to take effect. Lithuanian e-stores work via foreign payment centres, which makes the service expensive and diminishes one of the main advantages of purchasing via the Internet. Potential buyers could pay through SMS messaging on cell phones, a popular method for car parking payment. Payment by cash on delivery is a method also used by some e-stores. The fear that credit card data are not secure on the Internet is a real deterrent to customers.

In this chapter some analysis is presented to assess Lithuania's preparedness in electronic commerce and attempts to diagnose the actions needed to facilitate the successful establishment of a national electronic marketplace. According to The Economic Intelligence Unit Pyramid Research e-readiness ranking, "E-readiness" was defined as the extent to which the country's business environment is conducive to Internet-based commercial opportunities.

It was a concept that spanned a wide range of factors, from the sophistication of the telecom infrastructure to the security of credit-card transactions and the literacy of the population. The Internet and the World Wide Web were altering the landscape of international commerce. National strategy-makers were endeavoring to create an environment conducive to the rapid growth of the e-trade capability and to promote the development of e-competency at the level of individuals, companies and the organizations, public or private, that were involved in supporting the national export effort. Efforts were being made to integrate the economy with that of the global market place in the wake of the digital era.

B2B e-trade had redefined the traditional buyer–seller (importer-exporter) relationship and established new business practices as the norm. It placed emphasis on the exporting enterprise having a total response capability, i.e. the capability to compete on the basis of time and customer service, in addition to price and quality. It would impact on the operations and the performance of all export-oriented businesses, irrespective of what they supply. It should, therefore, be seen as a possible threat to current competitiveness, which must be addressed at the strategic level, within the company and the country as a whole.

E-trade opened up new commercial opportunities for export-oriented enterprises. In particular it empowered small and medium-sized enterprises to participate in international markets where previously market entry and promotion costs were prohibitive. It streamlined (i.e. eliminated intermediaries) its own supply- and export-distribution chains and reduced business transaction costs. In short, e-trade allows the enterprise to re-position itself in the international market place. As the business community was embracing B2B trade, it should be seen as a crucial element of any national export strategy.

E-trade capability did not, however, mean that the exporter must be able to conduct each stage of the international transaction electronically. That requirement may come in time, but for the moment the market does not demand it. Export development in the digital economy is not an ‘all or nothing’ proposition. The challenge, nevertheless, was to work towards acquiring e-trade capability at every stage of the transaction - a challenge that would require a positive and concerted response not just from the entrepreneur, but also from the public-sector strategy-maker and managers of trade support institutions, including banks.

1.6. Legal framework

1.6.1. Copyright protection

The Strategy for the Protection of Copyright and Related Rights (hereinafter referred to as the Strategy) has been drafted in the execution of the measures for the implementation of the Action Programme of the Government of Lithuania for the years 1999-2000, which were approved by Resolution No. 1497 of 28 December 1999 of the Government of Lithuania on the Approval of the Measures for the Implementation of the Action Programme of the Government of Lithuania for the Years 1999-2000. The Strategy was important to Lithuania’s progress in striving for membership of the World Trade Organization (entered on May 31, 2001) and integrating into the European Union. Article 67 of the Europe Agreement states that Lithuania must continue to improve the protection of intellectual property rights in order to provide for a level of protection similar to that existing in the European Union, including effective means of enforcing such rights. The main purpose of the Strategy is to develop

further in 2000-2003 the system for the implementation and protection of copyright and related rights, having regard to the needs and international obligations of Lithuania.

The principal goals of the Strategy are as follows:

1. to establish a reliable and efficient system for the implementation and protection of copyright and related rights in conformity with the European Union and international standards;
2. to guarantee and improve essentially the activities of government institutions and law enforcement institutions in the area of the protection of copyright and related rights;
3. upon the organization of education and training in the area of intellectual property rights, to shape favorable public opinion of the importance of tackling problems relating to the protection of intellectual property rights to the Lithuanian national economy, culture and international recognition.

Strategic objectives are as follows:

1. to upgrade the legislative framework relating to copyright and related rights, and to harmonize thereof with the European Union law and the provisions of the TRIPS Agreement of the World Trade Organization;
2. to ensure the implementation of Lithuania Law on Copyright and Related Rights;
3. to implement the international obligations undertaken by Lithuania in the area of intellectual property ;
4. to build up administrative capacity of government institutions and law enforcement institutions in the area of the protection of copyright and related rights;
5. to reinforce a collective administration system of copyright and related rights;
6. to raise public awareness of intellectual property law and provide information to the public in relation thereto, to aim at ensuring the protection of intellectual property and to change the public posture to the importance of the protection thereof.

The foundations for a modern regulatory framework ensuring the regulation and implementation of copyright and related rights have been laid down in Lithuania in recent years. Lithuania Law on Copyright and Related Rights (*Official Gazette* No. 50-1598, 1999), the provisions of which are in line with the EU directives and other international documents, was adopted on 18 May 1999.

Lithuania has ratified the fundamental international conventions regulating the protection of copyright and related rights. The Berne Convention for the Protection of Literary and Artistic Works (Paris, 1971) has become binding on Lithuania since 14 December 1994, the Rome Convention for the Protection of Performers, Producers of Phonograms and Broadcasting Organizations – since 22 July 1999 and the Geneva Convention for the Protection of Producers of Phonograms against Unauthorized Duplication of Their Phonograms – since 27 January 2000.

Lithuania has already completed with the ratification of the World Intellectual Property Organization's treaties– WIPO Copyright Treaty, done at Geneva on 20 December 1996, and WIPO Performances and Phonograms Treaty, done at Geneva on 20 December 1996. Upon Lithuania's membership at the end of 2001 to the World Trade Organization (WTO), the

provisions of the Agreement on Trade-Related Aspects of Intellectual Property Rights (hereinafter referred to as the TRIPS Agreement) entered into force.

The legal framework relating to the protection of copyright and related rights has been improved. Administrative liability for the unauthorized reproduction, distribution, public performance or other exploitation, in any way and by any means for commercial advantage, of a literary, scientific or artistic work (including computer programmes and databases), or a sound and (or) video recording is established by Article 214¹⁰ of the Code of Administrative Law Infringement of Lithuania (*Official Gazette* No. 25-637, 1998).

Lithuania Law on Amending Articles 35, 142, 308 and 321² of the Criminal Code of Lithuania and Supplementing Thereof with Articles 142¹, 142² and 142³ (*Official Gazette* No. 38-1055, 2000) and Lithuania Law on Amending Articles 37, 126 and 173 of the Code of Criminal Procedure of Lithuania (*Official Gazette* No. 38-1055, 2000) were adopted on 20 April 2000. The said laws should solve the relevant problems arising from the practical application of the Criminal Code of Lithuania.

In carrying out the National Programme for the Adoption of the Acquis and having regard to the requirements of the TRIPS Agreement, Lithuania Law on the Protection of Intellectual Property in the Field of Import and Export of Goods came into force on 1st January 2001. Upon the adoption of the said Law, the conditions for the suspension of counterfeit goods or infringing (pirated) copies of works at the customs will be created, and the circulation and export thereof as well as the execution of any customs procedure in respect of them will be prohibited.

The Ministry of Culture implements national policy in the area of copyright and related rights and co-ordinates, within its competence, the protection of these rights. Following Resolution No. 1283 of 19 November 1999 of the Government of Lithuania Concerning the Implementation of Lithuania Law on Copyright and Related Rights (*Official Gazette* No. 99-2861, 1999), the Ministry of Culture is the institution authorized by the Government of Lithuania to act in the area of copyright and related rights.

On 12 January 2000, the Lithuanian Board of Copyright and Related Rights was established. The Board is a public institution which, in the capacity as expert and consultant, addresses issues relating to the implementation of the provisions of Lithuania Law on Copyright and Related Rights and the international obligations undertaken by Lithuania in the area of copyright and related rights, as well as submits its conclusions and proposals to the Ministry of Culture.

Implementation of copyright protection of Computer programs and Databases

In September 1997, InfoBalt Association established InfoBalt Copyright Agency, the main goal of which is to ensure copyright protection of computer programs and data bases in accordance with the functioning laws and international treaties in the territory of Lithuania.

INFOBALT COPYRIGHT AGENCY works following into these directions:

COPYRIGHT INFRINGEMENT PREVENTION

- registration of computer software and databases, legal consultations and other juridical services provided in the field of copyright protection;
- public awareness campaigns focused on the end users concerning the disadvantages of pirated software usage and the benefits of purchasing legal products;

ENFORCEMENT - assistance to enforcement structure on implementation of copyright regulations, juridical and technical expertise;

PR - public relations dealing with different issues on software copyright protection.

LEGISLATION – lobbying and consultancy for lawmakers on copyright legislation;

RESEACH & CONSULTANCY – market research, consultancy and analyses on trends in Lithuania.

Objectives :

- to fulfill the registration of computer software as one of the prevention means;
- to promote INFOBALT COPYRIGHT AGENCY participation in trade show fairs, development conferences by showcasing managers, lawyers and other representatives to spread the information concerning the usage of legal software;
- to collaborate with other Lithuanian institutions of copyright protection on common public activities and advertising in media related to the piracy of intellectual property;
- to organize seminars for the large accounts and State Agencies with the assistance of representatives from EU and other IP institutions;
- to run a software market research on piracy rates in Lithuania;
- to co-operate with Governmental institutions at all levels, submit recommendations and proposals;
- to participate and represent software industry at the Governmental Copyright Group on various legal IT industry related questions;
- to provide end users with legal advice and other juridical services in the field of copyright protection;
- to assist enforcement structures;
- to provide juridical services and represent the copyright holders if needed;
- to educate users and create software license compliance education and certification system;
- to work on IPR legal framework development in e-commerce;

Enforcement

A special police division, i.e. the Unit for the Protection of Intellectual Property Rights of the Tax Police Department under the Ministry of the Interior, was established on June 1998. Since spring 2002, after reorganization of Tax police which has staff of dozen specialists dedicated for IPR enforcement issues, the Economy Policy division at the Ministry of Interior intercept these activities, enforcement of IPR became more complicated because of the lack of knowledge and skills of new formed staff.

In addressing intellectual property-related issues concerning the import and export of goods, officers responsible for the protection of intellectual property rights as regards imports and exports are appointed at all territorial customs and the biggest customs check-points. Cooperation between customs and police officers is provided for in the agreement on joint actions of 6 January 1998 of the Police Department under the Ministry of the Interior, Tax Police Department under the Ministry of the Interior and the Customs Department under the Ministry of Finance.

Latest amendments - harmonization of law with EU Directive on certain aspects of Copyright in the Information society

This current Copyright and related rights law has been in force for 4 years, therefore the practical problems and shortcomings related thereto might come to light in a longer period of time with the generalization of the results arising from the application of the law.

On amending the version of Article 142 of the Criminal Code of Lithuania and supplementing thereof with Articles 142¹, 142² and 142³, the scope of applying criminal liability for the infringements of intellectual property rights has been clearly expanding. It is necessary to ensure the alignment of the provisions relating to the protection of copyright and related rights of the Criminal Code of Lithuania and the Code of Administrative Law Infringement of Lithuania, which is drafted with the latest international requirements set for the protection of intellectual property rights, however waiting for the amendments of Lithuanian Copyright and related rights law, first.

With Lithuania's integration to the European Union Lithuania Law on Copyright and Related Rights will have to be amended and supplemented in accordance with the EU legislation governing the protection of copyright and related rights in the information society. In upgrading the provisions for the protection of copyright and related rights in the information society according new EU Copyright Directive, there is a new draft of Copyright and related rights law proposed and discussed since May 2002, introducing protection of technical measures and rights management information including un-authorized removal or alteration of electronic rights-management information. The new draft consider the improvement of reproduction right, the communication to the public right and distribution right. An attempt is made to achieve a balance between the interests of right owners and right users with the exemptions and limitations shaped in the national legal system and allowed by Directive.

One of hot issues are Article 20 on remuneration of authors for the reproduction for personal use of audio-visual works and works fixed in a phonogram (a blank tape levy). The same is with article 23 (reprography copying). With the aim of realizing these proposals, amendments to these articles of Lithuania Law on Copyright and Related Rights, which regulates the reproduction of works for personal use, are introduced. However, Lithuania ICT industry is strongly rejecting the intentions to put copyright levies on digital equipment and blank media contradi distinction Technical Protections measures (TPM) and Digital Rights management systems (DRM), instead.

Despite of long negotiations between lawmakers, collecting societies, consumers and IT suppliers are continuing widely, Lithuanian politicians who made their promises in the EC behalf of Lithuania's membership relevancy for EU, put them in hurry "to catch the train" on 1st of 2003.

Legal framework for companies financing

The legal framework for investment in Lithuania is geared toward (i) equity finance for larger, publicly-listed companies; (ii) debt finance via commercial banks. Neither instrument is optimal for high-growth, early-stage knowledge based companies. Companies at this stage are too risky for commercial bank credits as cash flow is not adequately predictable – and security against fixed assets is often not practical.

The legal framework for *private* equity, however, is not adequately developed – undermining the ability of investors and management to create an incentive system which aligns the interests of both parties. The set of instruments available for private equity investing is severely limited.

1.6.2. Protection of industrial property

The system of industrial property in Lithuania functioned well until 1940 (Trademark Act of January 27, 1925, Inventions and Improvements Act of May 14, 1928 and Industrial Models and Design Act). After Lithuania declared its independence on March 11, 1990 it started re-establishing independent national industrial property legislation. In Lithuania has been now organized the structure of institutions responsible for the protection of the industrial property.

Legal Acts

Law on Firm Names entered into force on January 1, 2000.

Law on Competition entered into force on April 2, 1999

Law on Trademarks, adopted on 10 10 2000, entered into force on January 1, 2001

Patent Law entered into force on February 1, 1994

Industrial Design Law entered into force on September 1, 1995

Law on Legal Protection of Topographies of Semiconductor Products entered force on December 1, 1998

Internationals agreements

Lithuania (LT) is a member of:

- Convention Establishing the World Intellectual Property Organization (WIPO) since April 30, 1992.
- Paris Convention for the Protection of Industrial Property since May 22, 1994.
- Patent Cooperation Treaty (PCT) since July 5, 1994.
- Nice Agreement Concerning the International Classification of Goods and Services for the Purposes of the Registration of Marks since February 22, 1997.
- Agreements with the European Patent Organization (EPO) for cooperation & for the extension of European patents to Lithuania since July 5, 1994. Lithuania can now be designated in European patent applications filed since that date.
- Trademark Law Treaty (for uniform registration procedures) was signed on October 28, 1994, entered into force on April 27, 1997.
- Protocol Relating to the Madrid Agreement Concerning the International Registration of Marks entered into force on November 15, 1997.

- Budapest Treaty on the International Recognition of the Deposit of Micro- organisms for the Purpose of Patent Procedure, since May 9, 1998.

Patents

Inventions, e.g. technical solutions of a specific problem, resulting from creative work which are new, involve an inventive step and are industrially applicable shall be protected by a patent.

Discoveries, scientific theories and mathematical methods, design of products, schemes, rules and methods of games, intellectual and economic activities, as well as programs for computers and presentations of information shall not be regarded as inventions.

Patents shall not be granted for the methods of treatment of people and animals, diagnostics and prevention of diseases (with the exception of equipment and materials utilized for such methods), varieties of plants and animals as well as for biological(except microbiological) methods of their production and also for the inventions which are deemed to be contrary to public interest, principles of humanity and morality.

Where the object of invention is a method, patent protection shall also be granted with respect to a product made by such method.

The term of patent protection shall be 20 years as from the date of filing the application.

On the basis of Cooperation and Extension Agreement between Lithuania and the EPO it is possible beginning with July 5, 1994 to extend European patents to Lithuania.

Industrial designs

The Industrial Design Law has been adopted by the Seimas of Lithuania on July 4, 1995 and beginning with September 1, 1995 it was enforced.

Industrial design shall be the aesthetic appearance of the whole product or a part of it, composed of specific lines, contours, colour, forms and (or) materials.

A product shall be an object manufactured industrially or handicraft, or it's separate parts, as well as assortments of objects or compositions, packaging, graphic symbols and typographic typefaces.

An industrial design must be new and must have individual characters and be not contradictory to the principles of public morality.

Industrial designs' protection shall be valid for 5 years from the filing date of an application.

The term of validity of an industrial design may in addition be extended four times, for 5-year periods, for up to 25 years, counting from the date of filing the application.

Trademarks

Any sign which distinguishes the goods of one person from those of another person or the services rendered by one person from the services rendered by another person and which can

be represented graphically shall be considered to be a sign capable of constituting a trademark or a service mark. By a mark may be protected such signs as words, personal names or slogans, letters and numerals, pictures, emblems, three-dimensional forms, including the shape of products, packing and containers, color, combinations of colors and arrangements of colors and also any combination of the above mentioned signs.

The initial term of registration of a mark shall be 10 years from the filing date of the application. The registration of a mark may be renewed for additional terms no longer than 10 years.

Firm names

Under the Article 3(1) of the Law on Firm names every company starting business in Lithuania must register its name with the State Patent Bureau. The firm's name is registered provided an identical or similar name is not yet included in the Register of Firm Names and other formal requirements are met. The Register of Firm Names is national.

Exclusive rights in a firm name can be obtained as from the date of registration of the company with the relevant authorities.

License agreements

The Trademark Law as well as the Patent Law and the Industrial Design Law, and Law on Topographies of Semiconductors provides that the transfer of the use of a trademark, a service mark, a patent and an industrial design shall be made by concluding a license agreement. It must be done in writing and declaration on licensing shall be entered into the relevant Register of Lithuania. Oral license agreements as well as those not meeting the above requirements shall have no legal effects.

Appeals

Disputes regarding registration and use of industrial property objects arising before granting documents of legal protection are settled by the Division of Appeals of the SPB. Procedure within Appeal Division is regulated under the Regulations adapted by director of the SPB. All subsequent appeals are settled by the Vilnius District Court.

Representation

Foreign natural and legal persons, having their ordinary residence or principal place of business outside Lithuania shall be represented before the State Patent Bureau (SPB) by the patent attorneys registered in the Register of Patent Attorneys of Lithuania.

Their legal status is based on the Regulations of patent attorneys approved by the Government on May 20, 1992 No. 362

The list of registered patent attorneys is available upon request from the SPB.

1.7. Access to information and data protection

The development of an information society depends, to a great extent, on legal regulations concerning access to information and the protection of citizens' communication rights. In this field, three separate laws address detailed regulation on: access to public information; personal data protection; and, confidential information as listed below.

In 1996, Government of Lithuania established State Data Protection Inspectorate, the supervisory authority responsible for monitoring and supervision of application of the Law on Legal Protection of Personal Data. In 1997 Government approved common requirements on data protection for information systems of governmental and municipal institutions, and in 2000 – the provisions of State Register of Personal Data Controllers. In 2001 Government of Lithuania granted more power to State Data Protection Inspectorate consolidating independent status of this institution and empowering it not only to supervise application of the Law on Legal Protection of Personal Data, but also to implement provisions of the Council of Europe Convention ETS No. 108. The maximum permissible number of staff was increased from 8 to 22.

Principal tasks of the Inspectorate are supervise and control the enforcement of the Law on Legal Protection of Personal Data of Lithuania and implement the provisions of the Convention for the Protection of Individuals with regard to Automatic Processing of Personal Data (ETS No 108) as amended by the Committee of Ministers of the Council of Europe.

Objectives of Data Protection Inspectorate are:

- To develop data protection system in Lithuania,
- To supervise the activities of personal data controllers processing personal data,
- To control the legality of the processing of personal data,
- To fight against the violations of data processing,
- To ensure the protection of the data subject rights.

General legal acts of Lithuania regulating Data Protection

1. Law on Legal Protection of Personal Data (11-06-1996, No. I-1374; new version 17-7-2000, No. VIII-1852; amended: 22-01-2002, No. IX-719; 20-06-2002, No. IX-970).*

The purpose of Law shall be protection of the right of inviolability of the person's private life related to the processing of personal data and creation of the conditions for a free movement of personal data.

2. Law on the Supplement to Administrative Code with Articles 214-14, 214-15, 214-16, 214-17 and Supplement to Articles 224, 259-1 (07-04-1998, No. VIII-687).

The law defines penalties for illegal data processing, for preventing person to access his/her data, and empowers the State Data Protection Inspectorate to issue protocols for administrative violations of law.

3. Resolution of the Government of Lithuania "On Setting up the State Register of Personal Data Controllers and on the Approval of the Regulations of the Register" (27-03-2000, No. 349; 20-02-2002, No. 262). *

By this Resolution the State Register of Personal Data Controllers was established and by the Resolution No. 262 reorganized by amending the list of the registration data, order of the collection and use of them.

4. Order of Head of the State Data Protection Inspectorate “On the Contract of Personal Data Disclosure” (25-06-1997, No. 17; 30-12-1999, No. 69; 11-01-2001, No. 01-10-04).

5. Order of Head of the State Data Protection Inspectorate “On the Approval of Requirements for a General Description of Personal Data Protection Measures and its Format” (13-07-2001, No. 01-10-39).

Approved requirements for a general description of personal data protection measures and format of a general description of personal data protection measures. Data protection measures shall be related to risks and shall be in conformity with the nature of personal data to be protected and the risks inherent in their processing.

The analysis of EU legal acts reveals the conclusion, that Lithuanian regulatory environment designed at implementing EU legal requirements in the fields of consumer protection is far from being satisfactory. Despite the fact, that formal enactment and legal basis in the area of consumer protection seems almost flawless and well-structured, the basic problems are concerning the real and practical realization, day-to-day implementation of established legal standards. *Unfortunately, very often Lithuanian legislators simply re-write the EU documents without any further analysis of possible legal or economic consequences of such plagiary “legislation”, ignoring problems, associated with the application of such legal acts, etc.*

The interplay between new information technologies and consumer protection in Lithuania could be best characterized by the following summaries:

- a) Currently e-commerce in Lithuania is undergoing only rudimental stage of development;
- b) Lithuania obviously lacks active role of national consumer protection associations and organizations, related to the education, information, etc;
- c) The passiveness of consumers and internet users (there are only a few complaints about infringement of rights in the internet context, filled with the National Consumer Protection Agency, and there are no such claims before the courts of the law at all). It demonstrates, that Lithuanian consumers are inclined to reconcile with the violation of their rights and interests, committed online.

Principles of reasonableness, transparency, good faith and fairness, mutual trust are of major importance in the context of consumer protection in internet.

Evaluating the consumer contracts, concluded online, the offer is to be discerned from the mere invitation to make offers. However, Lithuanian legislation does not address this issue.

Another important aspect – methods of expressing the acceptance of the offer – as a rule, acceptance in internet is expressed electronically. Thus, the requirement, set forth in the Articles 1.73 and 6.192 of the Civil Code are posing some doubts, as it is strictly required, that in order to meet the legal requirements as to the form, the transaction is to be executed in the enumerated manner or by virtue of “terminal telecommunications equipment”. The basic issues in that respect are associated with the obscurity, which occurs, when the internet is

accessed not via terminal telecommunications equipment, for instance via LAN, or in case of DSL, ADSL, etc.

One of the most fundamental consumers' right – right to information is guaranteed in Lithuania through implementation of EU Legal requirements (i.e., Distance Selling Directive 97/7, etc). However, despite the fact, that the statutory list of such information is inclusive and clear, the basic challenges are associated with the actual presentation of such information to the consumers.

Another important consumers' right in the context of e-commerce – right to avoid the contract without any reason within the term of 7 days following the delivery of goods or entering into the contract (in case of service agreements). This right is also appropriately specified in Lithuanian legal system through implementation of EU Legal requirements (i.e., Distance Selling Directive 97/7, etc). Despite there were no such analysis performed in Lithuania, investigation performed by the Consumers International has showed, that internet service and other e-products providers are very susceptible of ignoring that right. Lithuania is not an exception.

Alongside with other fundamental principles, consumers contracting online, must be guaranteed the right to safe product and product of high quality. Moreover, such e-consumer contracts are subject to the same test in order to evaluate dishonesty and unconsciousness of the terms and conditions thereof.

New Brussels Regulation of 2000 and Rome Convention of 1980 clearly specify, that both the competent court and applicable law are to be determined pursuant to the state, where the consumer is domiciled, thus safeguarding the consumers from deceptive “forum-shopping” and restrictions of statutory guarantees, applicable under the consumer’s “national law”.

Worldwide consumers are ensured possibility to defend their rights and remedy the violations through the alternative dispute resolutions mechanisms. It is widely recognized, that such alternative dispute resolutions mechanisms, which available online (Online Dispute Resolution), are the most efficient way to protect the infringed consumer interests.

Activities of consumers in internet are obviously related to possible privacy and data protection implications. There could be discerned the areas of “cookies”, spamming and other unsolicited communications. Unfortunately, so far Lithuania is also making only the initial steps in that respect.

Finally, widely recognised self-regulation mechanisms, such as labelling of internet sites, adherence of internet service and other e-products providers to international or national codes of behaviour are also playing a considerably increasing role in ensuring the efficient and operational system of consumer rights protection. Unfortunately, such mechanisms in Lithuania are still undergoing only rudimental and rather initial stages.

1.8. Standardization & Certification System

Lithuania established the Lithuanian Standards Board (LSB) in April 1990. The LSB was the authority responsible for formulating and implementing policy on standardization and quality assurance as well as other functions provided under the laws. It develops the Lithuanian standardization system, approves Lithuanian Standards (8100 standards approved by 1

January, 2002) and other normative documents related to its activities, sets up technical committees, participates in the implementation of European Union directives within its province and the harmonization of legal acts of Lithuania.

The LSBs activities are carried out by various divisions, viz, the Standardization Divisions, Quality Management Systems Certification Division, Information Centre, International Relations Division, Sales and Distribution Division, Library, etc. The Standardization Council assists the Lithuanian Standards Board in solving and coordinating strategic matters. In addition, there were technical committees to assist the LSB in drafting standards and implementing the Standardization Work Program.

The main technical committee relating to IT production and services were on:

- Radioelectronic engineering
- Information technology
- Electrical engineering
- Electromagnetic compatibility
- Telecommunications

The LSB represented Lithuania within the following international and European standardization organizations:

- International Organization for Standardization (ISO) - correspondent member since 1992,
- European Committee for Standardization (CEN) - affiliate member since 1994,
- International Electrotechnical Commission (IEC) - associated member since 1996,
- European Telecommunications Standards Institute (ETSI) - member since 1996.
- European Committee for Electrotechnical Standardization (CENELEC) - observer member since 1997.

The membership in the above organizations provided Lithuania access to newly published standards and other normative documents of the above-mentioned organizations. This formed the basis for its adoption of international and European standards as Lithuanian standards and its harmonization with the European Union.

While Lithuania's application for CEN/CENELEC full membership is under consideration of CEN/CENELEC expert team, a Lithuanian delegation participates as an observer in CEN/CENELEC TC meetings. Lithuania is a full member of ETSI, with voting rights.

The Information Centre of the LSB has acted as a World Trade Organization (WTO) Enquiry Point since 1996, under the terms of the WTO Agreement on Technical Barriers to Trade. It answers enquiries from other WTO Members and interested parties, provides copies of adopted or proposed Lithuanian standards, technical regulations and conformity assessment procedures in the Lithuanian language. It also provides information for legal entities and natural persons, also enterprises having no right of a legal person in Lithuania on the standards, technical regulations and conformity assessment procedures adopted or proposed by WTO Members, etc.

National Production Testing and Certification System

Lithuania is in the process of adopting European standard, testing and certification norms. A National Accreditation Board has been set up to negotiate mutual agreements with the EU. Procedures, laws and practices followed by the various laboratories have been certified by the relevant EU authorities. Consequently, the Lithuanian Government is obliged to allow the import of new products and services from the EU without further inspection or testing if they:

- Carry the CE mark (the EU's insignia of conformity),
- Carry the Lithuanian standards mark,
- Have a certificate of conformity by an acknowledged institute, or
- Have a declaration of conformity submitted by the manufacturer or importer.

The LSB signed a cooperation agreement with the German Standardization Institute (DIN) in 1992. Under a mandate from the Government of Lithuania it also signed agreements with: The Government of the Republic of Belarus in 1992; The Government of the Ukraine in 1996; The Government of the Russian Federation in 1997; the National Standards Board of Estonia (EVS) and the Latvian National Centre of Standardization and Metrology (LVS) in 1994; the Committee for Standardization, Metrology and Certification (BELST) in 1995; the publishing house of the German Electrotechnical Engineers Union (VDE) in 1995; the State Committee of the Ukraine for Standardization, Metrology and Certification (DSTU) in 1996; and the Slovak Office of Standards, Metrology and Testing (UNMS) in 1996.

In addition, a specific agreement was entered into between ISO and LST on the purchase of ISO standards published prior to LST's admission to ISO in 1993. A Memorandum of understanding between the Lithuanian Standards Board and the British Standards Institution (BSI) on the implementation of British standards in the Lithuanian system, and an agreement with DIN on the translation of German standards into Lithuanian and on their adoption as Lithuanian standards, were also signed in 1996.

2. The Institutional Regime

2.1. National system of governance of ICT and innovation policy

The national system of governance of innovation policy consists of :

- A. Governmental institutions (the parliamentary bodies, the Ministries, and other Governmental bodies),
- B. Policy Support and Advisory Bodies and
- C. Non-Governmental Policy and Advisory Bodies.

A. Governmental institutions

The parliament of Lithuania, the Seimas, is the policy creation body, which approves the Government's Programme, enacts relevant laws (for example, the legislation on small and medium sized business development). The Seimas has the following relevant parliamentary bodies – committees:

Committee on the Development of an Information society

This committee is one of the top and main policy making bodies in the field of information society and innovation development. It drafts and considers laws and other legal acts, regulating the development of information society as well as the development of innovative technologies and knowledge economy. This body participates in the development of long-termed strategic plans and other policy documents, co-ordinates the activities of different state institutions in the sphere of preparation of legislative acts and major policy documents.

Committee on Economics

This committee drafts and considers draft laws, resolutions and proposals on developing and regulating Lithuania's economy, the management, use, disposal of and privatisation of the State property, as well as co-ordinates activities of institutions drafting the relevant laws. It submits conclusions and proposals on strategy, assessment of macroeconomic indicators and forecasts of the development of Lithuania's economy. Further, the committee considers and submits proposals concerning the draft of the State Budget and the State Investment Programme.

Committee on Education, Science and Culture

This committee prepares and considers drafts of laws and other documents, which regulate education, science, culture and general provision of information, and present relative proposals.

Committee on Social Affairs and Labour

This committee considers and presents proposals pertaining to the formation of a State social policy in line with the European Union criteria of social development and the standard of living.

The Government of Lithuania is the executive body for the implementation of State policy in the sphere of innovation. The Government approves basic programs and policy documents. In its activities it is supported by the Advisory Group on Strategic Planning and Finance and the Advisory Group on Economic Development.

The Government is made up of various ministries and the main Ministry relevant for innovation is the *Ministry of Economy*. The Ministry of Economy (ME) is responsible for establishing strategies for the development of the Lithuanian economy, shaping economic state policy, and prepares and supervises the implementation of the national energy strategy.

The Economy Strategy Department of ME prepares the strategy for developing the Lithuanian economy, shapes the policy and strategy of state investments.

The Industry and Business Department of ME shapes state policy in the field of economic development, drafts proposals for the Government on improving the business climate in Lithuania, is responsible for drafting and implementation of incentive programmes for developing different industry sectors.

The Energy Development Department of ME establishes the priorities and aims of developing the energy sector and shapes the strategy for reorganising the energy sector.

The Minister of Economic Affairs is the head of the Council of Business Development, which analyses and evaluates the problems in developing industry, export and business and submits proposals on the strategic directions and measures to be taken.

Ministry of Education and Science

This is another Ministry relevant for the ICT and innovation sector, which forms and implements state policy in the field of education, including vocational training, science and higher education.

Lithuanian State Science and Studies Fund under the Ministry of Education and Science

This fund supports scientific research of scientists (groups of scientists), common research programmes carried out by several science institutions, scientific conferences and other scientific events, preparation of manuals for studies, other science works.

Committee on the Development of Information Society under the Government of Lithuania

This governmental institution, which is responsible for the preparation and implementation of State policy for creating information technologies and telecommunications (ITT) in Lithuania. The committee has to ensure the design, creation and development of the ITT, following requirements of the EU.

The European Committee under the Government of Lithuania

This committee is responsible for Lithuania's integration into the EU. In the process of integration, the committee co-ordinates harmonisation of Lithuanian legislation with EU law.

B. Policy Support and Advisory Bodies

Lithuanian Agency for Economic Development

The mission of the Lithuanian agency for development of the economy is to stimulate and attract direct foreign investment to Lithuania, as well as to increase export opportunities.

Lithuanian Development Agency For Small And Medium Sized Enterprises

The Lithuanian Development Agency for Small and Medium Sized Enterprises (SMEDA) seeks to create favourable conditions for development of small and medium sized business. The highest managing authority of SMEDA is the Ministry of Economy. SMEDA's principal objectives are to analyse and take part in forming development policy of small and medium sized business in Lithuania, to improve the business environment in which small and medium sized enterprises operate, to promote the setting up of small and medium sized enterprises and their development. Moreover, to implement the European Union PHARE programme support to SMEs and regional development in Lithuania.

National Regional Development Agency

This is the main institution of regional policy implementation and technical assistance at the national level in Lithuania. The mission is to implement regional development policies and provide technical assistance to regional and local authorities as well as social economic partners.

Centre of Educational Information Technologies

The centre of educational information technologies aims to integrate information technologies into education and enhance the computerisation of management.

C. Non-Governmental Policy and Advisory Bodies

Science and Technology Park

The S&TP was developed by the Semiconductor Physics Institute during 1993. The primary roles of the S&TP is to assist in the creation of new innovative companies based on promising technology (Program of Incubator) and to provide an interface between academia, research, and the commercial development of products and processes. The S&TP scientific activities are focused on two main areas: material science and information technologies.

Infobalt Copyright Agency

Infobalt copyright agency is a subsidiary of Infobalt, the association of Lithuanian ITT firms. The agency aims to protect intellectual property rights in the field of IT&T, especially of software producers. Being a subsidiary of major business association, the agency has some advisory influence on state policy in the field of intellectual property protection.

2.2. Relevant institutions for the information society development

Until 1998, it was the Ministry of Communications and Informatics that was responsible for the integrated development of the electronics and information technology policy, including its deployment in the creation of the information society. When this Ministry was dissolved, its functions were distributed among the Ministries of Transport, the Economy and the Interior. In summer 2001, a new institution, the Information Society Development Committee under the Government of Lithuania, was established, which is responsible for the are several state bodies coping with information society related issues in different participation in the formation of the state ITT development policy and coordination of its implementation. The regulatory structure for the IT sector at present is shown in Figure 1.1. Currently, there are a few levels of policy coordination:

The Council of Knowledge Society under the office of the President is a consultative body, which provides proposals on state knowledge policy formation and implementation.

The Information Society Development Committee of the Seimas (the national parliament) is the institution that prepares and discusses draft legal acts regulating information society issues, conducts the parliamentary control of state resources usage and investment projects and provides related proposals, etc.

The Governmental Information Society Development Commission chaired by the Prime Minister is in charge of providing proposals about improvement and update of the part “Information and Knowledge Society” of „Measures for implementation of the Programme of the Government of Lithuania for year 2001-2004“ (that is the main document on planning governmental institutions’ activities); besides, the Commission co-ordinates the implementation of these means and activities of governmental institutions in this field.

The Information Society Development Committee under the Government of Lithuania, which is the institution assigned to contribute to shaping of state policies related to the development of information society and to co-ordinate their implementation, focuses in its activities on four main problems: raising Lithuanian people’s competence in the field of use of information technologies, modernization of public administration by means of information technologies, development of business based on knowledge and new technologies and promotion of the linguistic and cultural inheritance of Lithuania in information society.

Other main institutions participating in these processes are: Ministry of Internal Affairs which is responsible for information technologies policy issues, and Ministry of Transport responsible for policy related to the telecommunications sector; Other ministries are involved in the issues of information society according to their sector: for example, Ministry of Education and Science is dealing with issues related to the competence of Lithuanian population in ICT area, Ministry of Economics is in charge of electronic business development, etc.

There are non-governmental institutions that are actively involved into processes of information society development and participating in various projects and initiatives dedicated

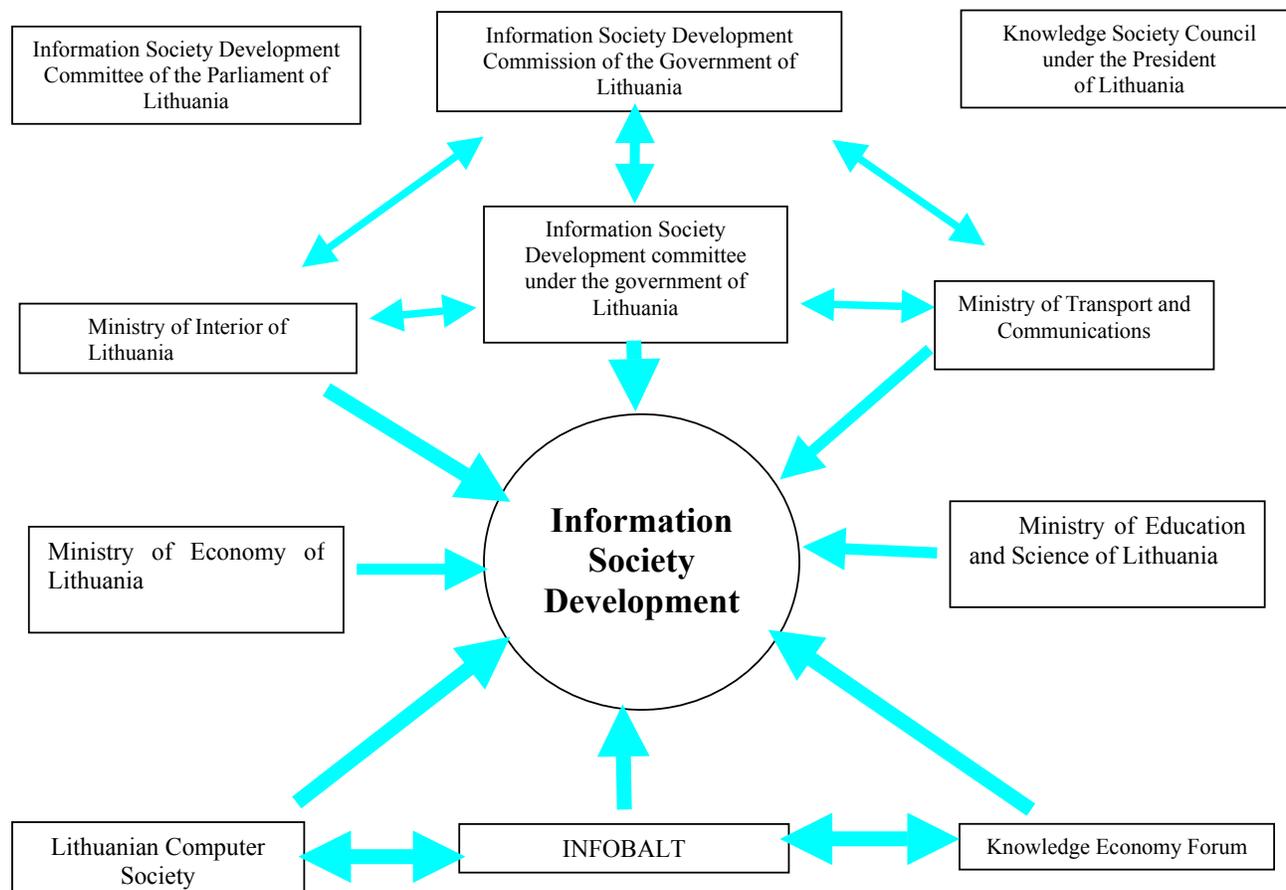


Figure 1.1: Regulatory Structure for IT Sector

to its development: Association of Information Technology, Telecommunications & Office Equipment of Lithuania “Infobalt”, Knowledge Economy Forum, Lithuanian Computer Society.

Similar to the situation in the innovation and R&D area, fragmentation of institutional responsibilities prevents effective leadership in policy formulation, planning, coordination monitoring and evaluation of information society related activities. In the absence of a clear governance structure, the Information Society Development Committee under the chancellery is attempting to carry out some of these functions without however having been vested with the required authority to do so. Several attempts to formulate broad strategies for development of the Information Society have been made, including by the Information Society Development Committee, but without clear responsibilities for subsequent implementation.

3. Present situation and trends in the Lithuania’s information system

In April 2001, the Department of Statistics under the Government of Lithuania conducted a research *Application of Information Technologies at Enterprises and Organizations*. The aim of this research was to determine to what extent enterprises and organizations use computers and Internet. Research questionnaires were sent out to 5600 respondents and filled out by 3118 respondents (56 percent), 2930 (94 percent) of which pointed out that they were using computers and Internet in their daily activities. Out of all respondents, 31 percent were engaged in trade, 21 percent - industrial activities, 9 percent – construction, and 8 percent were engaged in transport and communication services.

During the accountable period, i.e. in 2000, the amount of computer hardware increased by 19 percent. According to the data as of 1 January 2000, there were 17.6 computers per 100 employees, whereas on 1 January 2001 it equaled 21.7. There were 21.9 computers in every enterprise (organization) (see Table 2). Internet access further expanded - at the beginning of 2001, 60.4 percent of all computers at enterprises and organizations had Internet access (as compared to 48 percent at the beginning of 2000).

Enterprises of all sizes are fairly well equipped with information technologies. Nevertheless, hardware is concentrated in the hands of large Lithuanian companies with over 500 employees. In such enterprises, on average 245 employees use Internet. The vast majority of Internet or electronic mail users (53.2 percent) have access to Internet via a commutable telephone line, i.e. they use the dial-up service of Lietuvos Telekomas AB. The smallest number of respondents (as few as 3.4 percent) use a cable TV line. However, the situation has changed significantly in 2002 as DSL and other flat rate broadband services gained popularity among the prior users of dial-up access.

On 1 January 2001, 16.3 percent of all employees used Internet at their work places, on average 21 employees in every enterprise or organisation. However, over a quarter (25.5 percent) of those are working with Internet used only the electronic mail service. Low penetration of PCs and Internet among companies could be explained by a large number of industrial and construction companies that participated in the research and which demonstrate lower PC and Internet usage rates because of their industry specifics.

The research have shown that during 2000 year on average a 3.5 employees of every enterprise or organisation attended information technologies courses, among which employees of large enterprises prevailed. Enterprises and organizations engaged in the

communication (telecommunication), transport, real estate, public administration, and education sectors used Internet to a greater extent. The smallest number of computers with Internet access was recorded at agricultural enterprises and health organizations. Out of all respondents with Internet access, 41.6 percent have a homepage of the enterprise or organization and nearly one third (30.4 percent) perform various financial operations via Internet. More than one fifth of the respondents (20.9 percent) carry out electronic trading operations, i.e. buy and sell goods via Internet.

3.1. The ICT market in Lithuania

In 2001 Lithuanian ICT market, the largest among the Baltic States, was valued at Euro 806 million as against Euro 723 million in 2000, a growth of 11.5 %. Though according to European IT Observatory 2002 the Lithuanian ICT market grew by 11.5% in 2001, INFOBALT, Association of Information Technology, Telecommunications & Office Equipment of Lithuania, estimates the growth approximated 30%.

Continued growth of Lithuanian ICT market over 1999 – 2001 was influenced by several factors. Firstly, Lithuania's GDP growth of 5.9% in 2001 exceeded all forecasts resulting in increased investment in ICT, both in the business customer market segment and the fast developing consumer market. The booming economy influenced all sub-segments of the ICT industry. Mobile phone penetration doubled from 13% to 27%, which enabled the mobile market growth of approximately 45%. Secondly, Hardware and software sales surged by 30%, faster growth than in either Latvia or Estonia. And finally, leading Lithuanian IT companies managed to significantly improve their sales, both in western and eastern markets. The government initiative aimed at setting up an information society has also aided market growth.

Computer hardware

At the end of the year 2001, there were approximately 280,000 new personal computers in Lithuania, an increase by 75,000 units compared to the previous year. The majority of users were private companies and organizations. The PC market was dominated by locally assembled PCs such as Vector and Vectron manufactured by Sonex. Local brands held a market share of 51.5% and enjoyed a price advantage of between 8 and 10%. Among foreign brands IBM, Compaq, HP led the PC market. The Lithuanian market continued to be dominated by corporate, government procurement and banking or financial institutions sector. It is, therefore, encouraging to note the growth of mass-market delivery points such as Internet cafés, information kiosks and educational institutions and booming demand of residential segment during the period of 2001-2002.

Office equipment

The market for office equipment was estimated Euro 14 million in 2001, a growth of 6% over the previous year. The market was serviced by MNC brands including Xerox, Canon, H-P and IBM.

End user communications equipment

In 2001, the end user communications equipment market was valued at Euro 55 million, of which mobile telephone sets represented Euro 32 million.

Datacom and network equipment

The market for datacom and network equipment was estimated to be of the order of Euro 183 million in the year 2001, an increase of nearly 10% compared to 2000. The Lithuanian market for data communication equipment was expected to grow rapidly with the expansion of the e-Lithuania program now on the anvil. Furthermore, Lithuania's expected NATO and EU membership would call for European data to be provided in electronic form. A nationwide network connecting various government offices was therefore in the process of being established. City administration offices were also setting up their own networks to improve the interface with citizens. The PC penetration rate in Lithuania in 2001 was 27% based on the number of people that used a computer at least once a month.

Strong competition in the retail IT sales market has forced companies to compete on the basis of price and mark-ups that currently stand at between 5 and 15%. Six distributors dominated the IT market. CISCO led the network market, followed by HP and Entrance. In the lower price market segment, Asian companies had a major share. Routing solutions were mainly procured from CISCO. Other contenders were Lucent and Nortel. Most private companies in Lithuania were in the process of setting up their own corporate networks to improve efficiency through the use of IT. To help in preparation of trained network professionals, CISCO has set up two regional academies in association with the universities and 10 new centres providing training based on material from these regional academies. Approximately 250 students were in training, and the figure was expected to grow rapidly. Lithuania's anticipated EU and NATO membership together with increased investment in IT by the private business segment, will support the strong and continued growth of the IT market in 2002 and beyond.

Software products

The software products market grew by 14% to Euro 26 million in 2001 compared to Euro 23 million in the year 2000. Of the total number in 2001, system software accounted for Euro 11 million and application software represented for Euro 15 million. Microsoft dominated the packaged software market in Lithuania which is demonstrated by the high number of PCs shipped with Windows OS, 95, NT, 2000, XP, etc. software packages. Oracle was another major brand dominating the database segment and was mainly implemented by state institutions. Clients were opting for state-of-the-art software for their information systems.

The rapid software market growth was mainly driven by large-scale investment in the Lithuanian economy, with ICT and telecom services markets expanding fast, and with many corporations and government departments developing applications. Enterprise business solutions by Navision proved to be popular among SMEs, while large businesses and MNCs preferred SAP and Oracle. In 2002 first CRM and other more sophisticated applications were introduced. In 2002 first CRM and other more sophisticated applications were implemented. As the government took some initiatives to launch e-governance and create an information society through the implementation of major IT projects, the demand for standard software products and software application services was expected to steadily grow.

Carrier services

The carrier services market grew by 15.7% to Euro 15.41 million in 2001. Since 1998 Lietuvos Telekomas has invested Euro 0.52 billion to digitalize the switching and transmission networks in major cities and modernisation of its infrastructure, though the base

of fixed telephony subscribers reduced due the rapidly growing penetration of mobile communications. By the end of 2002, the digitalisation ratio is expected to reach 95% and 100% by 2004. The modernisation of the infrastructure helped Lietuvos Telekomas to launch new data transmission services, DSL technology, which increased the Internet user base twice over 2002. From 1 January, 2003, Lietuvos Telekomas' monopoly rights in fixed telephony as well as in international long distance services will expire and the market will be open to competition. However, market experts believe that the price for local calls is unlikely to come down significantly, as it would be difficult for any second operator to provide services at lower tariffs across the entire territory of Lithuania. However, over 10 operators already announced their intention to enter the market, which would definitely reduce the prices for international calls, data transmission and calls over the Internet. All mobile operators and CaTV providers are considered to be the most serious potential players. The subscriber base of fixed line telephony was expected to decline by about 20% by the year 2003. While at present Lietuvos Telekomas is the main backbone provider is, there will be competition from companies operating overseas providing backbone services to international clients via satellite.

Another important event for the Lithuanian market was the launch of DSL Internet services in the middle of 2001. Regrettably, monopoly rights have seriously impeded the general development of the telecom and Internet markets. An incident of refusing backbone connectivity to an Internet service provider was being investigated after the Competition Council of Lithuania fined Lietuvos Telekomas 602 thousand million Euro for terminating its provision of telecommunication services to Interprova, an Internet telephony provider.

Increased competition among mobile operators in 2001 resulted in the accelerated growth of mobile service users. At the beginning of 2001, two leading mobile communications companies Omnitel and Bite GSM, the majority shareholders of which are the Scandinavian companies Amber Teleholding Mobile and TDC, had 0.5 million subscribers, or 13% of the total population. As the third operator, TELE 2, entered the GSM market, the competition surged and the number of mobile users swelled to 0.95 million or 27% of the population at the end of 2002. In the autumn of 2002 cellular penetration in Lithuania reached 40% thereby exceeding fixed telephony penetration, which dropped to 31%. By the end of 2002 year cellular penetration in Lithuania is expected to reach more than 45%. Omnitel, the largest Lithuanian cellular operator, and the first to offer GPRS is set to become the largest cellular operator in the Baltics. Lithuanians were also among the most active users of SMS services in Europe which testifies the potential of value added services in the country.

Competition between Lietuvos Telekomas and cellular operators resulted in the reduction of the international service tariffs. Facing fierce competition, Lithuania's telecom companies resorted to making heavy investments in cellular network development and its optimization, introduction and using of most sophisticated tariff plans on the European market and enhanced customer service. Even Tele2, the third and smallest operator, was expected to increase its coverage to 95% by 2002.

3.2. Internet availability and affordability

Internet penetration has been steadily increasing in Lithuania. According to a survey conducted by SIC Gallup Media in June – August 2002, 21% of Lithuania's population used Internet at least once over the last six months, a double increase from 10% at the end of 2001. 17% of Lithuanian population was online at least once a month and 13% of the population

accessed the Internet at least once a week. Following a previous research at the start of 2002 the most frequently browsed web sites were www.lrytas.lt, a portal of the largest Lithuanian daily newspaper, visited by 43.6% of the interviewed group, followed by www.delfi.lt, the largest Pan-Baltic portal, and www.omni.lt, a portal of the local cellular operator visited by 39.2% and 33.1% respectively.

Strong growth of Internet penetration over 2002 positively influenced development of new services. The years 2001-2002 have seen a vigorous growth of Internet banking in Lithuania. According to NK Verslas, a Lithuanian IT business magazine, 7 out of 13 commercial banks provided Internet banking services at the end of 2001 while the rest were planning to launch Internet banking services in 2002. As of 1 December 2001, Vilniaus bankas was the leader with 48,700 users, Hansa-LTB claimed 8,000 users, Snoras –1,800 and Ukio bankas – 200.

More than 25% of Lithuanian companies had started to use e-banking services in the first year of its introduction. Mobile Internet services were also finding applications in the market. Large wholesalers, who took advantage of the mobile business model, used GPRS technologies. Almost a five-fold growth was recorded in the number of GPRS users in Lithuania in the first half of 2002 as 6,750 subscribers used GPRS in Lithuania at the end of June 2002 compared to 1,450 users at the beginning of the year. Omnitel reported more than 5,150 users while Bite GSM claimed to have about 1,600 GPRS subscribers.

In 2002, large telecommunications companies and banks were intending to invest in the establishment of public access centres, where citizens would be able to use the Internet. Nearly 40% of private companies had access to the Internet. Also, the introduction of flat access rates and broadband services proved to be a positive factor for Lithuanian Internet market development. In order to enhance citizen interface, a consortium consisting of Lietuvos Telekomas, Omnitel, Hansa LTB and others was set up to provide 65 Internet centres across the country providing access to people in remote areas and of lower income groups.

IT distribution had become the first business sector to be dominated by e-trade and business-to-business (B2B) services. GNT Lietuva generated about 60% of its turnover (EUR 54m) from sales from its e-warehouse. TechData Lietuva and Acme Computer Components provided similar services to the retail market. Omnitel plans to develop a package of self-service solutions and personalized services. The market for Internet telephony and data services was growing rapidly. There were many providers of data services in Lithuania who had taken leased lines from Lietuvos Telekomas and were distributing the signals to various customers.

Cable operators were emerging to become dominant market players who, in addition to entertainment, were also embarking upon providing Internet services and IT telephony. The Internet access market is fully competitive, and capital investments are low except for own network building. A NRA authorization is required to establish and operate public data transmission networks and to provide services through them. However, the high cost of access network and/or current dependence on the incumbent's infrastructure, especially at the local loop level, is a big disadvantage. The only viable alternative for Internet service provision is the usage of cable TV networks.

3.3. Information-communications sector trends

Although network equipment and data-com occupy the main share of Lithuanian ICT market, software and related services are expected to be the most active sub-segments. Local demand for management systems and applications for state institutions as a result of expected EU accession and export to the neighbouring Baltic and Western European countries should be the main drivers in the software market. In line with continuing investment of private companies and tele-operators, exports to the Baltic and FSU countries are expected to have positive influence on the data-com and network equipment sector.

The survey concluded that appropriate tax incentives needed to be introduced by the government to facilitate exponential growth of IT products and services market with the growth in IT deployment.

Another survey conducted by the Lithuanian Institute of Statistics on ownership of personal computers by households revealed the following:

- In 2000, 10% of households had a PC. The most active users were children aged 10-15, followed by persons in the age group of 16-65.
- 89% of households with a PC used it for playing games and leisure, 87% for studies, 72% for work and personal business.
- 43% of the households with PCs used the Internet or electronic mail.
- Almost half of those PC households not having e-mail or Internet indicated the high subscription fees as the reason. However, it should be noted that after the rapid growth of the home market in 2002 PC and Internet penetration should increase several times.
- As many as 9 out of 10 users of the Internet use the dial-up services of Lietuvos Telekomas.
- 6% of the households had Internet access via a satellite line.
- Least popular was the ISDN line, which was used by just 2% of Internet users.

A survey on computer usage among corporate and private users in the Baltics carried out by SIC rinkos tyrimai, Baltic Data House showed that in February – March 2002 in Lithuania the share of companies and residents, that had a computer stood at 65% and 13% respectively.

- According to European IT Observatory 2002 Lithuanian ICT market grew by 12% in 2001 amounting to Euro 806 million, though this estimate seems to be inaccurate as local sources based on the statistics of the largest ITC companies estimate the growth at nearly 30%.
- IT market for end user communications equipment demonstrated the biggest growth (30%) within the sector
- Structural change in the market observed as growing demand for IT services bolsters sales of leading local companies
- Turnover of Lithuanian IT service providers increased by nearly 40% in I half 2001 – I half 2002, business management applications gained popularity in 2001 and have become one of the most rapidly growing sectors in the ICT market.
- Turnover of main IT wholesalers and distributors grew by 30% in 2001 and has demonstrated similar growth pattern in 2002.

Growing demand for systems and software application by government and government agencies, driven by the EU and NATO integration processes

- Shift towards implementing IT solutions to improve enterprise productivity/e-governance
- Monopoly in fixed telephony and international calls to end by January 2003 and prices expected to fall. However, the fixed-line market is expected to fall from the existing tele-density of 30% due to competition posed by mobile operators.
- Cellular penetration driven by growing economy, large capital investment by telecom companies, increase of tariffs by Lietuvos Telekomas. . Mobile penetration reached 45% in 2002 and is expected to grow to 65% by the end of 2004.
- Local cable TV companies enter the ISP market and will be providing IP telephony to compete with the existing service providers.
- Investment in GPRS and e-business solutions for corporate customers to increase
- Lithuanian companies to enhance their investment in IT solutions to improve e-readiness
- Baltic region far ahead of other CEEC markets for ICT products
- NATO and EU membership expected to result in significant increase of IT spending in the upcoming years.

4. Characteristics of the Country's Human Resources

The responsibility for managing learning in the knowledge economy needs to be increasingly demand driven and based on individual needs, particularly as individuals progress upwards on the learning continuum. It is vital that the education sector at school level and the business sector work together so that the future workforce has an appreciation of business practices and the importance of 'innovation'. This would also provide an opportunity for the business community to influence the education sector and students at an early stage during their career development.

Although they may be very skilled in teaching their subjects many school teachers may not have had the opportunity to be fully aware how businesses function and the needs of businesses. If they have an opportunity to work closely with businesses they will adapt their teaching methods and curricula to meet the needs of businesses. Mobility between education sector and businesses is vital to promote this 'knowledge transfer'. Establishing a partnership between schools and local businesses may also bring other benefits such as sponsorships for equipment and facilities for schools. On the other hand, it will enable businesses to play an influential role in their local community and attract a better educated and skilled workforce

There are some local initiatives but these are not established widely due to lack of resources and incentives. Government help and intervention is recommended to create critical mass and build capacity so that 'Education Business Partnership' (EBP) becomes an established practice. There is a need to empower individuals to manage their own learning, as opposed to placing the full responsibility in the hands of educational and training institutions. This paradigm shift reflects the need for individuals to have basic knowledge (tools); knowledge of how to access and select specialized knowledge, evaluate it, and use it in an autonomous way in the context of lifelong learning in a knowledge economy.

The importance of investment in human capital for economic growth is affirmed in the economics literature. The linkage between the growth, or decline, of specific sectors directly

affects overall labor demand, as well as demand for specific knowledge. Shifts in employment by sector, including increased employment in sectors, which are “knowledge intensive” and use increasing amounts of information communication technology, emerge as a knowledge economy develops.

These shifts are apparent in Lithuania. They are causing structural changes in labor force demand, and have ramifications for education and training systems in Lithuania. As with other economies in Central and Eastern Europe, Lithuania’s transition years have been characterized by a sharp shift in employment from the public to the private sector. In 1991, the private sector employed less than 30 percent of the working population. By 2000, it employed nearly 70 percent. Much of the growth in private employment has taken place in small and medium enterprises, which in 1998 is 55% or twice their level just five years earlier. There has been a gradual shift into services and a decline in employment in industry and construction, with agriculture playing a buffer role. Despite positive GDP growth and strong export performance, employment has remained stagnant, with employment in 2000 slightly below that reported in 1995. This phenomenon of “jobless growth” is not specific to Lithuania; but typical of most transition economies in Central and Eastern Europe.

The primary reason for economic growth not coupled with employment growth is productivity improvements are associated with intensive restructuring. Labor productivity (measured as GDP per worker) has been quite strong since 1996, averaging 4 percent per year. Thus, economic growth in Lithuania has been achieved through more efficient utilization of labor resources rather than through an increased use of labor inputs. In Lithuania there appear to be some severe limitations in mobility from old to new jobs. The jobs that are being destroyed differ in salient characteristics (especially skill and location) from those being created. As a result, many of the workers that have lost their jobs do not have the right knowledge to take up the new ones. The skills gap seems to partly account for the limited transitions from unemployment into jobs. Unemployment is disproportionately concentrated among workers with low educational attainment and poor skills.

<i>Level of Education</i>	<i>Unemployment Rate (%)</i>
<i>University</i>	5.9
<i>College</i>	13.6
<i>Upper Secondary General</i>	17.3
<i>Upper Secondary Vocational</i>	18.6
<i>Lower Secondary General</i>	26.2
<i>Lower Secondary Vocational</i>	24.0
<i>Primary or less</i>	9.3
<i>Total</i>	15.4

Source: Labor Force Survey Data, Dept. of Statistics, Lithuania

Indicator	Lithuania	European Union
Unemployment Rate	13.50	7.75
Human Development Index	0.80	0.93
Public Spending as % of GDP	5.20	6.08
Primary student teacher ratio	15.00	14.00
Secondary School Enrollment	90.00	116.00
8 th Grade Math Achievement.	482.00	530.00
8 th Grade Science Achievement	488.00	545.00
Tertiary Enrollment	41.00	56.75
Adult Literacy (15 plus years)	99.50	98.83
Available Management Training	4.00	5.70
Prof/Tech. part of workforce in %	21.37	27.34
Extent of Enterprise Staff Training	3.40	5.65
Computers per 1000 persons	4.09	5.87
Telephones per 1000 persons	5.77	6.39

Source: Human Resources development indicators World Bank Institute, World Bank, World Bank Lithuania assessment team

4.1. Human Development Indicators

The following human resource indicators show that in a number of areas Lithuania generally follows trends in transition and developing countries (i.e., public spending on education, primary and secondary education enrollments, adult literacy). However, there are several key areas where Lithuania deviates from the norm (i.e., unemployment is significantly higher, mathematics and sciences scores for 8th graders are lower, tertiary enrollment is lower, as is the availability of *management training, and adult continuing education*). These deviations indicate shortfalls in basic and tertiary education, and potential problems in adult continuing education for the current work force. The latter deficiency contributes to long-term structural unemployment and shortage of human capital to support development of the knowledge economy.

4.2. Key Competencies for the Knowledge Economy

Research has just completed on “key competencies” by the OECD Defining and Selecting Key Competencies project (DeSoCo) and three broad areas of competence were identified *The capacity to act autonomously and reflectively* (i.e., having an orientation to the future, awareness of the environment, understanding how one fits, building a sense of self, participation in a social field). *The capacity to use tools effectively and interactively* (i.e., basic skills, instruments for dialogue, awareness of new tools, accommodation to potential of new tools, use of information communication technology, use if information effectively, use of language effectively). *The capacity to join and function in socially heterogeneous groups* (i.e., the social embeddedness of individuals, creating social capital, living in pluralistic societies, managing and responding to others, resolving conflict, participation in groups. In some quarters in Lithuania there is concern that the Matura exam may tend to focus curricula

and teaching on narrow factual learning at the expense of the softer skills, and results of the Citizenship and TIMSS Math and Science studies indicate shortfalls in selected skill areas.). To ensure a broad view of competencies Lithuanian educators plan to use the results of OECD research in curriculum reform, particularly in basic education (*Source: World Bank Lithuania assessment team*)

Broad sector employment data is available in Lithuania. But information on the emerging or declining sectors, and demand for specific skills, is fragmented and often based on single surveys, picked up from tangential studies, or is based on data with limited penetration (i.e., labor exchange data). There is evidence from employer-based surveys that technical and managerial shortages are constraints to development. This is of greater concern with larger companies. There is little regular follow-up of graduates of education and training institutions, and informal labor market training is evaluated, but only on a gross impact basis. Consideration should be given to: (a) undertaking regular regional medium term qualitative economic/labor force trend studies similar to those used in the USA, Sweden, Hungary, and Poland; (b) implementing regular sample follow-up surveys of graduates of education and training programs; and (c) implementing net impact studies of labor market training programs operated by the Labor Market Training Centers .

Lithuania participated in the 1999 Third International Mathematics and Science Study (TIMSS) of grade eight students, and International Association for Evaluation of Educational Achievement (IEA) Citizenship and Education Study (CES). It has not been involved in the Program of International Student Assessment (PISA) and International Adult Literacy Study (IALS) or the new Adult Literacy and Life skills (ALL). These studies could provide additional benchmarking related to the previously mentioned competencies.

There is some trend information already available from the CES and TIMSS studies and Lithuania is below the median on several areas on both studies. Citizenship skills relate to the DeSoCo competency areas of working with heterogeneous social groups and thinking autonomously and reflectively. Mathematics and science skills relate to the DeSoCo using tools effectively competencies. The above findings have direct ramifications for both the content and method of teaching in the Lithuanian education system, should be used to adjust curricula in primary and secondary schools, and Lithuania should consider participating in the PISA and ALL assessment.

Challenges to Assessment and Recognition of Non-formal Learning is a major challenges in promoting lifelong learning, particularly in developing countries, and is linked to the concept of key competencies, assessment, and increasing the flexibility of the overall lifelong learning system. The main arguments for recognition of non-formal and in-formal learning are that it motivates individual learners, facilitates recognition of alternative learning methods, promotes lifelong learning in general, and facilitates individual mobility.

Tertiary education is a critical element of lifelong learning and although it provides skills beyond basic competencies continued government support is justified because it provides major external benefits for economic and social development, imperfections in capital markets limit the ability of individuals to borrow, and tertiary education helps sustain basic education. Lithuania is now trying to find the appropriate balance between public and private financing, while maintaining equity, as it attempts to expand access through expanded public and private provision and contain public expenditures. The current proposals to finance student fees and scholarships are problematic and may not serve equity issues adequately. The

rate of population with tertiary education in Lithuania is about 45%, which is one of the highest in Europe and the World (US – 36.5, W.Europe – 29). But a sound discrepancy exist between a labour market needs and of education and training system supply in working force specialization and skills.

There is a void in financing policy in Non-formal Adult and Continuing Education in Lithuania, except for limited resources for training for the unemployed. Given the changing economy, increasing demand for skilled vs. semi-skilled workers, unemployment among worker with lower levels of training is important that this area of financing lifelong learning not be overlooked. There are a number of alternative individual based schemes that can be examined, including cost recovery (loans, graduate tax) and subsidies (learning account, vouchers). tax credits, and training levy payroll taxes. There is concern about access to knowledge economy and Internet services in rural and depressed areas, particularly with access to the Internet, and initiatives are underway to overcome lack of connectivity (i.e. telecom reform, private initiatives to provide rural community access to the internet).

Information Communication Technology (ICT) and the knowledge economy provide an opportunity for the disabled and handicapped to become involved in social and economic life. While some initiatives are underway (i.e. special Ministry of Education funding for adults) additional activities could be undertaken. Many public education facilities have very limited access for the disabled.

Low salaries of education staff at the higher education level are problem to the recruitment and retention of young staff and threaten the quality of teaching. Staff tend to have multiple employment, may put only minimal effort into their primary job at a University or College, and private institutions which can pay market rates, will tend to draw good staff away while State institutions are restricted by State salary rules. Staff remuneration policies need examination.

Surveys on motivation of Enterprises and Workers to Invest in Training in Lithuania indicate that in general workers are not very interested in upgrading their skills (65 % indicated they did not need training in a recent Lithuanian survey) and there is a shortage of supply. While some large ICT enterprises and those, which are involved with multinationals, indicate an interest in providing and or financing training, the general situation is not good (i.e. one recent survey of some 300 employers indicated that only 7 to 8% of employers were interested in providing or financing training). Other than a lack of appreciation of the importance of employee training, enterprise representatives cited the poor quality of training in some formal sector institutions, and the lack of tax incentives. In addition, there may be negative tax incentives for employees who are given training, as they have to report training financing as income and pay tax on it. There exists a series of weaknesses in terms of tailoring vocational and life-long learning education and training to the needs of the Lithuanian enterprises.

Under the former system, a large share of the population in Lithuania with secondary level education underwent vocational education which left them with specialized skills that do not complement the demands of the current labor market. In addition, vocational education and training was structured to fit the needs of the large state-owned enterprises and very little effort was concentrated on life-long learning due to a focus on life-time job training. It is well recognized that appropriate training in new technologies and new organizational and management skills are essential in sustaining the innovative capacities of enterprises. Increasing the flexibility and adaptability of human resources in enterprises to changing business conditions is a main challenge faced by policy-makers in charge of developing

human resources. Lithuania lacks a central institution responsible for coordinating, monitoring and analyzing training needs. This institution would manage the analysis of the labor market situation in order to define policy orientation and manage support schemes. Accurate and timely data on demand and supply of human resources for innovation would be a prerequisite for this institution to function effectively.

Lithuania has placed little recognition of innovation management techniques as important ingredients in the innovation process. Beyond quality management, innovation management tools are very limited at the enterprise level and even less evident at the policy-making level. Recipients of new technologies require the know-how to develop and commercialize their innovations, use and manage the technologies they learn and understand the complete spectrum of application for their particular technology. This requires the development of a specialization in management that creates a framework of interconnected institutions and a link between the public and private sectors. Although there are currently no reliable statistics providing information on the take-up and use of the various innovation management techniques, ISO (International Standards Organization) certification can be used to gauge the relative importance countries place on innovation management techniques.

For the most part, the awareness of the importance of ISO certification for candidate countries lags behind that of the lower income countries of the EU. Lithuania and other Baltic countries find themselves at the bottom of the list. To complement the new investment and changes in production processes that is brought out by ISO certification, there is a call for increased training of employees. ISO certification has proven to be a driver for change and potentially innovation within firms in the more developed candidate countries. The main benefits of the use of innovation management techniques for Lithuanian enterprises is that it forges closer links between technology and business strategy. The use of innovation management techniques encourages companies to become more forward-looking and to place more emphasis on human resources, technology and markets.

5. National innovation capabilities and their effectiveness

5.1. A Level of Innovation Development in Lithuania

Lithuania inherited from the past strong research potential and facilities, especially in electronics, biotechnology, precision engineering. Major players in the system were universities and research institutes. Despite strong research potential Lithuania suffered from central planning system in the sense that innovation chain has been broken and thus poles of R&D basis and market were becoming more and more distant. Since gaining independence from the USSR, Lithuania is developing rapidly new innovation support infrastructure. Due to the great number of unsynchronized activities of establishing the innovation support institutions and the science personnel hesitation to commercialize their inventions it can be observe several major problems in innovation development:

- Lack of communication and co-operation between different innovation support institutions
- Lack of co-operation between Higher Education Institutions (HEI) and research institutes and industry
- Lack of knowledge of Innovation Management and Entrepreneurship

Some innovation relevant indicators are stated in the following order to clarify the level of innovation development in Lithuania. Some of the statistics may be dubious due to the methods used, due to the discrepancy in data from different sources, but overall they are establishing a general picture. In 2001 the distribution of R&D personnel among the sectors was as following:

Table 5.1

	HEI	Institutes	Companies	Total
Total R&D personnel	9 206	4 820	945	14 980
Researchers	7 239	2 383	591	10 213
With PhD	3 641	1 419	70	5 130

Source: Zurauskas S., *R&D System in Lithuania*, Ministry of Education and Science, 2002.

The majority of researchers with PhD degree are concentrated in Biomedical sciences (27 %), Technical sciences (21 %) and Physical sciences (20 %). A dynamics of the Public and Business Expenditures as a percentage of Gross Domestic Product (GDP) are shown in the following table 5.2:

Table 5.2

Year	1997	1998	1999	2000	2001	EU '99
Total	0,57	0,57	0,52	0,60	0,59	1,85
Public expenditure on R&D	0,53	0,56	0,50	0,47	0,52	0,66
Business expenditure on R&D	0,04	0,01	0,02	0,13	0,07	1,19
Fraction of State budget funds in Total expenditures, %	72,0	74,4	72,4	57,9	85	

Source: European Commission, *2002 Innovation Scoreboard*, Brussels, 2001.

It is obvious that total expenditure is increasing due to the increase of business expenditures on R&D. Such trend resulted in decrease of State budget funds. Also, structure of R&D has been changed as a result of increase of companies' R&D investments, as it is presented in the following table 5.3

Table 5.3

Year		1997	1998	1999	2000	2001
Expenditures on R&D for, %	Basic research	41.1	46.6	55.7	41.7	35.3
	Applied research	44.1	43.3	34.5	36.3	29.8
	Experimental development	14.8	10.1	9.8	22.0	34.9
Fraction of personal costs in Total R&D Expenditures, %		74.6	77.3	80.6	66.4	57.1
Fraction of capital expenditures in Total R&D Expenditures, %		8.6	7.5	4.9	16.2	27.8

Source: Zurauskas S., *R&D System in Lithuania*, Ministry of Education and Science, 2002.

Innovation in Lithuania is mostly comprehended by following the linear model i.e., considered as technological push from invention via basic and applied research. Acquiring a new technology is also considered as innovation according to Lithuanian Law. The main innovation indicators for Lithuania are presented on table 5.4. Ways of developing new (improved) technologies are presented in the next table 5.5.

Table 5.4

		LT		EU
1.1	New Science and Engineering graduates (% of 20 – 29 years age class)	9.35	2000	10.26
1.2	Population with tertiary education (% of 25-64 years age class)	45.03	2001	21.22
1.3	Participation in life-long learning (% of 25-64 years age class)	3.7	2001	8.5
1.4	Employment in medium-high and high-tech manufacturing (% of total workforce)	3.13	2000	7.65
1.5	Employment in high-tech services (% of total workforce)	2.23	2000	3.39
2.1	Public R&D expenditures (GERD – BERD) (% of GDP)	0.53	2000	0.66
2.2	Business expenditures on R&D (BERD) (% of GDP)	0.07	2000	1.24
2.3.1	EPO high-tech patent applications (per million population)			27.8
2.3.1. A	EPO patent applications (per million population)	1.1	2000	152.7
2.3.2	USPTO high-tech patent applications (per million population)	0.54	1998	12.4
3.1	SMEs innovating in-house (% of manufacturing SMEs)	49.0	1998	44.0
3.2	SMEs involved in innovation co-operation (% of manufacturing SMEs)	12.0	1998	11.2
3.3	Innovation expenditures (% of all turnover in manufacturing)			3.7
4.1	High technology venture capital investment (% of GDP)	0.686	2000	0.108
4.2	Capital raised on parallel markets plus by new firms on main markets (% of GDP)			2.54
4.3	Sales of ‘new to market’ products (% of all turnover in manufacturing)			6.5
4.4	Home internet access (% of all households)			37.7
4.4.A	Home internet access (per 100 population)	6.1	2000	23.8

4.5	ICT expenditures (% of GDP)	4.7	1999	6.85
4.6	Share of manufacturing value-added in high-tech sectors	22.35	1999	10.1
4.6.A	Inward FDI (Foreign Direct Investment) stock (% of GDP)	19.7	1999	39.5

Source: *European Innovation Scoreboard*

As is shown in the table 5.4, the indicator of population with tertiary education (1.2) is more than two times higher than the EU average. The prime reason for that is that during Soviet times and during the past ten years higher education was more easily accessible. The principle of lifelong learning is rather new in Lithuania. The objective of implementing lifelong learning was only recognized by the state in the past two years. For the first time these objectives were included in the measures for implementation of the Government's programme for 2001-2004. That explains why the indicator of participation in life-long learning is lower than in EU.

Medium-high and high-tech manufacturing, as well as high-tech services are not extensive in Lithuania. The main sectors where high-tech manufacturing is present in the country are biotechnology, automation, lasers techniques. State support in this field is quite low. There is no strategic approach to the development of high-tech manufacturing or services. Therefore the indicator of employment in these spheres is not high. Lithuania does not have a clear vision or policy in the sphere of R&D. There are no innovation funding mechanisms and systems in Lithuania. The allocation of funds for research and creation of technologies is not legally regulated. The guarantee mechanisms, which could encourage financial institutions to finance innovation projects, are not developed. Therefore the GERD and BERD indicators are rather low. This also explains the indicators of patent applications and the high technology venture capital investments.

The development of small and medium sized business is recognized as one of the strategic goals for the economy of Lithuania, which is illustrated by the recent policy document – 'Strategic guidelines and Measures for Development of SMEs until 2004', adopted this year. The development of innovation in SMEs is continually emphasized by state policy documents. Therefore this sector is sufficiently developed and is functioning efficiently, which is also given credence by the indicators 3.1, 3.2 found in the table above. ICT expenditures show no significant difference from the average of the EU.

Table 5.5

Companies on their own	54,3 %
Together with foreign specialists	23 %
Acquired (by licenses)	9,9 %
Together with other companies	9,1 %
Together with research institutions	3,7 %

Source: *Group of Authors, Lithuanian Science and Technology White Paper, 2001.*

It can be seen from the table that cooperation between research institutions and industry seems to be very limited. To this, fact should be added that an unknown contribution comes from professors who consult for companies on private basis.

In addition to the role and involvement of different innovation support institutions into the development of innovation, SMEs Development Agency conducted research in order to find out the level of visibility of support institutions among companies. In the following table awareness survey results are presented.

Table 5.6

Institution	Awareness (%)
Chambers of Commerce, Industry and Crafts	72.4
Business Advisory Centres	63.5
Business Information Centres	51.5
SMEDA	45.5
Euro Info Centres	32.4
Business Incubators	25.7
Lithuanian Innovation Centre	23.2
Innovation Centres	18.9
Regional Development Agencies	18.4
National Regional Development Agency	14.3
Science and Technology Parks	11.0

Source: SMEDA, *Survey on institutions providing support to SMEs, 2001*.

5.2 . Innovation Support Infrastructure

Innovation Support Infrastructure is considered as an integral part of Business Support Infrastructure. Though many institutions that are going to be presented are more SMEs support oriented, their potential for a support of innovation is not utilized, and thus they can be considered as part of innovation support infrastructure. In the past small and medium sized enterprises have been defined as companies with less than 50 employees. It has been changed to less than 250 employees, comprising almost all companies. In the following text it is described the most important parts of the innovation structure i.e., the policy making, universities and research institutes, chambers and development agencies and other relevant institutions.

Policy Making

Key players in innovation policy making are Lithuanian Government, Ministry of Economy and Ministry of Education and Science. In 2002 *The Government of Republic of Lithuania* has formed The Science and Technology Council led by Prime Minister, several Ministers and businessmen, whose primary role will be fostering of innovation. Lithuanian Government has recognized the importance of innovation in the light of accession to EU, and thus Lithuania is very committed to the development of the innovation. Thus, at July 2002 the Government approved the following R&D priorities as an integral part of innovation development:

1. Research to ensure quality of life of people
2. Research to promote a knowledge-based society
3. Research to create nanotechnologies
4. R&D activities on nuclear safety of Ignalina nuclear power station in the stages of its operation and closure, and management of radioactive waste
5. R&D to increase international competitiveness of Lithuanian industries.

A major role in policy making belongs to the *Ministry of Economy*. The Ministry is a key policy maker and implementer in the sphere of SMEs and innovation. Several divisions within the Ministry are engaged in innovation support, such as the Business Competitiveness and SME divisions. So far, ministry has only 2 employees in charge of innovation. That is expected to change soon. Also, regard to SMEs department, organizational restructuring may take place at the end of 2002 or at the beginning of 2003. Organizational restructuring should improve coordination and functioning of three innovation support units: Business Advisory Centers, Business Incubators and Business Information Centers. The most important documents concerning innovation issued or prepared under the request by Ministry are:

- Programme for Innovations in Businesses (Expiring until the end of 2002)
- National Innovation strategy (under development)

New Programme for Innovations in Businesses is being prepared and its implementation is expected to start in January 2003. The Ministry is very active together with regional and local instances in the development of several innovation support infrastructures. The latest example includes Science and Technology Parks development. The Ministry is also involved in approving, recommending and moderating different innovation support programs proposed by non-Lithuanian institutions.

Ministry of Education and Science used to be involved as funding organization for Research Institutes and universities. Ministry initiated The Law on Research and Higher Education in 1991. Ministry's role has been significantly changed, thus it is involved in the establishment of Science and Technology Parks. In 1998 The Department of Science and Higher Education has been established with the primary role to enhance research and innovative activities in higher education institutions and to strengthen co-operation between research base and industry. The Department is employing only two persons in charge for innovation infrastructure development.

Universities and Research Institutes

Lithuania has two types of Higher Education Institutions (HEI): *universities* and *colleges*. There are 35 HEIs of which 22 (15 universities and 7 colleges) are state owned and 13 are non-state owned institutions (4 universities and 9 colleges). Universities are mostly concentrated in major Lithuanian cities: Vilnius, Kaunas, Klaipeda and Siaulia. From the mentioned 19 universities, 9 can be considered as a basis for R&D and innovation development because they exclude art, physical education, military academy and pedagogical universities.

Those 9 universities have approximately 88000 students, which is 84 % of university student's population. Doctoral students make up nearly 3%. Universities employ around 6000 scientists in 2001, of which 39% are docents and 10 % full time professors.

After a structural reform of state institutions of research and HEI in 2002, it is possible to distinct 3 types of *research institutes* e.g., state research institutes (17), university research institutes (9) and state establishments (18). Most of them are under the jurisdiction and financing of Ministry of Education and Economy.

State research institutes focus on scientific research and applied scientific research. They are established to conduct a long-term research of national importance on an international level.

University research institutes mainly focus on scientific research, and also participate in teaching activities at university. *State research establishment* exclusively concentrate on the activities of applied scientific research.

Chambers and Development Agencies

Association of Lithuanian Chambers of Commerce, Industry and Crafts (ALCCIC) is a voluntary union of Chambers of Commerce, Industry and Crafts. In fact the Association represents national interests of the local Chambers. The Association has 5 member Chambers in 5 Counties of Lithuania (Vilnius, Kaunas, Klaipeda, Siauliai and Panevezys). Innovation and SMEs support services that chambers provide are:

- Promotion of foreign trade;
- Support for development of Small and Medium - sized businesses;
- Information about business offers from foreign companies;
- Search and identification of foreign partners upon the request from members;
- Distribution of information to Lithuanian Embassies as well as to foreign Chambers about Chamber members and their activities;
- Information about trade - fairs, exhibitions and conferences in Lithuania and abroad;
- Arrangement of trade missions, visits of the companies, meetings with local entrepreneurs;
- Arrangement of seminars, lectures, training courses for businessmen, conferences and presentations;
- Assistance in arrangement of vocational training and education.

The Confederation of Lithuanian Industrialist (LPK) unites 41 branches and 8 regional associations, over 2700 various enterprises in all. The LPK members include most Lithuanian production enterprises, banks, trading companies, representative offices of foreign firms, research institutes, and educational establishments. Confederation of Lithuanian Industrialists is a non political organisation, fully independent from any kind of governmental control or authority in all its activities and free to take its decisions in any sphere. Main objectives of the Confederation are:

- To create most favorable conditions for the development of economic, technical and social progress of Lithuanian enterprises regardless their form of the ownership
- To represent rights of the members of the Confederation and defend their interests in the governmental, social and international structures
- To expand markets for products and raw materials, to improve conditions of exports as well as for imports in order to enable Lithuanian industry to contribute a proper contribution to the strengthening of the national economy
- To represent entrepreneurs and defend their social and legal interests
- To make contacts between Lithuanian manufacturers and their counterparts abroad through international exhibitions and available information systems

The Lithuanian Development Agency for Small and Medium Sized Enterprises (SMEDA) was founded in 1996 as a non-profit organisation seeking to create favourable conditions for development of small and medium sized business. In July 1997 SMEDA was reorganised into

a public institution. The owner and the highest managing authority of SMEDA is the Ministry of Economy. SMEDA's main objective is to support the development of SMEs through:

- stimulation of the birth-rate of the Lithuanian SMEs;
- increase of competitiveness of small and medium-sized enterprises;
- promotion of the creation of new jobs;
- increase of survival rate of small and medium-sized enterprises in Lithuania;
- increase of level of IT literacy among the small and medium-sized enterprises.

Lithuanian Development Agency (LDA) is oriented towards the development of Lithuania in three ways: attracting investments, promoting export and providing information and PR. *Euro Info Centre* is active in LDA since 2001.

The National Regional Development Agency (NRDA) is a public not-for-profit company owned by the Lithuanian Association of Chambers of Commerce. Established in 1999 it has grown to become one of the biggest consulting and technical assistance companies in the area of regional development in Lithuania. The Agency is partly funded by the state. Overall goals of the Agency are:

- to contribute to the implementation of the national regional development policy,
- to assist national, regional and local authorities in implementing a number of regional development instruments,
- to provide technical assistance and training concerning the programming and implementation of various EU-supported pre-accession programmes.

5.3. Innovation Support Development

It is possible to identify several waves of the establishment of different units whose mission is to develop SMEs and innovation infrastructure. All entities have been developed under different schemes with different participants, which is a key characteristic of the Lithuanian innovation support development. Such approach has in it a risk for lack of co-operation between different organizations. Those organizations are active either on national or regional levels. It can be identified 5 waves.

1st wave - Innovation Centres

The first wave of innovation support infrastructure development dates back to 1992 when *Innovation Centre of Lithuanian University of Agriculture* has been established.

Another university based innovation centre has been established in 1994 at Kaunas University of Technology. *Kaunas Innovation Centre* initiated development of Kaunas Technology Centre and left significant mark on the innovation development in Kaunas County and whole Lithuania, as well. At the beginning of 2003 Kaunas University of Technology is going to re-structure Innovation Centre under the new name The Innovation and Information Centre.

In 1996, *Lithuanian Innovation Centre(LIC)* was established. LIC is one of the most active innovation support institutions in Lithuania. It operates on the national level and is under the supervision of Ministry of Economy. Lithuanian Innovation Centre has 8 employees and is currently involved in three projects: Innovation Relay Centre (transnational technology transfer) which is the highest issue so far, BENTEX (international benchmarking of textile

industry) and TWINN (Developing IRC network throughout Lithuania). Despite national importance of Lithuanian Innovation Centre, only those companies and other innovation support organizations that are from the regions that gravitate to Vilnius and Kaunas recognize them. Main emphasis of LIC is:

- technology transfer: "export" and "import" of technology,
- introduction to the innovative business,
- information services,
- promotion of high-tech entrepreneurship.

Since the 2000, two more university based innovation centres have been established: *Vilnius Gediminas Technical University Innovation Centre* and *Alytus College Innovation Centre*.

2nd wave - Business Advisory Centres

They have been founded in 1995 by a Phare programme. There are 6 BACs and they operate as self-sustainable companies. Main activity is related to business plan development and providing SMEs with the general information. Now-days Business Advisory Centres are being operated private like.

3rd wave - Business Incubators

Business incubators have been established under the initiative of Ministry of Economy. Founders of Business Incubators are Ministry of Economy, Municipalities and Regional Innovation Centers. There are 5 business incubators (Siauliai, Alytus, Kazlu Rudos, Telsiu and Vilnius) operating in Lithuania with the area of approximately 2800 m² for hiring out and with 80 tenants accommodated in. These Business incubators are general purpose ones with the aim renting the office space.

In addition, with the support of the German Government and Lithuanian Ministry of Economy two Technology Centres (Technology Business Incubators) have been established: one in Kaunas (Kaunas Technology Centre) and one in Vilnius (Vilnius S&T Park). They have almost 50 tenants and nearly 4000 m² available for renting.

Business incubators and some of the S&T Parks created The Union of Lithuanian Business Centres.

4th wave - Business Information Centres

The fourth wave of the support organizations had been presented with establishment of the *Business Information Centers (BIC)*. There are 17 BICs all over Lithuania with Ministry of Economy and Municipalities as the key shareholders. The BICs provide advisory service and each of them employs 3 to 4 people.

5th wave - Science & Technology Parks

The last wave of innovation structure development is related to the rapid appearance of 4 new Science and Technology Parks. Their development reflects Lithuanian Government's readiness to develop business and innovation support infrastructure. Together with institutes,

municipalities, universities, companies and other interested parties, Ministries of Economy and Education and Science have established the following S&T Parks:

- Northtown Technology Park,
- Visoriai Information Technology Park
- Kaunas Information Technology Park
- Klaipeda University Technology Park

5.4. Innovation Support Infrastructure in the Regions

Vilnius

Vilnius County is one of the ten administrative units of higher level of Lithuania set up in 1995. Vilnius County is the largest among all Lithuania's counties by population (nearly 900.000 inhabitants) and territory (9.650 km²). It's located in the southeastern part of the country and has boundaries with Republic Belarus. Vilnius County includes eight territorial administrative units: Vilnius city, Elektrėnai municipality and Šalčininkai, Širvintos, Švenčionys, Trakai, Ukmergė and Vilnius districts. Vilnius is the capital of Lithuania as well as the administrative centre of Vilnius County. The distance from the regional centre to its boarders varies from 30 to 120 km. Vilnius city produces over 80% of industrial production of the County. There are 16 cities and towns in the County. The urban population makes up 80%, including 64, 6% for Vilnius. Economic indicators of the area are among the best in Lithuania: 26 % of the Lithuanian labor force is from Vilnius County, 28 % of all Lithuanian industrial enterprises are located in Vilnius County and Vilnius County contributed to the national GDP with 32 %.

Universities

- Vilnius Gediminas Technical University
- Vilnius University

Both Vilnius based universities have strong commitment in innovation development resulting in their active participation in the development of The Sunrise Valley S&T Park. Innovation center is established at Gediminas Technical University in order to develop commercialization of scientific research. Physics and IT with the strong tradition and biotechnology as a new topic are research strengths at Gediminas Technical. Vilnius University is very active in the biotechnology and lasers research.

Research institutes

State research institutes (Biochemistry, Biotechnology, Botany, Chemistry, Geology and Geography, Mathematics and Informatics, Physics, Semiconductor Physics). The Institute of Biotechnology has had a large influence on the emergence and development of the Lithuanian biotechnology sector. The research has been carried out for nearly 30 years. Three leading biotechnology companies are established in the vicinity of the institute. The institute is famous both for scientific research and co-operation with industry. The Institute of Mathematics and Informatics is research leader in IT and active participant in the innovation dissemination. They have a great number of spin-offs in IT. They are one of the co-founders of the new S&T Park (Visoriai). Institutes of Physics and Semiconductor Physics are together with the Institute of Theoretical Physics and Astronomy founders of the Vilnius S&T Park.

Research and co-operation with the industry are oriented on laser technologies and telecommunication.

- State research establishments (Forensic Medicine, Information Technology)
- University research institutes (Thermal Insulation, Experimental and Clinical Medicine, Immunology, Oncology, Theoretical Physics and Astronomy)

Chambers

Vilnius Chamber of Commerce, Industry & Crafts has taken over and still continues the traditions of a similar institution set up in Lithuania in 1924. Vilnius Chamber of Commerce, Industry & Crafts operates in the Eastern part of Lithuania where the State borders the Republic of Belarus and the Republic of Poland.

Other innovation support institutions

Vilnius S&T Park was established in 1993 by three research institutes (Institute of Physics, Institute of Semiconductor Physics, Institute of Theoretical Physics and Astronomy). The primary roles of the S&TP are to assist in the creation of new innovative companies based on promising technology (Program of Incubator) and to provide an interface between academia, research work and the commercial development. The S&TP scientific activities are focused on two main areas: material science and informational technologies. The new technologies and projects which the S&TP is pursuing are microelectronics, information technologies, opto-electronics, sensor systems, computer software and hardware, energy saving and environmental technologies. To encourage that type of activity, preferential conditions are created for transformation of distinctive groups into self-standing private companies. In addition the scientific level of principals have attracted a several private companies from outside. *Vilnius Business Incubator* has been established in 1998 as a joint project of the Ministry of Economy and the Neris business company. Neris provided the incubator with the 1000 m² for rental purposes. The Vilnius Business Incubator accommodates 25 companies.

Northtown Technology Park was established in August 2002 at the location of former Red Army's barracks. It occupies two buildings and refurbishment is undergoing, although some tenants have already moved in the incubator. Besides incubation services, Northtown is going to act as consultant and risk capital provider. Special emphasis is going to be given to IT and telecommunication.

Visoriai Information Technology Park has been established in November 2002. It is located in the vicinity of several research institutes. It has 17 shareholders, among which 14 are innovative companies. Primary interest is to host IT companies. Premises allocated to Visoriai are approximately 1500 m². First function of it is going to be incubation. Later it is expected to develop on 9 ha of future S&T Park's area. In the near future two additional Parks are going to be established: *Sunrise Valley and Biotechnology Science Park*.

Kaunas

Kaunas County is the geographical, educational, as well as industrial and transportation centre of Lithuania. The County comprises the city of Kaunas, the municipality of Birštonas, and the districts of Kaunas, Kairiadykiai, Prienai, Raseiniai, Kedainiai as well as Jonava District. The

County covers the area of 8.060 km², and its population numbers 703.200. It borders on Vilnius, Utena, Panevezys, Siauliai, Taurage, Marijampole and Alytus counties. The city is also located at the crossroads of the country's two major motorways. The A1 motorway Vilnius - Kaunas - Klaipeda is a connection between the capital city of Vilnius and the ice-free Klaipėda Seaport. The Via Baltica (road E67) leading from Estonia via Latvia to Poland will be integrated into the TransEuropean motorway system, serving as a connection between Nordic countries and Central and Western Europe. Some Districts of the Region, such as Jonava, Kedainiai and Kaunas, have been industrial centres for many years, with deep traditions in textile and fibre, electronics, chemical, wood processing and furniture industries.

Universities

- Kaunas University of Medicine
- Kaunas University of Technology (KUT) is national innovation support leader. Researchers are oriented towards applied sciences and implementation of scientific results. Since 1995 KUT is permanently developing innovation support structure. First, they have started with the Innovation center, that later initiated the establishment of the Business Incubator. Nowadays the Innovation center is going to be restructured into one of the university's department (Department for Innovation and Information). KUT also runs a corporate relations office in order to strengthen relation with industry. There have been a significant number of spin-offs.
- Lithuanian Veterinary Academy
- Lithuanian University of Agriculture (LUA) is one of the pioneers in Lithuanian innovation support development. It has established an university based Innovation center in 1992 in order to support commercialization of research results at the university. The Innovation center is still active and a Park of Agricultural Science and Technologies also exists at the LUA.
- Vytautas Magnus University is co-founder of the Kaunas S&T Park. Major research activities are concentrating on fundamental sciences and IT.

Research institutes

- State research institutes (Lithuanian Energy, Forest research, Agriculture); Almost 300 scientists are conducting research at Lithuanian Energy Institute. LEI is one of the co-founders of Kaunas S&T Park and one of the few truly active institutes in the innovation process.
- State research establishments (Architecture and Construction, Physical Electronics, Biomedical, Cardiology, Endocrinology, Food, Textile)
- University research institutes (Agricultural Engineering)

Chambers and Agencies

Kaunas Chamber of Commerce, Industry and Crafts was established in 1991. The organizational structure is of corporate character and consists of corporations of industry, trade, services, transport, construction, finance, innovation, SMEs, tourism and education. The Chamber's Innovation committee consists of innovative companies and is very active in promoting innovation. The hamber is also running an *Euro Info Centre*.

Kaunas Regional Association of Industrialists and Employers is regional member of LPK and it has one representative at the Kaunas University of Technology who is acting as a *Liaison* between science and industry.

Kaunas Regional Development Agency (KRDA) was registered in 2000. The founders of the agency are Kaunas County's Governor's Administration, Municipalities of Kaunas and Birštonas cities, Kaunas, Jonava, Kaišiadorys, Kėdainiai, Prienai and Raseiniai districts and NGOs: Kaunas Chamber of Commerce, Industry and Crafts, Chamber of Agriculture, Kaunas Technological University's Business Incubator, Kaunas Development Forum. KRDA's mission is to organize activities for sustainable and balanced Kaunas region development, linked to the National and European Commission regional development policy. KRDA's vision is to become an institution that consolidates and coordinates activities of scientific, technical-technological, creative, innovative, entrepreneurial potential and local governmental institutions of Kaunas region, implementing National regional development policy and stimulating sustainable and balanced Kaunas region development.

Other innovation support institutions

Kaunas Technology Centre (KTC) has been established under the initiative of Kaunas Innovation Centre and with the support of Lithuanian and German governments. KTC is specialized for hosting technologically advanced companies, mainly IT oriented. They have been active in the accommodation of companies, but starting with 2002 they organise different training programmes in co-operation with Kaunas University of Technology. In the 2003 KTC is going to be expanded to another location with some additional 3.200 m² of office space available for renting. The present location with 1.200 m² is aimed to be only for IT companies.

Kaunas Information Technology Park established by two universities, one institute and the Ministry of Economy is going to be located in the KUT campus area in the three existing buildings provided by KUT and Institute of Energy. It is supposed to have 4000 m² of an indoor area. Additional 0,5 km² is also planned to be park's area.

Klaipėda

Klaipėda is the second fastest developing city in Lithuania. Klaipėda offers the most northern ice-free Baltic seaport and the only year-round ice-free port in the eastern Baltics. Klaipėda County is situated in the west of the country. It comprises the Districts of Klsipeda, Kretinga, Skuodas and Silute and municipalities of Palanga and Neringa. The County's center is Klaipėda city. The Region's overall area amounts to 5.209 km², which accounts for about 8 % of the country's area. The Region borders on Latvia in the north, Curonian Lagoon and Baltic Sea in the west and Kaliningrad Region (Russian Federation) in the south. Within the country Klaipėda Region borders on Telsiai and Taurage Regions.

The County's population numbers approximately 400.000 which is 11 % of total population. Half of the residents live in Klaipėda. More than two thirds (72,4%) of the county's residents live in cities and 27,6% live in the countryside.

The specific features of Klaipėda County's economy are greatly influenced by the fact that Klaipėda is a seaport-city close to the biggest seaports of the Baltic - Kaliningrad (Russia) and Riga (Latvia). It is the most northern ice-free Baltic seaport and the only year-round ice-free

port in the eastern Baltics. Klaipeda is a large transportation junction that unites sea, land and railway infrastructure. The Klaipeda Free Economic Zone is a 2 km² industrial and commercial site. Today Klaipeda County attracts 12,6% of all foreign investments coming to Lithuania.

Universities

- Klaipeda University has been established in 1991 and is the youngest Lithuanian university. It is one of the co-founders of the Klaipeda S&T Park, which is under establishment. Major research activities are concentrated on Maritime engineering, Environmental engineering and IT. University has established very good professional relations with the Port of Klaipeda.

Chambers and Agencies

Klaipėda Chamber of Commerce, Industry and Crafts was established in 1996. It is a regional organisation representing interests of entrepreneurs and promoting business development in Klaipėda and Tauragė counties. The Chamber actively participates in different international programs and projects orientated to export, SME's, Human resources development, which will reduce economical differences between well and poorly developed districts of the county. Klaipėda Chamber of Commerce, Industry and Crafts closely co-operates with all the municipalities of the county considering different business development issues.

Klaipeda Economic Development Agency (KEDA) and Klaipeda Regional Development Agency are key attractors of FDIs and export promoters in Klaipeda region. Very good relationship is maintained with regional authorities, businesses and the Klaipeda University. One-stop-shop services for SMEs are available at KEDA.

Other innovation support institutions

Klaipeda University Technology Park is established and the process of refurbishment of buildings is going on. The Park will be located on the Klaipeda University's campus with an area of some 3.000 m².

5.5. Innovation policy developments

The political situation is stable in Lithuania and slight economic growth was evident. According to preliminary data, GDP growth in 2001 was 5.7%. Monthly average unemployment for the year 2001 was 12.5%. In January 2002, unemployment rose to 13.1%. Direct foreign investment has increased about 11%. Industry sales for 2001 increased to approximately 16.8%. During 2001 both exports increased by 20.3% and imports by 15.1%.

On 30 November 2001, the Statistics department announced the results of the survey, which covered the year 2000, on the use of information technologies in enterprises and organizations. According to this survey computer equipment had increased by 19%, as compared to the previous year. Moreover the survey found that on 1 January 2001, around 16.3% of employees used the Internet at work. One of the important changes in the Economy of Lithuania is the pegging of the national currency LTL to the currency of the EU's Euro, which took place on 1 February 2001. Previously the LTL was pegged to the US dollar. Starting from 2 February 2002, the official exchange rate of LTL to the € is 3.4528 LTL for

€1. This change in economic policy of Lithuania will, on the one hand, benefit those who deal with exports to EU countries. On the other hand, those, who make payments in US dollars, will be under risk of floating currency rates.

The Lithuanian Government took several actions affecting innovation development. However, the State's overall activity in the sphere of innovation does not show any significant changes. One of the more important general policy documents, affecting *inter alia* innovations, is being prepared – Lithuania's national strategy for the development of an information society. Although this draft has not yet been approved by governmental institutions and does not yet have the status of a normative document, it will surely be one of the most important policy documents in the field of innovation.

The list of Lithuanian Government measures presented on table 6.1.

Table 6.1

Code	Title	Start/ end dates	Old/new/ modified/ extended etc.
LT_01	National ACQUIS implementation programme, action plan for 2000	2000/2000	Extended
LT_02	Programme for modernisation of general education	1999-	Continued
LT_03	Programme of second stage of reform of territorial administration units	1999/2000	Continued
LT_04	Programme for development of co-operation in agriculture	1999/2000	Continued
LT_05	Main fields of activity of state research institutes	1998-	Continued
LT_06	Programme of reorganisation of tax legislation	1998/2000	Continued
LT_07	Governmental decree <i>On participation of Republic of Lithuania in EU training and education programmes 'Leonardo da Vinci II' and 'Socrates II'</i> .	2000	Extended
LT_08	Programme on innovations in business	2000-	Continued
LT_09	Law on Protection of Intellectual property in import and export of goods	2000-	Continued
LT_10	National ACQUIS implementation programme, action plan for 2001	2001	Extended by LT_13
LT_11	Strategic plan for the development of informative society	2001-	Continued
LT_12	Governmental decree <i>On participation of Republic of Lithuania in EU training and education programmes 'Leonardo da Vinci II' and 'Socrates II'</i> .	2001-2006	Continued

LT_13	National ACQUIS implementation programme, action plan for 2002	2002	New measure, superseding LT_10
LT_14	Measures for implementation of the Government's programme for 2001-2004	2001-2004	New measure
LT_15	Strategic guidelines and Measures for Development of SMEs till 2004	2002-2004	New measure

The most important state policy document affecting almost all the spheres of life in Lithuania were the measures for implementation of the Government's programme for 2001-2004. These set out specific measures to be taken till 2004, which relate to almost all action plan lines (fostering an innovation culture, establishing a framework conducive to innovation, etc.).

Important changes in the manner of strategic planning have occurred. The framework on strategic planning, approved by the Government of Lithuania established the main requirements for a strategic planning system, the principles on formation of strategic plans and the manner of formation of strategic plans in each economic sector. The sample documents on strategic planning in the IT sector have been annexed to this document. Special attention is given to the requirements on evaluation of the results of implemented measures.

In the field of small and medium-sized business development, the basic and most important policy document was approved by the Lithuanian Government on 13 July 2002 - the 'Strategic guidelines and Measures for Development of SMEs until 2004'. The development of small and medium-sized business sector was recognized as a priority. The improvement of SMEs competitiveness by creating favorable conditions for implementation of innovations and new technologies is given the status of a strategic objective. It is also a strategic aim to finish formation of basic links in the SMEs sector: institutional, informational and financial support structure and control. This document also contains the estimation of possible results of implementation of the specific foreseen measures.

The main challenges of the public R&D system in Lithuania are:

- (ii) to increase significantly flexibility in R&D financing instruments,
- (iii) to improve efficiency of R&D organizations,
- (iv) to upgrade the level of expertise (professionalism) in the management of public R&D funding,
- (v) to increase demand and need orientation among universities and research institutes, and
- (vi) to promote co-operation between industry and academia.

Current research and technology policies in Lithuania do not sufficiently reflect the importance and role of innovation as the primary source of competitiveness on the world market. A several papers on Science, Technology and Innovation policy¹ has been prepared, but little action has been taken or actions have not been fully consistent with the papers. The recently adopted Law on Higher Education and Science introduces some positive changes but overall innovation systems in Lithuania are marked by an absence of:

¹ The White book on Science and Technology, Ministry of Science and Education, Vilnius, 2001
V. Snitka Research, Technology, Innovation Policy and Knowledge Economy Growth, Kaunas, 2002.

- (i) meaningful goals,
- (ii) priorities for financial support (beyond the enumeration of selected themes),
- (iii) provision of instruments that explicitly support R&D activities, as well as
- (iv) a longer term vision of a National Innovation System. As a result, much of the research undertaken to date is irrelevant to the business community.

The environment for entrepreneurship remains weak in Lithuania, as networks for mentoring and funding of early-stage companies are still in early stages of development. Firms remain wary of outside involvement, from both local and international investors. Private investors often have little to offer beyond funding; strategic investors (i.e., larger companies) typically want complete control, leaving little role for the original management teams. Cross-firm collaboration in areas such as marketing, promotion and networking also remain limited. Activities of private sector associations and networking groups to address these problems remain limited – in both sector coverage and depth of activities – particularly beyond the IT/Telecom sector. Despite several actions related to innovation development, which were taken by Lithuanian Government, the major European Union policy document – the Commission Communication on “Innovation in a Knowledge-driven Economy” is little known to Lithuanian policy making bodies. Therefore it is difficult to evaluate any progress in attaining the objectives, set out in this document.

6. Major National Initiatives and documents

6.1. Political initiatives

The Lithuanian Governmental bodies took several actions, which impacted the ICT and innovation policy in Lithuania. On 4 October 2001, the Government of Lithuania approved the measures for implementing the Government’s Programme for 2001-2004 [LT_14]. It establishes concrete actions to be taken by state institutions in order to achieve the goals, set out by the Government’s programme. Among other things, it is foreseen to prepare a long-term strategy of developing Lithuania’s economy, to update the Programme on Innovations in Business and implement its action plan.

On 30 October 2001, the Government commissioned the Ministry of Economy to prepare, together with other ministries and state institutions, a long-term strategy for developing Lithuania’s economy. The Government has also approved the list of members for the Co-ordination commission in charge of preparing this strategy. It is important to note that the Director General of the Committee on developing an information society under the Government of Lithuania is a member of this commission

On 14 December 2001, the Minister of Finance of Lithuania signed financial memorandums on financing the second part of the National Phare programme for 2001. One of the programmes – innovation abilities, has received funding of €0.8m. This programme is aimed to strengthen institutional abilities necessary for innovation development in Lithuania.

On 21 December 2001, the Director General of the Statistics department under the Government of Lithuania approved the official statistics work program for the year 2002. Besides surveying innovation development in enterprises, it will also be conducting surveys on the use of information technologies in enterprises, state institutions and organisations. This data will be used for evaluating results of implemented measures, as taken by the Government of Lithuania.

In December 2001, the Government of Lithuania has made some amendments to the statutes on the Committee for Development of an Information society under the Government of Lithuania. The new functions relating to the fostering of innovation and policy making have been attributed to this Committee.

On 1 January 2002, the new Law on Profit tax entered into force. This law reduced the rate of profit tax for legal persons from 29% to 15%, which undoubtedly will make business conditions more favorable in Lithuania.

On 14 January 2002, the Government of Lithuania has adopted and approved the top priorities for the Government use of reserve funds. Another priority is to ensure further necessary improvement of business development conditions, the development of competitive agriculture and to increase employment. Furthermore, the development of an information society is also considered a top priority.

On 27 February 2002, the Government of Lithuania adopted the national ACQUIS implementation programme, action plan for 2002 [LT_13]. This action plan contains a list of regulatory and institutional measures in order to prepare the implementation of EU law in various spheres of public life, including innovations. A number of innovation-related measures are foreseen in the fields of industrial policy, SMEs, science and research, education and training as well as regional development.

On 27 February 2002, the Government of Lithuania established an inter-institutional body – the Commission for developing an information society. Besides the coordinating functions of this Commission, its aim is to foster technology innovations in other sectors of society (e-business, e-literacy, and other programmes).

On 5 April 2002, the Minister of Economy approved the Rules on allocation of funds for raising the competitiveness of business by fostering the introduction of innovations and new technologies. According to these Rules, funds may be granted for creating a strategic foundation for:

- a national innovation system;
- developing a co-operation between enterprises in implementing innovations;
- for implementation of measures from the section “Industry policy” of the National acquis implementation programme;
- for implementation of the PHARE project “Administrative skills of Innovations” 2001;
- for the creation of a legal framework for innovations. The funds may be granted for any type of commercial enterprises.

On 10 April 2002, the Minister of Economy approved the regulations on provision of some of these, especially electronic commerce, services of informational society in internal market. These regulations introduced some legal clarity in the provision of informational services by establishing the requirements for commercial information and for provision of information to customers and state institutions.

On 26 April 2002, the Minister of Agriculture approved several rules on subsidizing areas in agriculture – the rules on subsidizing the development of quality investigation system of agricultural products; the rules on subsidizing the organizing of conferences, seminars,

trainings, and agricultural exhibitions. These rules are aimed at the development of innovation in the agricultural sector.

On 30 April 2002, the Lithuanian Government approved the detailed plan for the development of an information society in Lithuania during 2002. It established the concrete specific measures to be implemented in fields of competence for the Lithuanian population; public administration; electronic business; Lithuanian culture.

On 6 June 2002, the Government of Lithuania approved the framework that set out the rules on strategic planning in any sphere of economy as well as samples of planning documents. This should help the strategic planning and evaluation of developments in any field of the economy, including the IT sector.

On 19 July 2002, the Government of Lithuania approved the strategic guidelines and measures for development of SMEs till 2004, which, among other things, include measures for developing the use of innovations and IT:

- in small and middle-sized business;
- for regional development of SMEs;
- improvement of legal and economic environment for SMEs (it was one of the first policy documents, which foresaw not only concrete measures to be implemented, but also expected results).

Despite several actions related to innovation development, which were taken during the covered period, the major EU policy document – the Commission Communication on “Innovation in a Knowledge-driven Economy” is little known to Lithuanian policy making bodies. Therefore it is difficult to evaluate any progress in attaining the objectives, set out in this document. The new policy measures are foreseen in a recent major policy document - Measures for implementation of the Government’s programme for 2001-2004 [LT_14]. One of the objectives, which bears relation to innovation culture, is the creation of such conditions in schools of general education, which would help prepare children for the information society. In order to achieve these aims, the Programme on Implementing Information and Communication Technologies in Education system will be prepared. This programme is intended to establish that 10 children should have at least 1 computer at school and all education institutions might use the computer networks. Teachers must be prepared accordingly.

Another important objective foreseen in the document discussed above [LT_14], is to prepare a Strategy for ensuring the lifelong learning and an action plan for its implementation. The Ministry of Education and Science and the Ministry of Social Security and Labour are responsible for the implementation of these tasks. The estimated term for implementation of this measure is the 4th quarter of 2002.

In order to promote investment, the Ministry of Finance has signed agreements on strategic investor status with all three mobile operators Omnitel, Bite and Tele2. Each operator committed to invest at least EUR 58 million in information technology infrastructure and to create at least 270 additional employment positions within a time frame of 3 years. The targeted operations have to cover GSM with integrated Internet services, data transmission services, digital signature infrastructure and other activities based on telecommunications and information technology.

6.2. State projects on the information society development

Customs computerization - Finance Ministry
National ID cards (smart cards)
Setting up of online tax administration system
Security system maintenance - Ministry of Interior
Health Administration Improvement through IT
Networking of banks, financial institutions & bank clearance system
Education & Research Network - knowledge economy
Integration of all National Registers
Land Records and Cadastral maps
Ministry of Labors and Social Security – National Employment System;
National State Pension Office
MIS for Ministry of Justice
Knowledge Parks and Incubation Centers
B2B & B2C Commerce – launch of e-banking
Library automation system

Beside the Governmental measures several, public initiated, National wide activities play an important role in information society and Knowledge Economy development in Lithuania.

6.3. Public activities

Innovation Relay Center Lithuania

The main aim of the project is to promote the ability of Lithuanian SMEs to adopt new technologies, and develop existing technologies utilizing the international co-operation instruments of EU. The activities include:

- organizing of training, information seminars, conferences and brokerage events;
- analysis of the technological demand of Latvian SMEs and publishing them in the EU IRC network;
- preparation and distribution of informative materials on possibilities for cooperation;
- with EU and candidate countries in the field of technology development;
- support for Lithuanian SMEs in preparing projects for EU and assistance in finding co-operation partners.

Public Internet Access Points in Lithuania

The Lithuanian Business Association “Window to the Future” in collaboration with Ministry of Education and Science 2000 implemented a project that was aimed at developing the Information Society, reducing social injustices in the area of information access, and making information technologies available to as many people as possible, especially in rural regions. In the first phase of the project, public Internet access facilities were established in public places in all parts of the country e.g libraries.

Computers with Internet connections were installed, and these were available for free to anyone who wanted to work with them. The project provided financing for the computer

equipment, as well as for the services of a qualified consultancy. The main focus in this programme was to ensure that local residents were widely involved in all aspects of the process. This project allowed the establishment of the public Internet access facilities and got people in various Lithuanian regions to access information, and it promoted the spread of the Internet and various information technologies throughout the country. Financing under the auspices of the project was awarded for the purchase of computer equipment, the installation of an Internet connection, and the operations of the facility for the first year.

Clusters development

In early 2002, the Lithuanian Knowledge Economy Forum signed a Memorandum of Understanding with the Municipality of Vilnius, Vilnius University, Vilnius Gediminas Technical University and confirmed the goals and forms of mutual co-operation in promoting the development of knowledge economy in Vilnius. The idea was to establish and develop clusters in Vilnius: Sunrise Valley, Biotechnology science park, IT Visoriai technology park.

Sunrise Valley will become an area of close co-operation between modern universities and research institutes, existing and new high technology companies. Vilnius University campus offers a favourable location for the cluster because of a large concentration of study and research and good development prospects. At present the following departments and organisations are based on Sunrise campus: Economy, Physics, Communications and Law Departments of Vilnius University, UNESCO Associated Centre of Excellence for Research and Training in Basic Sciences at Vilnius University, Laser Research Centre, Institute of Material Science and Applied Research, International Business School, Departments of Environmental Engineering, Fundamental Science, Construction and Business Management of Vilnius Gediminas Technical University, Centre of International Studies, Innovation Centre, Institute of Transport Studies, Research laboratories working in IT and other technology areas.

On the basis of the research institutions concentrated in the area and the competitive advantages of the city of Vilnius, the following business could be developed in Sunrise Valley: information technology, laser technology, semiconductor optical electronic technology, nanotechnology, environmental technology. The Biotechnology Science Park could be established in Paneriai district where all Vilnius' biotechnology research institutions and industrial companies are based. The Biotechnology Science Park will be based in the building of the Institute of Biotechnology. The aim of Biotechnology Science Park will be to promote progress in biotechnological industry.

National Cooperation

Knowledge Economy Forum was one of the initiators to launch "The National agreement to promote economic and social progress". The agreement was signed in 2002 by main political parties and non-government organizations. The Lithuanian public agreed that the most important objective during the next fifteen years is to achieve significant growth of the economy and social well-being that will result from a rapid increase of economic productivity and market competitiveness, creation of new jobs and the overcoming of poverty and social isolation. An essential objective is to increase the productivity of Lithuania's economy, which presently accounts for only 30 per cent of the EU average, so that within the next 15 years it would reach the present level of the EU. In order to achieve higher productivity and

competitiveness of the economy we need to significantly increase the role of knowledge in all key areas that generate GDP. We provided for the following long-term priorities:

- 1) to ensure that Lithuania's economy becomes a competitive knowledge-based economy, providing an abundance of knowledge-consuming jobs;
- 2) to adjust the system of education and science to knowledge society and to the European system of higher education and research;
- 3) to overcome poverty and social isolation;
- 4) to restructure rural areas by creating competitive agriculture, modern infrastructure and active business opportunities;
- 5) to reform the country's government by creating pre-conditions for the implementation of clear priorities.

Conclusion

The creation of an information society based on knowledge and innovative technologies remains a strategic objective and guideline for economic development. Lithuanian development strategy foresees to prepare a National Innovation Strategy and its implementation programme for the development of innovation processes. The objective is set to foster the speeding-up of innovation processes for the knowledge economy. The Measures for Implementation of the Government's Programme for 2001-2004 include the objective to ensure the long-term systematic development of science and technology in the Country. The Science and Technology development strategy should be prepared for the implementation of the said objective.

During the last few years specific policy steps were taken in order to foster the use of innovations and information technologies in business. However, strengthening of the research made by companies still does not have sufficient attention in Lithuania. *No measures have been introduced under this action line.* The Lithuanian Government continues to consider start-up of technology-based companies as an important area and focus for policy, but *no particular steps were taken in this field.* In Lithuanian innovation policy more emphasis is given to supporting existing technology-based companies, than to start-up's. Technology parks and innovation centres in Lithuania continue to be connecting links between science and industry. These institutions, specialised laboratories and centres of Universities are the sources for establishing centres of new enterprises (laser systems, biotechnology, IT, bio-energy etc...). However, *there is no system facilitating the interaction* between science institutes and private companies. Moreover, there is no special state system dispersing financial aid for the promotion of such interaction. The programme on innovation rests upon the objective to intensify the interrelations between science and companies. However, *no specific actions have been taken yet.*

The document 'Measures for implementation of the Government's Programme for 2001-2004' foresaw the specific objective in this field – to prepare the concept for development of science and technology parks and business incubators. It targets the creation of favourable conditions for co-operation between science and technology. This field gained the intensive attention. The major policy document of the state - Measures for implementation of the Government's Programme for 2001-2004 - embodied several policy objectives and actions to support the use and absorption of new technologies and know-how. One of the actions to be taken for implementation of this objective is the preparation of the concept on development of business incubators and technology parks.

The most important measure of this policy document is [LT_14], which aims to foster the introduction and implementation of innovations in all spheres related to the development of the country. In particular, the renewal and correction of the Programme on Innovations in Business should be focused on. The Strategic guidelines and Measures for Development of SMEs until 2004 have set up the middle-term vision for the development of SMEs. One of the perspectives of this vision is the introduction of new production methods and the increased use of information technologies. The creation of favourable conditions for implementing innovations and the use of new technologies is recognised as one of the strategic objectives. The concrete steps, which the Government has foreseen to take in order to achieve these objectives are the following: Modes for transferring business into an electronic environment have to be prepared; SMEs should be encouraged to participate in international innovation projects; SMEs should be encouraged to introduce and use electronic payment systems, to introduce information technologies, to use the recent achievements in science; and the growth of innovation in enterprises should be accelerated by giving state support.

Competitive National Innovation System requires that research institutions in Lithuania become more relevant to the demands of the business community; and that the disconnect between research, business and society at large be overcome. Linking Lithuanian Science and Technology with international research networks is one of important elements in this effort. Generally, innovation system will require a culture and opportunities for networking, both between businesses and institutions not only in Lithuania, but also outside of the country. Research institutions need to be reformed. The average age of researchers is around 55 years while the current incentive structure, both in terms of remunerations and personal recognition are such that few of the young and brightest today engage in a research career in Lithuania with troublesome prospects for Lithuania's research base. The resistance of academic community against the reform of the educational and research system based on competition is one of the main obstacles to the modern innovation system building.

Education system in Lithuania need to become much more relevant to a changing world requiring new and different competencies. This involves breaking down the walls between education institutions and between formal, non-formal and informal education. This will also require introducing life long learning opportunities from pre-school to retirement. In sum it requires a mind-set that puts the learner at the center of all efforts as opposed to the institutions.

The challenges are considerable in information infrastructure. They include, amongst others:

- (a) reforming of telecommunication regulations leading to increased competition;
- (b) improving access to telephone and internet for the population at large;
- (c) introducing e-government services for citizens; and
- (d) coordinating the various Government bodies that have a role to play in the information society. While this could be cause for concern, -- and clearly improvements will need to be strived for -- it should not distract policy makers from moving forward on the other important issues which constitute a truly knowledge-based economy such as education and Science&Technology.

The current institutional arrangements within Government to support an Information Society and the Knowledge Economy are fragmented. This will require rethinking to ensure efficient

coordination and implementation of Government efforts in this field. The challenge will consist in moving from the Digital Divide to the Digital Inclusion for poor families, remote communities and small enterprises. The recent “Window to the Future” Initiative to create the public Internet access points across the country funded by an association of private enterprise is a promising sign.

Compared to other countries of the Baltic and Nordic regions, Lithuania has the highest Internet connections fees and one of the highest fees for international calls – as shown in the table below. This is one of the main hindrances to the take off of the Internet and the ability of Lithuanian entrepreneurs and citizens to gain access to global knowledge and markets. The current ranking of Lithuania on the e-Europe + benchmarking, innovation policy, S&T policy benchmarking *is in the lower third of the group* of 13 candidate countries.

Annex I – Benchmarking

Category	Description	Stage
Network	Information infrastructure	3.5
Access	Internet availability	3.5
	Internet affordability	3.5
	Network speed and quality	3.0
	Hardware and software	3.5
	Service and support	3.0
Network	Schools access to ICTs	3.5
Learning	Enhancing education with ICTs	3.5
	Developing the ICT workforce	3.5
Network	People and organizations online	3.5
Society	Locally relevant content	3.5
	ICTs in everyday life	3.0
	ICTs in workplace	3.0
Network	ICT employment opportunities	3.8
Economy	B2C electronic commerce	3.0
	B2B electronic commerce	3.5
	e-government	3.5
Network	Telecommunications regulation	4.0
Policy	ICT trade policy	3.0
	Average:	3.4

Source: Self assessment 2001 e-SEEurope, Version: 9 May 2001 by eSEEurope and Data on Lithuania on ITC teams assessment.

Annex II - Knowledge-Based Economy Indicators

1. Network Access

1.1. Information infrastructure

- Telephone penetration (number of mainlines per 100 people)
31,29 (Source: Lietuvos Telekomas, 2001)
- Mobile wireless penetration (%), growth trend
more than 50% yearly growth trend (2000/2001)
- Total number of mobile telephone subscribers
932 thousands (Sources: Association Infobalt)
- Total number of mobile telephone subscribers per 1000 people
250 (Source: Department of Statistics, Lithuania)
- Wireless penetration (percentage of the population), growth trend,
more than 40% (Association Infobalt, 2002)
- Total number of cable TV subscribers
500,000 (Association Infobalt, 2002)
- Cable TV subscribers, % of households
45% (Association Infobalt, 2002)

1.2. Internet availability

- Total number of ISP providers

54 (Association Infobalt, 2002)

- Prevailing types of ISPs' networks (microwaves/radio...)

most of the competing ISPs' networks are built on fixed line Lithuanian Telekomas networks. Cable television and wireless GPRS connection is a new growing area.

- % of unsuccessful local calls

N/A

(Data not to be disclosed by Lietuvos Telekomas)

- Is there competition among ISP providers?

The total number of ISP operating in Lithuania is approx. 54. Competitors are significantly constrained by the telecommunications monopoly in Lithuania. Public fixed network is under Lietuvos Telekomas monopoly until January 2003. After the Lietuvos Telekomas monopoly, the situation is expected to change. Internet prices may drop thanks to lower network operating costs, but not significantly, since the Internet services market is already competitive.

- What are the opportunities for public Internet access (libraries, Internet-cafes, etc.)?

Large libraries offer their information online. Some, including the Lithuanian National Library, the Library of Academy of Sciences, Universities libraries have special Internet classrooms. Internet cafes have been in operation in Lithuania since 1995. A particular initiative is the Public Internet Access Points, which business associations initiated with Government in 2001.

Internet access facilities – mostly in libraries and local government buildings – were provided with computers and Internet connections.

Schools are another place where Internet access is provided in the countryside.

Schools often have computer classrooms with Internet connections that were set up under the auspices of the Latvian Education Informatization Project.

The Local Government Information Systems Program also involves the installation of connections in local government institutions, libraries and schools.

- Are there dedicated line lease possibilities? Are there competing providers?

Since the fixed network is under Lietuvos Telekomas monopoly, there is only one leased line provider until January 2003. Both national and international digital leased lines are available (9.6 Kbps-155 Mbps). Internet development and prices are considerably influenced by Lietuvos Telekomas monopoly on leased lines. Companies including national energy company Lietuvos Energija, railroad, radio and television centres and a few private emerging datacoms have the basis to create competition after the monopoly ends.

Competition will appear in long-haul communications and in last-mile markets in cities.

1.3. Internet affordability

- What are the prices of Internet access (unlimited access, per minute charge)?

Description	Tarrifs
Public voice telephony tariffs	
Residential rental charge (Eur/per month)	5.5
Business rental charge (Eur/per month)	6.9
Local call charge, 3 min. (E-cents)	13.0
Local call charge, 10 min (E-cents)	35.5
Long-distance call charge, 3 min. (E-cents)	38.2
Long-distance call charge, 10 min. (E-cents)	119.3
Incumbent operator leased lines charges (EUR)	
Leased line 64Kbit/s, 2km national circuit	1.674
Leased line 2Mbit/s, 200km national circuit	26.78
Leased line 2Mbit/s, 200km international circuit	107.24
Internet access cost (EUR)	
PSTN fixed charge	5.5
PSTN usage charge - 20 hours	41.9

Total cost for 20 h peak time	47.4
PSTN usage charge - 20 hours, of-peak time	17.6
Total cost for 20 h off-peak time	23.1
Total cost for 40 h peak time	75.5
Unlimited access (DSL connection)	70-80

Source: ECSC-EC-EAEC, Brussels - Luxembourg (2002)

- Is it affordable for majority/minority (compare with average salary/income)?

Compared to average Lithuania population's income, the prices are high, even for population with highest income. An increase in service use can be expected as the income and need for information will growth.

- What are the rates for leasing lines?

Rates for national digital leased lines, range from 1.7 Eur/month 64Kbps to 107 Eur/month for 2 Mbps regardless of distance.

- Are the rates affordable for small businesses or individuals?

Prices of digital leased lines are too high and unacceptable for the most businesses and individuals. This is the main reason why wireless networks are popular. At the moment DSL services are available in cities from the monopoly Lietuvos Telekomas. These services are significantly lower priced and thus more popular than leased lines.

1.4. Network speed and quality

- What is the percentage of successful calls?

*High
(Exact data not to be disclosed by Lietuvos Telekomas)*

- What is the quality of voice connection?

High

- How many faults are reported per year for each 100 telephone mainlines?

N/A

- How long it takes to clear faults (48 hours, a week, month)?

*48 h(90% faults)
(Source:Lietuvos telekomas, 1st-2nd quarter, 2002)*

- Which services are supported by local telecommunications infrastructure: e-mail,high-speed modem connection, what is the maximum speed?

E-mail services are available either from ISPs or content providers (portals) for free. Most of

the ISPs support analogue modem speeds up to 56 Kbps and ISDN up to 128 Kbps. Internet connections are available at speeds up to 1 Gbps.

- Are there sufficient backbone facilities/networks? Even for peak demand?

Mostly yes. New last mile providers are emerging. However there are problems with long-haul broadband connections in rural areas.

- What is the percentage of packet loss by the network?

*Typically packet loss is less than 1%
(Source: Association Infobalt, 2002)*

1.5. Hardware and software

- Are there local IT hardware/software sales points?

Yes, more than 100 local hardware/software companies offer their products at sales points.

- Is the price of IT hardware/software affordable for majority/minority of citizens/businesses?

For the last 2-3 years the price for hardware has dropped dramatically. PC and networking hardware, especially of Lithuanian origin is of affordable price to businesses and citizens (for example, price of locally assembled PC is about the one month salary). Several Lithuanian companies offer original software, mostly accounting and office management systems, localization tools, which are an affordable price to businesses. The software from leading international companies (eg., Microsoft, Oracle) is still quite expensive.

- Is there software in local languages?

Yes. Both original software produced by Lithuanian companies, as well as localized versions of International products, for example MS Windows, MS Office.

- Is software imported or adapted locally? (percentage of the imported, adapted, produced locally hardware or software in total number in circulation)

Both.

- Is there a broad variety/some/very few software business applications?

There is a broad variety of software business applications. Most of the international products are presented in Lithuania. Local companies provide their original business applications, which are used not only in Lithuania, but also exported to other countries.

- Are the IT software/hardware retail and wholesale markets competitive and vibrant?

IT software/hardware market has grown rapidly during the last 5 years

Lithuania : Global trade in ICT products (Value US\$ million)

	1998	1999	2000	2001
Total imports	338	264	274	362
Total exports	145	125	169	186
Trade deficits	-193	-139	-105	-176

Source: ITC/PCTAS database & Lithuania Trade Statistics Department, 2001

Lithuania: Global Export of ICT products (Value US\$ million)

Product category	1998*	1999*	2000*	2001*
Electronic components	81	77	115	122
Electronic data processing	12	9	13	19
Office equipment	1	1	1	2
Telecommunication	13	8	5	7
Other components	24	21	23	21
Scientific equipment	13	11	12	15
Total	145	125	169	186

Source : ITC/PCTAS database 1996-2000

*Source: Lithuania Trade Statistics Department, 2001

Lithuania: Global import of ICT products (Value US\$ million)

Product category	1998	1999	2000	2001
Electronic components	51	44	45	55
Electronic data processing	89	86	92	117
Office equipment	12	7	7	7
Telecommunication	99	58	68	91
Other components	54	38	37	60
Scientific equipment	33	31	25	32
Total	338	264	274	362

Source : ITC/PCTAS database 1996-2000; Statistics Lithuania 1998-2001

Lithuania: Market for ICT Products (Euro million at constant 2000 exchange rates)

	1999	2000	2001	2000/01
				%
Server systems	9	13	13	0.4
Workstations	1	1	1	-16.8
PCs	35	30	34	11.1
Add-ons	10	11	11	6.0
Computer hardware	55	55	59	7.0
Copiers	3	3	3	1.2
Other office equipment	9	10	11	7.5
Office equipment	12	13	14	6.1
Mobile telephone sets	12	20	32	55.1
Other end user communications equipment	21	22	23	5.0
End user communications equipment	32	42	55	29.1
LAN hardware	7	8	9	7.1
PBX, key systems and circuit switching equipment	46	49	48	-1.8
Cellular mobile radio infrastructure	48	71	82	15.5
Packet switching and routing equipment	12	14	16	11.9
Other datacom and network equipment	21	24	28	14.6
Datacom and network equipment	134	137	183	9.6
Total ICT equipment	233	278	311	11.9
System software	9	10	11	15.6
Application software	12	13	15	13.1
Software products	20	23	26	14.2
IT services	35	40	44	10.2
Telephone services	192	204	214	5.0
Mobile telephone services	118	159	187	18.1
Switched data and lease line services	6	8	10	18.1
CaTV services	9	12	14	19.5
Carrier services	325	382	425	11.2
Total ICT	614	723	806	11.5
Total IT	152	166	182	9.7
Total telecommunications	462	557	624	12.0

Source: European IT Observatory, 2002

1.6. Service and support

- How long is the waiting period for telephone line instalment ? (total number of those on the waiting list; waiting period: days, weeks, months, years)

Average period for telephone line installment from the moment of application:

8-10 working days for residents,

4-8 working days for corporate business

(Source: Lietuvos telekomas, 2nd half, 2002)

- How long is the waiting period for reported telephone line problem to be fixed? (minutes, hours, days and etc.)

2 working days (90% faults)

(Source: Lietuvos Telekomas, 2002)

- Are there software developers, web designers, network administrators and other technical personnel, and how many (working where, employed/ unemployed)?

In telecommunication sector 8700 employees (0.9% from all the employees)

In Computers and computer related operations: 5200.

2. Networked Learning

2.1. Schools' access to ICTs

(Source – Ministry of Education and Science, 2002)

- Are there computers in schools? How many students per computer? On which level (university/secondary/primary)?

	<i>Secondary and primary</i>	Universities
<i>Number of schools</i>	2270	19
<i>Number of computers in schools</i>	23 000	
<i>Number of schools with computer labs</i>	N/A	
<i>Number of computers per school</i>	11	
<i>Number of students</i>	814, 000	116,000
<i>Students per computer</i>	35	
<i>% of schools with computer labs</i>	N/A	

- Who has access to computes (technical staff/faculty/students)?

In 90% of schools students have access to computers.

- What is the quality of hardware (386/486/Pentium...)?

Pentium or equivalent.

- Are there LANs in schools? Regional WANs? National school networks?

Mostly yes. The Lithuanian Science and Education Ministry program has allowed many schools to obtain computers and Internet connections. A national connection to the European GEANT academic network, which is administered by Litnet, has been established.

LANs are mostly Windows NT based, but there are also Unix, Linux LANs.

Regional WANs are built around Lithuanian Educational Information System

Regional support centres

- Do schools have Internet connectivity? Is it dial-up or through a leased line, wireless?

75% of schools use the Internet. 25% use permanent Internet connection.

2.2. Enhancing education with CTs

- What are the computers used for? What is the level of computer literacy/skills?

Various training programmes for teachers were designed in the framework of Computer Literacy program. In 2001 these programmes were tied with the content of the European Computer Driving Licence (ECDL), taking into account the specific needs of teachers. ICT trained teachers make about 60% of total number of teachers in Lithuania

- What is the level of information and communication technologies integration in the curriculum?

The teaching aids have been developed for different disciplines. Using these materials together with original software ensures that approx. 25% of the secondary school program can be taught in a computerized way. In some disciplines, e.g., Latvian language and mathematics, this percentage reaches 75% of the whole syllabus.

2.3. Developing the ICT workforce

- Are there training opportunities for programming, maintenance, and support?

There are 21 training and skill upgrading facilities in Lithuania. There are also 5 software technology parks and testing and certification facilities.

- Who is offering them (public/private centres)?

Both public and private universities, as well as private companies are offering higher professional education and specialised courses in ICT.

- Are they affordable for majority/minority of the population?

ICT education is affordable for majority of the population.

- Is there an on-line training available?

Yes. Several universities offer this possibility including distance Learning center with video conferencing facilities.

- Do employers offer training?

Yes.

3. Networked Society

3.1. People and organisation online

- What the percentage of the population:

Is aware of Internet existence?

70%

Has used Internet recently?

40%

Uses Internet regularly?

21% of the economically active population

(Source: Infobalt Association, 2002)

- What is the structure of users by gender, age, social and educational status?

N/A

- What is the number locally registered domain names (per 1000 people)?

3.5

(Source: Infobalt Association, 2002)

- Is there advertising for online companies, and how common is it?

Online advertising market is one of the fastest growing market.

3.2. Locally relevant content

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

Many

In local languages?

Most

- How often are they updated and is content static or dynamic?
Biggest and most popular sites are updated daily and content is dynamic.

- Are the above web sites created in the community?

Yes.

- Are bulletin board systems, Usenet groups, newsletters, and/or listservs in use?

Yes, widely

- Are there opportunities for Web-related training?

Yes

3.3. ICTs in Everyday life

- Does population include information and communication technologies (phones, faxes, pagers, computers) in everyday life?

Yes, widely.

- Are there phones, wireless phones, digital assistants, 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.)

They are being used regularly among the active Information Society members. Percentage of households using these devices and services is increasing. There large number of online banking users. Chatting is also becoming popular, particularly among young people.

- Are there PCs with e-mail capability available (cyber cafés, telecentres) and are they being widely used?

There are several internet cafés, and the number of users of them is growing, although the main place to use PCs is at work, schools and at home.

3.4. ICTs in the workplace

- Do employees have:

(Un)limited access to phones?

Mostly unlimited access for the work purposes. Depending on the sector and region there are some limitations.

Personal e-mail accounts?

Mostly every employee has an e-mail account, if he or she has computer and Internet access. Depending on the sector, occupation and region there are some limitations.

Internet access from personal workstations?

Mostly every employee has Internet access, if he or she has computer and Internet connection. Depending on the sector, occupation and region there are some limitations.

E-mail and web addresses on business cards?

This is as typical as having a phone number on a business card.

- What percentage of businesses and government offices has computers, how many of them, how many employees use them?

Nearly 100% of Government and business offices have at least one PC for communications and office work.

- Are they networked?

Almost all of them.

- Is business mostly conducted in person or by e-mail, or are there data sharing, enterprise, reporting, transaction, and research applications? How intensively are they used?

In most e-mail is the main means of communication both between employees of the same company, as well as for communication between different companies.

The large corporate companies as a practice have ERP and other advanced data management and sharing applications. Also company intranets are common.

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

Company managers from both large corporate and SME sector see ICT applications as an efficient tool for increasing productivity and reducing costs. The major ICT system applications are in universities, RTD sector, banking and finance, communications and utilities, as well as services sectors.

4. Networked Economy

4.1. ICT employment opportunities

- Are there opportunities for technically skilled workers within the country?

Yes. ICT skilled people are in the highest demand and their salary averages are amongst the highest in the country.

- Are companies from outside of the country investing in IT related projects?

Most international ICT brands like Microsoft, HP, Siemens, IBM have invested in IT related projects both in public and private sectors in Lithuania.

- What is the portion of knowledge workers and information related business in the economy? (percentage of labour force, percentage of GDP)?

See page 82-83.

- Are businesses considering IT in their strategies?

IT strategy normally becomes part of company's overall strategy.

4.2. B2C electronic commerce

- Do local businesses have websites and how many? Is content current or static?

About 28% of companies with more than 10 employees have website (end of 2002)

- Are there online B2C transactions, or are transactions mainly oral and/or paper-based, phone or fax-based?

There are online transactions, which are possible without any paper-based activities.

- Is online retail noticeable component of the overall commercial activity?

Online retail is not significant part of overall commercial activity.

4.3. B2B electronic commerce

- What are the sources of market information, are they sufficient for providing transparency?

Yes, there is a national e-commerce concept publicly available, statistics and advice are available from ministries, statistics bureau and Internet association. The Internet is also increasingly becoming an important source of market information

- Are there online B2B transactions, or are transactions mainly oral, paper-based, phone or fax-based?

Yes, there are B2B transactions, mostly conducted via Internet banking.

- Can transactions be conducted online without any paper documents? Is the process automated? Does it allow online tracking, monitoring?

Transactions are mostly conducted without paper documents, however often initial paper based agreement is required to establish completely automatic and electronic cooperation.

- What portion of B2B activity is conducted on line? Is there gain in efficiency?

There are no official statistics available about the percentage of all transactions performed online. The general trend is that B2B transactions are increasing. There is gain in efficiency, since the transaction volume is continuously growing.

4.4. E-Government

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

Most of the government institutions have websites, containing information about functions and services. Many have information not only in Lithuanian, but also in English. Information is updated regularly.

- Is there online interaction between government and citizens, or is interaction mainly oral, paper-based, phone or fax-based?

On the ministerial level there is high level of interaction online, while on municipal level interaction is mainly paper and phone-based. It is planned to adopt the law on electronic documents in the nearest future

- Is there online interaction between government and suppliers and contractors, or is the interaction mainly oral, paper-based, phone or fax-based?

Yes, it is interaction on-line already.. Most Ministries on the Websites has a chapter about procurement where it is possible to download applications, etc. It is planned to adopt the law on electronic documents in the nearest future.

- Is it possible to download applications from the websites?

Yes, it is possible to download tax and customs declarations and other documents.

- Can citizens apply for permits, licenses, and taxes on line?

In some cases.

5. Network Policy

5.1. Telecommunications regulation

- Is liberalisation of telecommunications sector planned or implemented?

To begin on January 2003.

- Is there competition between telecommunications service providers?

There is a competition among mobile telecommunication operators.

- Is broadband Internet access offered?

Yes.

- Is regulation set and enforced by an independent body?

Yes, by regulator – Lithuania's Communications Regulatory Authority (CRA).

5.2. ICT trade policy

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

There are at present restrictions for offering fixed communication services, frequency selection for mobile communications. Other ICT service sectors do not have any specific restrictions.

- Are there restrictions in the service (including information services) sector?

There are no restrictions for trade in service sector. The trade policy is in line with the international norms.

- Are there disproportional taxes on electronically delivered services?

The tax regime is the same for electronically delivered services.

- Is Foreign Direct Investment in IT sector existent, and is it encouraged, discouraged, restricted?

Foreign direct investment in IT sector is encouraged by favorable investment regulations. Figure of FDI in IT sector for recent years are presented in following table:

Cumulative FDI by Sector (as of April 1, 2002)

Sector	Sum (US\$ million)	% of total sum
Manufacturing	674.9	24.8 %
Wholesale and retail sale	525.0	19.3 %
Financial intermediation	560.2	20.6 %
Post and telecommunication	404.8	14.8 %
Other activities	557.1	20.5 %

*Source: Lithuanian Department of Statistics 2002 * LDA info (Including full cost of Telecom acquisition)*

6. Media

6.1. Radio, TV and newspapers

- Number of Radio and TV stations, newspapers, the size of audience/circulation

Media	Number of broadcasting companies	Total length of programmes (hours)
TV	23	N/A
Radio	40	N/A

Newspapers	2002
<i>Number of titles</i>	80
<i>Single circulation (thous. copies)</i>	N/A
<i>Annual circulation (million copies)</i>	N/A

6.2. Employment in the media

- Number of employees in the media

Number of employees	2001
Production of magazines and other periodicals	2530
Production of Newspapers	2300
Radio and TV	1760
News agencies	128
Total	6718

Source: Department of Statistics, Lithuania

- Trend: is the number increasing/decreasing?

The general trend is that the media business is developing in Lithuania and thus the number of employees in this sector is gradually increasing as well

7. Intellectual Capital

Source: Patent office of Lithuania

7.1. Patents

- What is the number issued per annum?

Year	2000	2001
Granted patents	148	128

- What are the trends?

The number of patents issued remains rather stable.

7.2. Copyrights

- What is the number issued per annum?

N/A

- What are the trends?

N/A

Copyrights are not registered by state institutions, thus statistics are not available. The copyrights are protected by legislation and relevant international treaties.

7.3. Licenses

- What is the number issued per annum?

Registered License Agreements

	2000	2001
Of inventions	126	123
Of industrial design	106	85
Of industrial design	4	2

- What are the trends?

The general trend is that the amount of license agreements issued per annum is increasing

7.4. Trademarks

- What is the number issued per annum?

	2000	2001
<i>Registered trademarks</i>	2500	2355

- What are the trends?

The amount of registered trademarks is fluctuating, yet is slightly increasing.

7.5. Scientific and/or tech associations

- List with a brief profile

There are a large number of associations and other non-governmental organizations operating in Lithuania. Below is a list and brief profile of those that are most directly linked with development of knowledge-based economy.

IT Trade and Industry Associations in Lithuania

<p>Association of Information Technology, Telecommunications & Office Equipment of Lithuania (INFOBALT) Vokieciu G. 28/17-16 2001 Vilnius Lithuania Tel. : +370 5 262 26 23 Fax : +370 5 262 26 29 Email: office@infobalt.lt Website: www.infobalt.lt</p>
<p>International Chamber of Commerce Vokieciu str. 28/17, LT-2001 Vilnius, Lithuania Tel. : +370 5 212 1111 Fax : +370 5 212 2621 e-mail : r.volungevicius@tprl.lt</p>
<p>Association of Lithuanian Chambers of Commerce, Industry and Crafts J. Tumo-Vaizganto str. 9/1-63a LT-2001 Vilnius Lithuania Tel. : +370 5 261 21 02 Fax : +370 5 2 61 21 12 Website : http://www.chambers.lt</p>
<p>National Association of Business Administrators Gedimino pr. 38/2, LT-2600 Vilnius Tel.: (370 5) 2617 174; Fax: (370 5) 2616 674 E-mail: nvaasoc@iti.lt</p>
<p>Association of Investment Companies Juozapaviciaus 6/2, LT-2686 Vilnius Tel.: (370 5) 2425 571; Fax: (370 5) 2725 685 E-mail: invalida@aiva.lt</p>
<p>Association of Retail Trade Enterprises Vienuolio 8, LT-2600 Vilnius Tel./Fax: (370 5) 2312 522 E-mail: zizysg@takas.lt</p>
<p>Investors' Forum c/o AB Lietuvos Telekomas Lvovo 21a, Room 303, LT-2726 Vilnius Tel/Fax: (370 5) 2755 258 www.investorsforum.lt E-mail:investors.forum@takas.lt</p>

Source: ITC Project File

Chambers of Commerce and Industry in Lithuania

<p>International Chamber of Commerce Vokieciu str. 28/17, LT-2001 Vilnius, Lithuania Tel. : +370 5 212 1111 Fax : +370 5 212 2621 e-mail : r.volungevicius@tprl.lt</p>
<p>Association of Lithuanian Chambers of Commerce, Industry and Crafts J. Tumo-Vaizganto 9/1-63a, LT-2600 Vilnius Tel.: (370 5) 2612 102; Fax: (370 5) 2612 112 www.chambers.lt E-mail: info@chambers.lt</p>
<p>Confederation of Lithuanian Industrialists Vienuolio 8, LT-2000 Vilnius Tel.: (370 5) 2225 217; Fax: (370 5) 2225 209 www.lpk.lt E-mail: info@lpk.lt</p>
<p>Vilnius Chamber of Commerce, Industry and Crafts Algirdo 31, LT-2600 Vilnius Tel.: (370 5) 2235 550; Fax: (370 5) 2235 542 www.cci.lt E-mail: vilnius@cci.lt</p>
<p>Kaunas Chamber of Commerce, Industry and Crafts Donelaicio 8, LT-3000 Kaunas Tel.: (370 37) 229 212; Fax: (370 37) 208 330 www.chamber.lt E-mail: chamber@chamber.lt</p>
<p>Siauliai Chamber of Commerce, Industry and Crafts Vilniaus 88, LT-5400 Siauliai Tel.: (370 41) 525 504; Fax: (370 41) 523 903 www.rumai.lt E-mail: siauliai_cci@siauliai.omnitel.net</p>
<p>Klaipeda Chamber of Commerce, Industry and Crafts Danes 17, LT-5800 Klaipeda Tel.: (370 46) 410 625; Fax: (370 46) 410 626 E-mail: klaipeda@chambers.lt</p>
<p>Panevezys Chamber of Commerce, Industry and Crafts Respublikos 34, LT-5319 Panevezys Tel.: (370 45) 463 687; Fax: (370 45) 462 227 www.ccic.lt E-mail: panevezys@chambers.lt</p>

Source: Lithuanian Development Agency

Activity priorities of the Association INFOBALT

Definition and representation of the position of the Association members concerning key issues of the information technologies and telecommunications (hereinafter – ITT) market and information society development (hereinafter – ISD).

ITT and IST events, exhibitions and conferences in Lithuania.

ITT and IST events, exhibitions (joint stands) and conferences abroad.

Infobalt activity promoting exports (informing the members on partners, inquiries, training programs, competitions, teaming of business delegations, their exchange programmes, etc.)

Representation of the Association members in international organisations.

Representation of the Association members in public authorities and public organisations, work groups and projects in Lithuania.

Infobalt public relations (press conferences and press releases), cooperation with the mass media. INFOBALT INFORMATION ALLIANCE with the Lithuanian and foreign mass media (NK, INFOTEKA, NK TV, VEIDAS, UKININKAS, KOMPIUTERIJA, BALTIC IT & T Review, KULTUROS BARAI, etc.).

Shaping of the public opinion and assistance to the public in developing its skills with regard to ISD issues, dissemination of ITT market data through the Lithuania mass media.

Events for the Association members (seminars, tourist jamborees, parties, go-karting matches, general meetings, VIP club).

International projects implemented by the Infobalt: BSP, Telebalt, copyright protection projects.

Participation of the Association in development of new international projects: advice to the members, training programmes, development of their skills necessary for the implementation of international projects, funding of business missions.

Founding of international representative offices of Lithuanian ITT enterprises or initiation of founding at the national level.

Active participation in promotion of the development of the ITT business incubators in Lithuania.

Educational projects aimed at fostering ISD, partnership of business, science and public authorities, and supporting the youth (championships of programmers, sponsorship of educational broadcasts, LAN party – a joint initiative of the Infobalt and the Ministry of the National Defence, Internet Robinsons, etc.).

Infobalt e-conferences („c-info“, „c-members“, etc.), topic-specific Internet rubrics for the Association members (proposals, calendar, etc.), updating of the web page www.infobalt.lt, topic-specific inquiries, proposals submitted to the members electronically.

Publishing activity of the Association (INFOBALT Time, Infobalt catalogue, catalogues of exhibitions, etc.).

Conducting and publication (for the members) of market surveys (quarterly), drawing up and analysis of new questionnaires, publication of the ITT market data in the mass media.

Consultations of the Association members on issues of copyright.

Infobalt educational initiatives related to copyright.

Infobalt publication devoted to the copyright issues. Software catalogue.

The **Lithuanian Council of Science** is a collegial body of researchers that deals with science and research problems within the country. The Council was founded in accordance with the decision of the Council of Ministers in July of 1990.

The Latvian Council of Science:

- makes conceptual proposals on science and technology policy for the Cabinet of Ministers and the Ministry of Education and Science;
- defines priorities for the development of science and research areas;
- proposes the draft of the state science budget for the current year;
- elaborates on projects for decisions and legislative acts aimed at developing the organisational and financing system for science and research;
- organises the evaluation and funding of basic and applied research projects;
- promotes co-operation and integration between research institutes and higher education institutions

Lithuanian Association Business Incubators

The main objectives of LABI are:

- to create permanent links among all the business support structures in Lithuania;
- to raise the qualification of the members of the LABI;
- to represent and to protect the interests of its members at various governmental and non-governmental institutions and organisations
- to create an information network to support technology-oriented SMEs;
- to promote the establishment of new business support structures;
- to support technology transfer and innovation;
- to create contacts and participate at various different international and regional associations;
- to cooperate with self-governmental and local authorities, science and research centres;
- to publicise the LABI and the activities of its member, etc.

8. Education

8.1. Higher education

Source: Ministry of Education and Science

- Total number of high education establishments (public/private)

	1999	2000	2001
Public	15	19	22
Private	1	7	13
Total	16	26	35

- Total number of students (total average per annum, in the private and in the public sector)

Number of students

	1999/2000	2000/2001
Public		
Private		
Total	97 083	115 178

- Prevailing specialisations (distribution of students among the fields)

Study field % of all students

	<i>Academic year 2001/2002</i>
<i>Social sciences</i>	29
<i>Pedagogy</i>	7
<i>Engineering & technology</i>	21
<i>Nature sciences & mathematics</i>	23
<i>Humanitarian sciences</i>	12
<i>Health & health care</i>	3
<i>Other</i>	5

- Cumulative number of population with higher education degrees (total and in science and technology fields)

	2001
<i>Number of people with higher education</i>	388 500
<i>Total number of people 15 years and older</i>	2 800 385
<i>Percentage of people with high education (15 years and older)</i>	15%
<i>Number of R&D personnel</i>	5130

Enrollment by level of education

	1996	1997	1998	1999	2000	2001
Total	772260	804298	832761	860200	875306	885175
males	387700	405466	419968	433719	442017	447979
females	384560	398832	412793	426481	433289	437196
Pre-primary education level (level 0)	87137	91287	93645	93444	87959	88533
males	41723	43746	45050	44662	42162	42118
females	45414	47541	48595	48782	45797	46415
Primary education level (level 1)	222724	222278	219661	218181	211650	197463
males	107315	107738	106422	106220	102747	95875
females	115409	114540	113239	111961	108903	101588
Lower secondary education level (level 2)	251434	263653	273405	322885	332097	336096
males	121614	126971	131236	156455	159890	161245
females	129820	136682	142169	166430	172207	174851
Upper secondary education level (level 3)	122941	126079	133546	98235	100957	106734
males	64259	65467	69136	49523	51499	53999
females	58682	60612	64410	48712	49458	52735
Post-secondary-non tertiary education level (level 4)	4379	4630	5085	5551	6720	7561
males	3223	3449	3668	3767	4383	4795
females	1156	1181	1417	1784	2337	2766
First stage of tertiary education level (level 5b)	24869	29303	32887	37559	36783	31498
males	16473	19378	21405	24240	23564	19928
females	8396	9925	11482	13319	13219	11570
First stage of tertiary education level (level 5a)	57488	65592	72657	82322	97083	115178

males	32504	38000	42079	47739	56633	68812
females	24984	27592	30578	34583	40450	46366
Second stage of tertiary education level (level 6)	1288	1476	1875	2023	2057	2112
males	589	717	972	1113	1139	1207
females	699	759	903	910	918	905

Enrollment rates ¹(in per cent)

	1996	1997	1998	1999	2000 ²	2001
Pre-primary education (level 0)						
Gross	41.7	46.7	51.9	55.9	56.3	58.6
Net	39.9	44.5	49.6	53.4	54.3	56.4
Primary education (level 1)						
Gross	95.5	96.8	97.7	99.6	103.1	102.7
Net	91.9	91.8	91.0	93.1	96.4	95.7
Lower and upper secondary education (level 2,3)						
Gross	86.4	88.5	90.9	92.9	99.6	101.1
Net	83.9	85.4	86.0	87.2	92.7	93.4
Post-secondary education (level 4)						
Gross	4.2	4.5	4.9	5.3	6.9	7.7
Net	2.2	2.5	2.8	2.9	4.0	4.3
Tertiary education (level 5)						
Gross	16.0	18.9	21.1	24.0	25.5	21.5
Net	9.2	10.7	11.7	12.9	13.6	11.4
Tertiary education (level 6)						
Gross	17.8	20.8	23.3	26.5	34.3	40.3
Net	12.6	14.4	16.3	17.8	22.4	25.9
Tertiary education (level 7)						
Gross	0.6	0.6	0.8	0.9	1.1	1.1
Net	0.3	0.3	0.4	0.4	0.5	0.5

¹ Percentage of the enrolled as compared to a certain age group of population.

² The indicator were estimated basing on the data of Population Census.

	1995	1996	1997	1998	1999	2000	2001
Basic	38.0	41.9	38.4	41.9	... ¹⁾	42.6	45.3
Upper secondary	23.4	24.1	25.7	26.4	32.6	32.7	36.1
Vocational colleges	6.8	6.3	5.7	6.1	7.0	8.1	8.7
University (bachelors' studies)	9.2	8.8	7.4	8.2	9.1	10.3	11.6

8.2. Distant learning

- Distant learning facilities

The Lithuanian Science and Education Ministry made the decision to support the Distant Learning program as e-learning development and universities co-operation. Several universities are active in distant learning. The most experienced is Kaunas University of Technology.

- 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

R&D personnel by performance sector

	1996	1997	1998	1999	2000	2001
RTD personnel (HE sector)	6192	6020	6659	6827		
RTD personnel (public sector)	5978	5800	5761	5528		
RTD personnel total (full time equivalent)	12569	12171	12847	12794		
Researchers total (full time equivalent)	10006	10057	10651	10688		
Expenditure on R&D,(GOVERD) million of EUR	21	27.3	32.2	29.9		
Expenditure on R&D, (BERD) million of EUR	1.2	2.6	1.0	2.3		
Expenditure on R&D as a percentage of GDP (%)	0.52	0.57	0.57	0.52		

Source: Eurostat

- Compensation rates in the fields (average salaries)

The compensation rates in the technical fields including ICT has increased during the last years. The average level is given in the following table:

	Years	Average monthly gross earnings, LTL	Average monthly net earnings, LTL
Whole economy	2001	982.3	699.4
	2000	970.8	692.2
	1999	987.4	722.4
	1998	929.8	683.7
	1997	778.1	576.6
	1996	618.2	466.7
	1995	480.9	362.6
Public sector	2001	1097.8	773.5
	2000	1076.8	760.0
	1999	1090.3	790.3
	1998	1032.6	751.5
	1997	851.1	624.8
	1996	682.7	509.3
	1995	531.4	395.9
Private sector	2001	888.1	639.0
	2000	878.1	632.6
	1999	894.3	661.0
	1998	840.0	624.4
	1997	710.2	531.7
	1996	549.7	421.5
	1995	429.4	328.6

1 USD = 4 LTL (1995-2001)

1 USD = 3.2 LTL (January 2003)

9.2. Employment in electronics industry

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

Employed population by economic activity, 1990-2001¹
(annual average number; in thousand)

Kind of economic activity	1997	1998	1999	2000	2001
Total	1669.2	1656.1	1647.5	1586.0	1521.8
Agriculture, hunting and forestry and fishing (A+B)	364.7	356.0	332.5	315.4	260.7
Agriculture, hunting and forestry (A)	363.0	354.6	331.1	314.0	258.7
Agriculture	348.0	340.9	316.0	300.3	245.5
Fishing (B)	1.7	1.4	1.4	1.4	2.0
Industry (C-E)	334.4	331.1	326.4	319.6	314.3
Mining and quarrying (C)	3.7	3.6	3.7	3.5	3.3
Manufacturing (D)	289.3	286.9	283.2	280.3	272.5
Electricity, gas and water supply (E)	41.4	40.6	39.5	35.8	38.5
Construction (F)	118.7	118.2	108.6	96.4	99.4
Services (G-P)	851.4	850.8	880.0	854.6	847.4
Wholesale and retail trade, repair of motor-vehicles, motorcycles and personal and household goods (G)	246.5	242.7	236.9	232.6	233.9
Hotels and restaurants (H)	26.5	25.1	26.7	28.0	27.9
Transport, storage and communication (I)	95.6	96.9	105.1	100.6	92.0
Financial intermediation (J)	16.8	15.6	16.4	15.4	15.0
Real estate, renting and business activities (K)	53.3	56.5	55.1	57.9	60.7
Public administration and defense; compulsory social security (L)	69.2	71.1	72.4	76.9	76.7
Education (M)	149.2	152.8	158.4	162.5	165.5
Health and social work (N)	106.6	108.6	110.8	110.5	106.8
Other community, social and personal service activities (O)	86.9	79.5	94.9	67.4	64.4
Activity of private households with paid personnel (P)	0.8	2.0	3.3	2.8	4.5

- Compensation rates and trends in the fields

N/A

9.3. Employment in telecom industry

- Number of employees and trends in the fields

8700 employees (0.9% of total workforce)

Number of employees is growing

- Compensation rates and trends in the fields

N/A

10. Research and Development

10.1. Research institutions

- Number of research institutions

Higher education sector 15

Public sector 35

Private sector 2

Private non-profit sector 2

Total 54

10.2. Investments in research and development

- The total amount, government and private business breakdown of total investment in research and development

Investments in R&D according to their sources (2001)

Million Litass, Million USD (current exchange rate 1USD=3.2 Litass)

Governmental sector (GERD) 68 million USD

International sources 7million USD

Business sector(BERD) 9.5 million USD

Other N/A – not available