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

REPORT ON ESTONIA

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Preface

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

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

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

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

The contract was awarded by: Institute for Prospective Technological Studies (IPTS) of the Directorate General Joint Research Centre, European Commission
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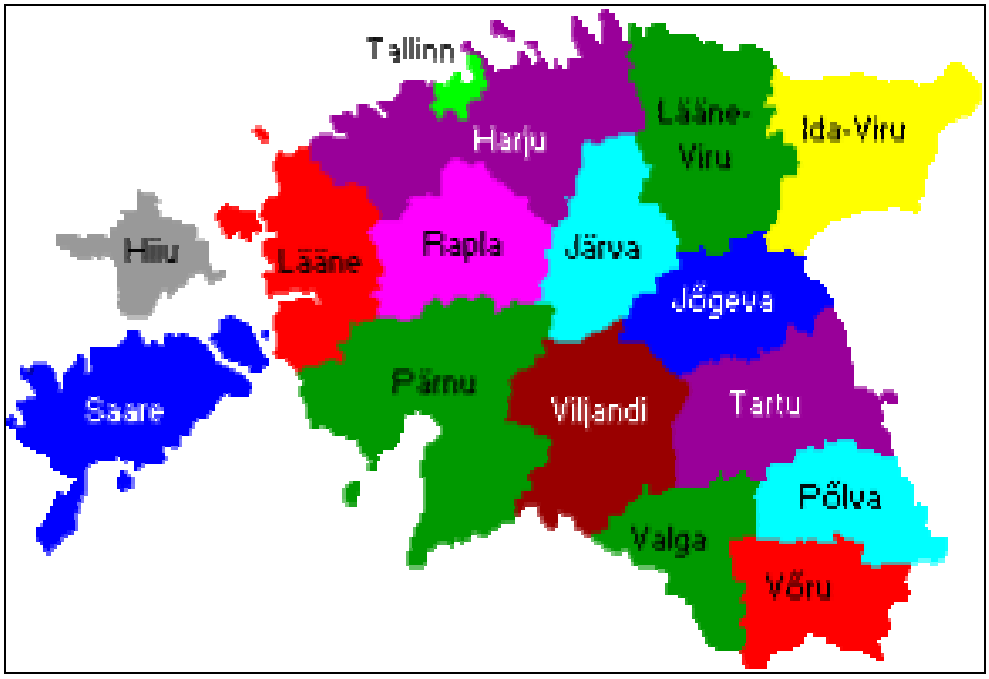
COUNTRY PROFILE

Official name of the state	Republic of Estonia
Independence Day	24 February (1918)
Polity	Parliamentary
Capital city	Tallinn (as of 1 January 2003, 397 000 inhabitants or 29% of total population)
Official language	Estonian
National currency	Estonian kroon (1 kroon = 100 sents) Estonian national currency, the kroon, was introduced on 20 June 1992. On 1 January 1999, the Bank of Estonia fixed the exchange rate between the Estonian kroon and the euro: 1 EUR = 15.6466 EEK
Population	1 356 000 (as of 1 January 2003)
Ethnic composition	Estonians (67.9%), Russians (25.6%), other (6.5%) as of 2000 population census
Population density	30 inhabitants per km^2
Total area	45,227 km^2
Administrative division	15 counties, 39 cities, 8 cities without municipal status, 202 rural municipalities
Number of islands	1521
GDP per capita PPS in 2001 (EUR)	9260.0
GDP real growth rate in 2002	6.0
GDP composition in 2002 (%)	
agriculture	5.4
industry, construction	26.1
services	68.6
International trade in 2002 (MEUR)	
exports	3637.9
imports	5078.8
International reserves (MEUR)	957.7

Source: Statistical Office of Estonia, 2003

Administrative division of Estonia



A. NATIONAL AND REGIONAL ECONOMY

A.1. Introduction

Estonia restored its independent statehood in 1991. The legacy from the Soviet period consisted mainly of a state-owned and centrally planned economy with an oversized, rather inefficient and ill-functioning public sector. It meant that almost all institutions had to be rebuilt to meet market economy requirements. The formerly state-owned enterprises were privatised and numerous new ones were established. A completely new financial sector was established as well. Although government agencies and private enterprises inherited old and outdated capital stock, it was replaced quite rapidly. New institutions, enterprises and their transactions were largely based on new technologies. There were no significant traditions or habits to carry on. It made the penetration of new technologies easier.

During the transition period, Estonia's development was based on the following economic and political principles:

- Currency Board System,
- balanced general government budget,
- liberal foreign trade policy combined with the maintenance of favourable investment climate.

Such a stable macro-economic framework together with rapid privatisation and other market economy reforms have developed a favourable economic environment in Estonia.

Estonia is pursuing a very liberal and open economic policy. In the process of building up new institutions and enterprises for market economy, Estonia learned a lot from its nearest market economy neighbours – Finland and Sweden. These countries happened to be among the technologically most advanced ones with rather high level of New Economy. Besides learning from neighbours, the impact of Finland and Sweden was boosted by ample inflow of Finnish and Swedish capital into Estonian economy. Numerous subsidiaries and affiliates of Nordic companies in Estonia contributed to faster penetration of New Economy and especially Information and Communication Technology (ICT). In order to compete with them domestically owned enterprises had to implement similar technologies.

An advantage of Estonia was also the presence of qualified ICT experts in the stage of economic transition. Almost every former state-owned enterprise had its computing centre with specialists prepared by Tallinn Technical University and the University of Tartu. Remarkable research in the ICT field had also been conducted at the Academy of Sciences – for example, the Institute of Cybernetics had rich experiences in elaborating problem-oriented software systems. However, later the Academy of Sciences was reformed and the institutes were mainly merged with universities. Nevertheless, there were experts who could be employed in new institutions and enterprises to implement as new ICT technology as possible.

The present Estonian monograph is based on data of the Statistical Office of Estonia and international comparative data, previously published research findings and previous research by the authors. As the topic deals with IST (Information Society Technology) developments, it may be necessary to mention that 95-97% of the information used in this monograph is available in the Internet and perhaps 95% in English.

A.2. Economic growth

The shock brought along by the transition to a new economic system caused a deep decline of gross domestic product (GDP) in 1991-1994. During this period the government liberalised trade and prices and several important companies were privatised. At the same time, the currency reform, bringing along the Currency Board system, was implemented. The situation was stabilised at the beginning of 1994 when the increasing macro-economic efficiency and stabilisation created a favourable environment for economic growth.

Since 1994, Estonia has enjoyed rather high growth rates (Table A1) which in recent years have exceeded those of the present 15 member states of the European Union (EU15) and the Eurozone. Throughout the period, the average growth rates in acceding countries have been higher than averages for EU15 and the Eurozone. It draws our attention to the fact that economic performance in the countries with higher level of IST development (like EU15, USA or Japan) is not better than in less developed 10 EU accession countries (ACC). It doesn't concern only the years 2001-2003 that are shadowed with difficulties for economically more developed EU countries, USA, Japan and ICT sector but also the second half of 1990s when the ICT or *dot.com* bubble was built.

However, according to the concluding statement of International Monetary Fund (IMF) in May 2003 (ICEG EC, 2003), Estonia's economic outlook continues to be favourable. The Bank of Estonia has modified its GDP growth forecast for 2003 from 5.3% in December 2002 to 4.4% (IMF's prediction 4.9%, Eurostat's 4.7%). The main reason for the worsening prospects is the delayed recovery of the global economy.

Table A1.: Annual GDP growth rates, %

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
EU15	2,8	2,4	1,6	2,5	2,9	2,8	3,5	1,5	1	1.2 f
Eurozone	2,4	2,2	1,4	2,3	2,9	2,8	3,5	1,4	0,8	1.0 f
ACC	:	6,55	4,57	4,83	3,79	3,13	9.56 p	2.35 p	2.06 f	3.55 f
Estonia	-2	4,27	3,92	9,79	4,6	-0,63	7,13	5,04	5,75	4.70 f

Source: Eurostat, 2003[1]

In the period 1991-2002, Estonia's population decreased by 210 thousand persons or by 13.5%. Reasons for the depopulation were both negative natural growth and out-migration (see Chapter H). Thus, GDP per capita growth was even faster. Nevertheless, if compared by GDP per capita at Purchasing Power Standard (PPS) the Estonian level is far below the EU average and also below many acceding countries (Table A2).

Table A2.: GDP per capita in PPS, (EU15=100)

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
EU15	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00 f	100.00 f
Eurozone	100.70	101.50	100.60	100.30	100.10	100.60	100.70	99.40	99.10 f	98.80 f
ACC	:	41.46	42.81	43.91	44.39	44.62	:	:	:	:
Lithuania	:	33.04	33.43	35.55	37.00	34.50	35.60	38.22	39.57	:
Latvia	:	24.72	25.59	27.40	28.25	28.61	31.07	33.76	34.93	:
Estonia	:	33.97	35.37	38.42	39.57	38.70	40.42	39.85	40.29	:

Source: Eurostat, 2003[2]

[1] http://europa.eu.int/comm/eurostat/Public/datashop/print-product/

As Estonia is pursuing a liberal economic policy, its GDP dynamics is rather dependent on foreign trade and capital flows. There were almost no import duties until harmonisation with the EU *acquis communautaire* that insisted on introduction of import duties against third countries. There were no restrictions on foreign capital flows either in the second half of the 1990s. It made Estonian economy highly exposed to external shocks and to changes in international economic environment.

Within this relatively short time period, Estonia's economic development suffered a serious shock in 1999. It resulted from the Russian and Commonwealth of Independent States (CIS) default in 1998 autumn when devaluation of the rouble and other CIS currencies almost blocked exports to CIS. CIS domestic prices were well below world market prices and it was especially difficult for Estonian producers to enter Russian markets as Russia imposed double duties on imports from Estonia. Estonian producers and exporters of foodstuffs suffered most, but difficulties occurred in agriculture and some other industries as well. A similar drawback can be noticed in Lithuania while Latvia remained in a positive area although with a clearly lower growth rate in 1999 (Table A1)

The Russian 1998 default pushed ahead reorientation to the Western markets and hurried up structural changes in the economy. Thus, a 7% GDP growth in 2000 was already a success for Estonia. However, subcontracting to Nordic ICT companies contributed to this success (see Chapter C). A serious (more than 5%) decline in exports of goods followed in 2001 when subcontracting to Nordic ICT companies squeezed. However, this squeeze was parallel to more than 10% growth in exports of services and to continuously strong growth in investments that helped to keep demand growing (Table A3) and to continue with quite good GDP growth rates. So, the recurrence of economic growth in 2000 was a result of restructuring and more effective utilisation of available resources and a rapid growth continued in 2001 and 2002.

[2] http://europa.eu.int/comm/eurostat/Public/datashop/print-product/EN?catalogue=Eurostat&product=1-eb011-EN&mode=download

Table A3.: Change of GDP compared with previous year at 2000 constant prices, %

	1994	1995	1996	1997	1998	1999	2000	2001	2002
By expenditure approach									
Private consumption expenditure	0.6	3.3	9.2	7.8	4.3	-2.9	6.5	4.9	8.2
General government final consumption expenditure	5.5	16.3	-1.0	1.8	4.5	3.8	0.1	2.1	5.0
Consumption expenditure of non-profit institutions serving households	-5.6	12.3	14.0	4.5	3.8	15.5	21.1	-0.7	44.4
Gross fixed capital formation	6.3	4.1	11.4	17.6	11.3	-14.8	13.3	9.1	17.5
Change in inventories	-72.2	41.3	53.5	225.7	..	..	..	-26.0	127.3
DOMESTIC DEMAND	1.6	6.4	7.6	10.6	3.2	-4.7	9.7	4.6	12.1
Exports of goods and services (f.o.b.)	3.5	5.3	2.4	29.5	12.0	0.5	28.6	-0.2	5.5
..exports of goods	5.9	6.5	0.9	35.6	16.3	-2.6	40.9	-5.5	2.9
..exports of services	0.1	3.6	4.7	20.4	4.7	6.3	7.8	11.7	10.4
Imports of goods and services (f.o.b.)	12.2	5.4	7.6	29.1	12.9	-5.4	27.9	2.1	10.2
..imports of goods	14.6	5.9	6.9	33.7	10.6	-7.9	32.6	0.3	5.2
..imports of services	3.5	3.4	10.2	11.5	23.4	4.9	10.9	9.9	29.9
Statistical discrepancy	..	..	..	..	..	..	..	..	..
TOTAL	**-2.0**	**4.3**	**3.9**	**9.8**	**4.6**	**-0.6**	**7.1**	**5.0**	**5.8**
VALUE ADDED TOTAL	-1.7	3.7	4.2	9.3	4.9	-0.1	7.2	4.9	5.7
FISIM (-)	6.5	2.0	6.0	10.9	-25.5	10.0	10.0	9.7	10.9
GDP AT BASIC PRICES	-1.9	3.7	4.2	9.2	5.5	-0.2	7.1	4.9	5.6
Net taxes on products	-2.6	8.1	2.2	13.6	-1.5	-3.5	7.3	6.3	7.1
GDP AT MARKET PRICES	**-2.0**	**4.3**	**3.9**	**9.8**	**4.6**	**-0.6**	**7.1**	**5.0**	**5.8**

Source: Statistical Office of Estonia[3],

In Estonia, the main source of inflation has been the domestic and foreign price convergence that started in 1992 after the price liberalisation. During the first half of 1992, the price liberalisation caused the process of hyperinflation. The implementation of the Currency Board system and strict budget policy helped to stabilise the prices soon enough. Although the inflation rate continued to fall in 1995-1998, it was still high due to the slow convergence towards the world market prices and domestic factors (Table A4). The consumption quality and structure have also had a considerable effect on the rise in prices.

Table A4.: Inflation in Estonia in 1996-2001, changes compared to previous year, %

	1996	1997	1998	1999	2000	2001	2002
Consumer price index (CPI)	23.1	11.2	8.2	3.3	4.0	5.8	3.6
Goods	19.6	8.5	6.2	0.3	3.3	4.9	1.9
Services	27.2	14.2	12.7	9.7	5.4	7.6	6.8
Liberal prices	19.4	9.8	6.4	0.8	2.7	5.9	2.8
Prices regulated at administrative level	29.8	13.5	13.4	10.1	7.3	5.5	5.4

Source: Estonian National Development Plan, 2004[4]

[3] http://gatekeeper.stat.ee:8000/px-web.2001/Dialog/statfileri.asp
[4] http://www.fin.ee/index.php?id=5119

The increase in prices slowed down considerably at the end of 1998 and in 1999 when the economy adjusted to the consequences of the crisis. In 1999, the consumer price rise dropped to the lowest level during the period of independence (3.3%). The acceleration of inflation is attributed to the foreign price pressure (higher prices of fuel, foodstuffs and strong USD), but there was also some contribution of domestic factors, in most cases administrative price advance. According to the Statistical Office, inflation has stayed below 5% since 2002 (3.6% in 2002). CPI rose in June 2003 compared with June 2002 only 0.3%, being still lower than in the Eurozone. The lowest ever CPI in Estonia was due to the cheapening of foodstuffs and transportation services. The annual consumer price rise was most influenced by cheapening of transportation services in connection with the low exchange rate of the US dollar and competition between local fuel companies. Food and non-alcoholic beverages prices fell both compared with low prices in the world market and as a result of sharp domestic competition (according to Estonian Institute of Economic Research (EKI)). However, the annual price fall in the group of food and non-alcoholic beverages was smaller than in May.

Since the beginning of the transition period, Estonia has been carrying out a strict fiscal policy. As the local government budgets have a deficit on constant basis, the central government has had to get adjusted to balance the general government budget. The Constitution of the Republic of Estonia establishes the requirement for balanced income and expenditures in the national budget. The conservative approach of the central government is mostly brought by the restriction established by the Currency Committee system, preventing the central bank from crediting the government. Foreign finance is mostly limited to investments. The stabilisation reserve was established to diminish the economic risks and provide for stable funding of structural reforms. The reserve is replenished from funds, accumulated from privatisation and other public revenues.

For the first time since 1997, the budget of the government sector showed a surplus in 2001 (0.4% of GDP) as both the economic growth and inflation exceeded expectations (Estonian National, 2004). The same trend continued in 2002 – the surplus of the general government budget accounted for 1.2% of GDP.

An increasing convergence of the structure of Estonian economy towards the industrial countries could be noticed in the 1990s. The most common characteristics of the structural changes have been the decreasing importance of agriculture and post-soviet industries and a rapid surge of services sector and some other new industries (Table A5). By 2001, the share of primary sector in GDP had dropped to 5.8% while the share of tertiary sector had increased to 68.8% (71.6% EU and 61.2% candidate countries average in 1999 (Facchini and Segnana, 2003)).

Table A5.: Changes in the structure of GDP in 1996-2002, %

	1996	1997	1998	1999	2000	2001	2002
Agriculture[1]	8.4	7.9	7.2	6.6	6.1	5.6	5.4
Mining and quarrying	1.6	1.5	1.2	1.1	1.1	1.0	1.0
Manufacturing	18.1	18.0	17.7	16.5	18.0	18.4	18.6
Construction	6.3	6.3	6.7	6.0	6.1	6.2	6.6
Services	65.6	66.3	67.2	69.8	68.7	68.8	68.2

[1] With hunting, forestry and fishery

Source: Estonian National Development Plan, 2004[5]; Statistical Office of Estonia

[5] http://www.fin.ee/index.php?id=5119

Besides agriculture, changes in the structure of GDP indicate also the declining contribution of mining and quarrying. The contribution of manufacturing in GDP also declined until 1999 but then some recovery occurred. The process was similar to deindustrialisation in developed economies. The share of transport, storage and communications is growing as well as that of real estate, renting and business activities. The growth in transport is mainly driven by the increasing transit flows via Estonian ports.

A.2.1. Factors of growth

As mentioned already, economic openness has had a remarkable impact on Estonia's economic growth. The success of macroeconomic stabilisation and meeting the requirements of *acquis communautaire* of the EU is largely dependent on the positive impact of external sector and balance of payments issues. The same business environment that attracted foreign investors was highly beneficial to domestic investors as well. In the main, the causation goes as follows:

- creating a liberal and competitive economic environment,
- inflow of foreign capital, establishment of many (at least partly) foreign owned businesses that increased fixed capital formation,
- allocation of subcontracts of Nordic companies to Estonian (often foreign owned) enterprises, which sometimes are subsidiaries of these Nordic companies, and growth of re-exports (after processing),
- implementation of ICT to be competitive with Nordic companies,
- demand (both foreign and domestic) driven output and GDP growth.

A.2.1.1. Liberal and competitive economic environment

Right after the restoration of independent statehood in 1991, Estonia's main political priority was to build up an efficient and competitive market economy. It was quite broadly accepted that Estonia inherited from the socialist period no structures to protect against normal market forces. It was understood that a completely new economy was to be built up.

One of the most important cornerstones of the new economy was currency reform in 1992, which introduced Estonian kroon (EEK) as a stable anchor to economic restructuring. Estonian kroon was pegged to German mark at the rate EEK 8 = DEM 1. To protect this exchange rate a rather strict currency board arrangement was introduced. In principle, all emitted kroons were backed with foreign currency reserves so that at any moment the central bank (Bank of Estonia - BOE) should be able to convert all Estonian kroons into foreign currencies. With the introduction of euro, the peg to German mark was replaced by the peg to euro with the exact same nominal exchange rate (EEK 15.6466 = EUR 1). In order to follow the principles of currency board, strict fiscal policies were to be followed and no planned deficits of the state budgets were allowed. This monetary system was very transparent and provided stable exchange rates that helped to make international comparisons, to evaluate projects and make investment decisions. Thus, while usually monetary policy and exchange rate adjust to national economy developments, in Estonia's case it was vice versa - the economy was let to adjust to the fixed exchange rate.

Provided with the stable and fully convertible currency as an anchor for comparison and evaluation, Estonia took radical steps towards liberalisation of the economy. State-owned enterprises were privatised, prices were liberalised, import duties and export restrictions were

abolished. Tax policy was initially made even in favour of foreign investors who were granted tax holiday and tax exemptions for certain periods. Later on, tax rates for foreign and domestic investors were equalised. Estonia offers now quite a favourable tax system with a proportional personal income tax and tax exemption on reinvested incomes for businesses (only dividends paid to owners are levied with income tax).

There are many studies that link various freedom indicators to economic growth. Political rights and civil liberties were included into cross-country growth and convergence regressions for instance by Barro and Lee (1994), by Sala-i-Martin (1997) and de Melo *et al*. (1997).

Studying the role of institutions in transition (their sample included CEE countries and descendants of the former Soviet Union), Havrylyshyn and van Roden (2000) suggested distinguishing two categories of institutions that are separately measurable and may have separate effects on economic performance:

- Political and civic freedom, which includes democratic process, freedom of assembly and speech, equal treatment of political and judicial bodies etc;
- Legal framework for economic activity that includes legislation for free economic activity, contract law, rule of law and transparency, security of property rights etc.

The Freedom House[6] publishes indicators of political rights and civil liberties as the first category of institutions that concern more general values. Although no strong or robust impact of civil rights and political liberties indicators can be confirmed in EU member states and candidate countries, the indicators still deserve some attention (Ennuste, Kein, Rajasalu, 2002). In FH country ratings the indices between 1 and 2.5 are given to countries that are considered to be “free”; indices between 3 and 5.5 indicate “partly free” countries, while indices between 5.5 and 7 describe countries that are “not free”. Estonia shares with other acceding countries quite high political rights and civil liberties (see Table A4 in Annex) that are close to those of EU member states. Only Turkey had remarkably and Romania and Bulgaria little worse ratings in the area of political rights.

As broad indicators of institutional development don’t provide a good explanation of differences in economic growth, more detailed indicators that are closely linked to economic activity are to be looked at. Many aspects of economic freedom have found to be significant determinants of economic growth[7].

[6] http://www.freedomhouse.org/research/freeworld/_FHSCORES. xls

[7] For instance, property rights as determinants of economic growth were discussed by Knack and Keefer (1995), Voigt and Engerer (2002). Kaufmann, Kraay and Lobatón (1999, 2002) studied the role of governance. Murrell (1992, 1996) studied sequencing of liberalisation and institutional development for the transition process. Piazolo (1999) found that economic growth in 25 transition economies was positively correlated with the advancement of institutional change (assessed by EBRD (European Bank for Reconstruction and Development) in nine different areas) and increase in the capital stock in transition economies. There are also many studies of corruption, rule of law etc.

The indices of economic freedom (and their sub-indices) published by the Heritage Foundation (HF, 2003) may serve as proxies for institutions concerning economic freedom. The index of economic freedom is published at the beginning of the year based on the information available before July in the previous year. Thus, the index for 2003 is based on developments from July 2001 till the end of June 2002. And available indices from 1995 to 2003 actually describe how countries scored in 1994-2002. The list of 50 independent variables is divided into 10 broad factors (or sub-indices) of economic freedom. The higher the score of a factor, the greater the level of government interference in the economy and the less economic freedom a country enjoys (index 1 describes the freest economies while a score of 5 signifies a set of institutions and policies that are least conducive to growth). The sub-indexes include:

The 2003 evaluation of the Heritage Foundation (that considers situation in 2001-2002) ranks Estonia 6-8 together with Denmark and United States (HF 2003[8]). Estonia is ranked among the best EU countries (in detail, see Table A5 in Annex) with especially liberal trade policy and free movement of capital (time series for EU-15 and CC are given in Tables A6-A16 in Annex). High scores are also enjoyed in banking and finance (there are no state-owned banks and no risks for political allocation of credits), and in the area of wages and prices that are mainly market controlled with minimal government controls and almost without any subsidies. Economic freedom indices show that Estonia really offered a good business environment to local and foreign investors.

The good business environment in Estonia is also confirmed by the relatively high scoring[9] in the World Competitiveness Yearbook produced by the International Institute for Management Development (IMD). An extract from the data for 2002 and 2001 places Estonia rather high among EU member states and candidate countries (Table A6, in detail see Table A17 in Annex). The list was headed in both years by the USA with the score of 100.0 while Singapore was in the second place in 2001 (and 5th place in 2002).

- Fiscal burden of government (measured by tax rates, government expenditures, methods of financing expenditures, etc. to capture the true cost of government to society) – acronym (used in panel estimations of economic growth) *FISC*;
- Trade policy (measured by such impediments to trade as tariffs and duties, quotas, licensing requirements, corruption within customs service etc.) – acronym *TRAD*;
- Government intervention in the economy (government consumption as a percentage of economy, government ownership of businesses and industries, economic output produced by the government etc) - acronym *GOVE*;
- Monetary policy (the main criterion is inflation that confiscates wealth and distorts pricing, misallocates resources and undermines a free society) - acronym *MONE*;
- Capital flows and foreign investment (restrictions on foreign investment and inflow of foreign capital in foreign investment code, restrictions on foreign ownership, unequal treatment of foreign and domestic investors, restrictions on repatriation of earnings etc.) – acronym *FORE*;
- Banking and finance (evaluated through government ownership in banks and government influence over allocation of credit, restrictions to foreign banks, restrictions to offer financial services like transactions with securities and insurance activities) – acronym *BAN*K;
- Wages and prices (extent of government wage and price controls that distort allocation of resources to their highest use or market value, government subsidies to businesses) – acronym *WAGE*;
- Property rights (legally granted and protected private property, commercial code defining contracts, government expropriation of property, government influence on judicial system, delays in receiving judicial decisions, corruption within judiciary) – acronym *PROP*;
- Regulation (licensing requirements to run businesses, ease of obtaining licenses, environmental and labour regulations including paid vacations and parental leave, corruption and uniform appliance of regulations) – acronym *REGU*;
- Black market (as a reaction to government intervention and restrictions but also as smuggling, piracy of intellectual property, production of goods and services for black market) – acronym *BLAC*.

Economic freedom in a country in general is assessed by overall index (acronym *OVER*). Four broad categories are distinguished on the basis of overall index: countries with score under 1.95 – free, with score between 2 to 2.95 – mostly free, with score between 3 and 3.95 – mostly unfree and countries with score of 4 or higher – repressed

[8] http://www.heritage.org/research/features/index/

[9] In the World Competitiveness Yearbook the 321 competitiveness criteria are grouped into the four Competitiveness Factors: Economic Performance (75 criteria), Government Efficiency (81 criteria), Business Efficiency (69 criteria), Infrastructure (96 criteria).

Table A6.: Selected EU member states and candidate countries in World Competitiveness Scoreboard 2002 (the list includes 49 countries)

2002 ranking	Countries (with 2001 ranking in brackets)	Score for 2002	Score for 2001
15.	(12) Germany	70.942	74.043
16.	(19) United Kingdom	68.930	64.781
18.	(17) Belgium	66.734	66.026
21.	**(22) Estonia**	**63.444**	**60.196**
22.	(25) France	61.641	59.556
23.	(23) Spain	61.519	60.135
28.	(27) Hungary	56.702	55.638
29.	(35) Czech Republic	55.322	46.676
37.	(37) Slovak Republic	45.714	43.590
38.	(37) Slovenia	45.499	42.485
45.	(47) Poland	30.209	32.007
46.	(44) Turkey	27.965	35.438

Source: IMD, World Competitiveness Yearbook[10]

A.2.1.2. High capital formation ratio promotion by foreign capital inflow

Thus, in international comparisons Estonia's business environment is rather favourable indeed. It helped to keep the gross capital formation ratio to GDP quite high (28.5% in 2001) (Table A7, in detail, see Table A18 in Annex). However, remarkably high investment ratios were also maintained in many other candidate countries, even above 30% of GDP.

Table A7.: Gross capital formation as per cent of GDP in EU member states and candidate countries

Country	1994	1995	1996	1997	1998	1999	2000	2001
Czech Republic	29.8	34.0	34.3	32.6	30.2	27.9	29.7	30.0
Estonia	**27.4**	**26.6**	**27.8**	**30.9**	**29.4**	**24.6**	**25.8**	**28.5**
Germany	23.2	22.7	21.7	21.6	21.8	22.2	22.7	19.6
Hungary	22.1	23.9	27.2	27.7	29.7	28.5	30.6	27.3
Italy	18.5	19.3	18.7	18.9	19.3	19.8	20.5	19.7
Latvia	...	...	18.8	22.8	27.6	27.0	27.1	27.7
Lithuania	...	...	24.5	26.5	24.4	22.7	20.7	21.9
Poland	17.6	19.7	21.9	24.6	26.2	26.4	26.5	27.2
Portugal	23.0	24.3	23.8	25.7	26.7	27.2	28.2	28.2
Slovak Republic	21.4	26.5	37.1	36.6	36.1	31.9	30.1	34.7
Sweden	15.9	16.6	15.9	15.6	16.8	17.0	17.9	17.6
United Kingdom	16.5	16.9	16.8	17.2	18.0	17.5	17.9	16.6

Source. The World Bank. Data Query[11]

Estonia's domestic saving rate is far too low for funding necessary investments. Inflow of foreign capital has remarkably contributed to investments as Estonia appears to have been rather successful in attracting foreign investors (Facchini and Segnana, 2003).

Data on capital and financial accounts (Table A8, see more detailed Table A19 in Annex) reveal that net inflow of foreign capital prevailed in 1993-2002. Along with net inflow in the

[10] http://www01.imd.ch/wcy/ranking/
[11] http://www.worldbank.org/data/dataquery.html

form of foreign direct investments there was also a net inflow of portfolio and other investments. Current account deficit has been mainly funded by the net inflow of capital.

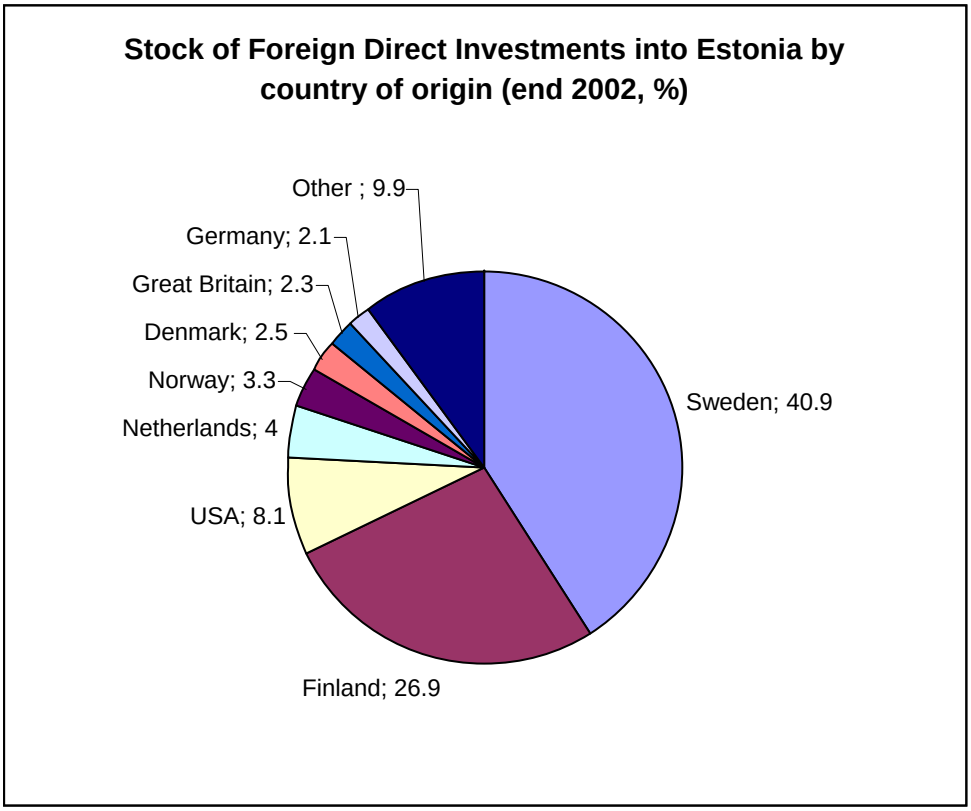
Table A8.: Capital and financial account, ECU/EUR mill.

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Capital and Financial Account	188.1	144.7	191.4	424.3	699.0	435.3	378.1	480.1	352.3	866.8
Capital account	0.0	-0.5	-0.6	-0.5	-0.1	1.6	1.1	17.8	5.8	20.4
Financial account	188.1	145.3	192.0	424.9	699.1	433.7	377.0	462.3	346.5	846.4
Direct Investment	133.9	181.7	154.1	88.2	113.7	506.2	205.0	358.0	377.1	199.5
Abroad	-5.3	-1.9	-2.0	-32.1	-122.1	-5.2	-79.2	-66.7	-225.6	-130.4
Estonia	139.2	183.7	156.1	120.4	235.7	511.4	284.3	424.7	602.7	329.9
Portfolio Investment	-0.2	-11.9	-17.2	118.4	233.3	-1.5	10.0	118.5	104.1	235.5
Other investment	54.4	-24.5	55.1	218.3	352.2	-71.1	162.0	-14.2	-134.7	411.4

Source: Bank of Estonia[12]

In cumulative stock of foreign direct investments into Estonia, Swedish and Finnish capital is prevailing (Figure A1). Two-thirds of the total of 4 billion euros invested into Estonia in the form of FDI originates from Sweden and Finland.

Figure A1.: FDI into Estonia by country of origin



Source: Statistical Office of Estonia

[12] http://www.ee/epbe/en/statistical.html

Sweden is the major foreign investor with a total of EUR 1.65 billion (40.9 % of the total volume of all investments as of 31 December 2002)[13]. The bulk of the investments have been made in the banking, transport and communications sectors. The largest amounts of direct investments based on Swedish capital have been made into the following enterprises: *Hansapank, Ühispank, Eesti Telefon, Eesti Mobiiltelefon, Eesti Statoil, Kreenholmi Manufaktuur, and Saku Õlletehas* (Ministry of Foreign Affairs[14]).

There were 1 977 enterprises registered with Finnish investment shares. Major Finnish direct investments in Estonia have been made in the following enterprises: *ABB Eesti, Kunda Nordic Tsement, Paulig Balti, Radiolinja Eesti, Rakvere Lihakombinaat, Elcoteq Tallinn, Nordea Bank Finland PLC Estonia Branch, Neste Eesti, A le Coq, Rannila Profiil, Eesti Telekom* (Ministry of Foreign Affairs[15]).

Participation of Swedish and Finnish capital in the Estonian economy has obviously implications on IST development. First, Sweden and Finland are countries with high IST development. There is some technology transfer from Nordic companies to their subsidiaries in Estonia. Second, the aforementioned list of most important enterprises with Swedish and Finnish capital includes three banks (*Hansapank, Ühispank, Nordea Bank Finland PLC Estonia Branch*) and banks (at the end of 2001, over 85% of the share capital of Estonian banks belonged to foreign owners (Eesti, 2002)) are the most active implementers of IST solutions and main motivators of the IST penetration growth in Estonia. The list includes also *Eesti Telekom* (and its subsidiaries *Eesti Telefon* as the main fixed line telephone service and ADSL internet service provider, and *Eesti Mobiiltelefon* as a mobile phone service provider). It includes also *Radiolinja Eesti* as another mobile service provider and *Elcoteq Tallinn,* which is mainly engaged in subcontracting to *Ericsson* and *Nokia*. Thus, the list of partly or fully Swedish or Finnish owned enterprises includes the main IST sector enterprises in Estonia.

About one-quarter of foreign direct investments in Estonian economy were made into the financial sector (Table A9, in detail by years in Table A20 in Annex). These investments include payments by Swedish banks for 2 major Estonian banks where they obtained majority stakes. Almost as much has been invested into transport, storage and communications, where Finnish *Sonera* and Swedish *Telia* obtained the majority stake in *Eesti Telekom.* Thus, the financial sector and communications sector together absorbed half of foreign direct investments made into Estonia. Manufacturing and trade followed with 18.7% and 13.4%. As a result of intensive Finnish investments, Finnish-owned retail trade chains prevail in Estonia.

[13] According to the Estonian Business Register, the largest part of enterprises in foreign ownership (more than 50% of ownership) registered in Estonia are partly or fully based on Nordic capital. Enterprises in foreign ownership accounted approximately for 5% of total number of enterprises, they employed 19% of total number employed persons and produced more than one-fourth of total turnover in 2002.

[14] http://www.vm.ee/eng/kat_176/1199.html

[15] http://www.vm.ee/eng/kat_176/ 1097.html

Table A9.: Foreign direct investment stock by fields of activity (by 31.12.2002)

	MEUR	%
FDI in Estonia		
Fishing	0.3	0.0
Public administration and defence; compulsory social security	0.9	0.0
Education	1.3	0.0
Health care	2.2	0.1
Mining, quarrying	10.7	0.3
Not classified	11.7	0.3
Agriculture, hunting, forestry	22.2	0.6
Other community, social and personal service activities	40.9	1.0
Hotels, restaurants	53.7	1.3
Construction	97.1	2.4
Electricity, gas and water supply	99.4	2.5
Real estate, renting and business activities	385.5	9.6
Wholesale, retail trade	538.6	13.4
Manufacturing	753.0	18.7
Transport, storage, communication	909.7	22.6
Finance	1106.9	27.4
TOTAL	4034.1	100.0

Source: Bank of Estonia[16]

The impact of Swedish or Finnish capital is not restricted to FDI only. The contribution of these countries in portfolio investments is also high. Tallinn Stock Exchange was merged with Helsinki Stock Exchange (HEX) and HEX trading environment. From the holdings of Estonian listed securities (including strategic holdings), 48.8 % were owned by investors of Swedish residency, 19.4% by Estonian residents and 8.4% by USA residents. Finnish residents had a 6.8% share in these holdings. Thus, besides strategic ownership in Estonian enterprises, foreign investors also had obtained remarkable shares through portfolio investments and as shareholders control activities of Estonian enterprises.

The third channel of foreign capital inflow goes through Swedish and Finnish owned banks (which are responsible for more than 90% of Estonian banking activities). Foreign owned Estonian banks often borrow from abroad and intermediate these funds to Estonian enterprises and individuals. This is the main item that increases the liabilities under inflow of other capital.

A.2.1.3. Foreign trade in goods and services

As already mentioned, the Estonian economy is very open. Economic growth has resulted primarily from the rapid growth of export to industrial countries and foreign investment inflow. Exports of goods and services have reached 85-94% of the GDP value and imports 94-98% since 2000. Foreign trade in commodities is in deficit, which is compensated to some extent with the surplus in trade with services.

The export of goods and services (f.o.b.) in Estonia increased by 5.5% in 2002 (-0.2% in 2001). The EU15 are responsible for 68% of Estonian exports from which 24.5% goes to the non-EMU members (ISEG, 2003). The export performance can be considered to be good

[16] http://www.eestipank.info/pub/en/dokumendid/statistika/

considering that the share of re-exportation after inward processing (subcontracting)[17] fell significantly (to 31% in 2002) according to the Bank of Estonia. The export has shifted towards electronics, timber and textile products with higher value added (Estonian, 2004[18]).

The share of export of wood and articles of wood of the exports total value increased to 15.1% in 2002 (Table A10, Table A21 in Annex). The largest share of exports of wood and articles of wood (at current prices) was wood sawn or chipped lengthwise of a thickness exceeding 6mm (35%), wooden furniture and parts thereof (20%) and wood in the rough, whether or not stripped of bark or of sapwood or roughly squared (19%) (Statistical, 2003c). The main destination country of wood sawn or chipped lengthwise was the United Kingdom and the second largest destination country was Germany in 2002 (the share 30% and 12%, respectively). The main destination countries of exports of wooden furniture and parts thereof were Germany, Finland and Denmark (correspondingly 29%, 17% and 13% of the value of exports in 2002).

In 2002, the special export of machinery and mechanical appliances accounted for 24.8% of the total exports of Estonia (8.0% in 1993) (Table A10, also see Table A21 in Annex), of which 3.8% was exports of mechanical and 21% electrical machinery and equipment (Foreign, 2003). The major share of exports (75%) was re-exportation after inward processing. The largest proportion of the total exports of electrical machinery and equipment was exports of apparatus of radio and television, parts and exports of insulated wire (correspondingly 71% and 13% of total value of exports). Finland remained the main destination country of the export of apparatus for radio and television, parts in 2002 but the share of Finland decreased from 72% in 2001 to 44% in 2002 of the value of exports. The second largest destination country was Sweden (20%), the third Germany (18%) and the next Hungary (6%). Finland kept its first place among destination countries of exports of insulated wire (44%), the share of Sweden was 28% and Latvia 7%.

Mostly, the production comes from subsidiaries of large Nordic corporations, supported by foreign investments. Low content of value added has been one of the main problems of exports in Estonia. Diversification of the exports structure and increasing their sophistication presumes some changes in the entrepreneurs' attitude towards innovation accompanied by improved qualification of the employees (Estonian, 2004[19]).

[17] According to the Estonian Bank, subcontracting (of which machinery and mechanical appliances, electrical equipment accounted for 60% and textiles and textile articles 16%) constituted about 18% of GDP in 2002. In total special exports, the share of subcontracting was highest also in the aforementioned commodity groups, 75.2% and 41.3% respectively. The high share of subcontracting can be regarded as a development potential for a small country like Estonia but also as a weakness due to the low value added.

[18] http://www.fin.ee/index.php?id=5119

[19] http://www.fin.ee/index.php?id=5119

Table A10.: Special exports (1993 and 1994 general exports) by HS commodity chapter at current prices, %

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Commodities total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
I Live animals; animal products	9.9	7.7	7.8	6.9	6.3	5.0	4.0	3.6	4.2	4.2
II Vegetable products	1.1	1.7	1.2	1.2	1.1	0.9	0.7	0.5	0.5	0.6
III Animal or vegetable fats and oils and their cleavage products; prepared edible fats; ...	0.7	0.5	0.3	0.2	0.1	0.0	0.0	0.2	0.2	0.4
IV Prepared foodstuffs; beverages, spirits and vinegar; tobacco and ...	11.1	12.3	6.9	6.9	4.0	3.9	2.8	1.6	3.1	3.1
V Mineral products	5.5	8.2	6.5	5.8	4.7	2.8	2.6	2.4	2.1	2.7
VI Products of the chemical or allied industries	5.0	6.8	8.0	8.1	6.4	5.0	4.1	3.7	4.3	4.4
VII Plastics and articles thereof; rubber and articles thereof	1.5	1.8	2.5	2.0	2.0	2.1	2.0	1.8	2.0	2.6
VIII Raw hides and skins, leather, furskins and articles thereof; saddlery and harness; ...	1.8	1.2	1.2	1.4	1.2	1.1	1.1	0.9	1.2	1.2
IX Wood and articles of wood; wood charcoal; cork and articles of cork; manufactures of straw, ...	7.8	10.2	13.0	12.5	15.6	16.1	17.9	13.4	13.2	15.1
X Pulp of wood or of other fibrous cellulosic material; waste and scrap of paper or paperboard; ...	0.6	0.8	1.2	1.9	1.9	2.0	2.1	1.8	2.0	2.3
XI Textiles and textile articles	12.8	13.7	14.7	15.9	14.7	14.3	14.1	11.3	11.5	12.1
XII Footwear, headgear, umbrellas, sun umbrellas, walking sticks, seat-sticks, whips, ...	1.3	1.5	1.6	1.8	1.5	1.5	1.8	1.4	1.3	1.5
XIII Articles of stone, plaster, cement, asbestos, mica and similar materials; ...	2.0	1.7	1.6	1.7	1.8	1.4	1.6	1.2	1.2	1.4
XIV Natural or cultured pearls, precious or semi-precious stones, precious metals, ...	1.3	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3
XV Base metals and articles of base metal	10.9	8.0	6.9	6.5	7.3	7.8	7.8	7.1	6.9	7.8
XVI Machinery and mechanical appliances; electrical equipment; parts thereof; sound recorders ...	8.0	9.3	14.0	14.2	19.4	23.6	24.3	37.4	33.1	24.8
XVII Vehicles, aircraft, vessels and associated transport equipment	11.1	7.6	4.7	4.1	3.8	3.4	3.0	2.6	3.2	4.1
XVIII Optical, photographic, cinematographic, measuring, checking, precision, medical or ...	1.6	1.2	1.3	1.8	1.8	2.2	2.0	2.0	1.6	1.9
XIX Arms and ammunition; parts and accessories thereof	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
XX Miscellaneous manufactured articles	5.4	5.4	6.1	6.8	6.2	6.7	7.9	6.6	8.1	9.6
XXI Works of art, collectors' pieces, and antiques	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
XXII Supplies for foreign vessels	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Source: Statistical Office of Estonia, 2001[20]

Given the strong participation of Swedish and Finnish capital in Estonian economy it is not surprising that the contribution of these countries in Estonian foreign trade of commodities is high also (Table A11).

[20] http://gatekeeper.stat.ee:8000/px-web.2001/Dialog/statfileri.asp

Table A11.: Special exports[21] to main trading partner countries, 1999–2002 (at current prices)

	1999		2000		2001		2002	
	MEUR	**%**	**MEUR**	**%**	**MEUR**	**%**	**MEUR**	**%**
TOTAL	2 238.5	100.0	3 444.4	100.0	3 696.1	100.0	3 637.9	100.0
Finland	527.3	23.6	1 114.1	32.3	1 251.6	33.9	901.4	24.8
Sweden	513.4	22.9	706.2	20.5	518.3	14.0	557.7	15.3
Germany	191.4	8.6	292.7	8.5	256.3	6.9	360.1	9.9
Latvia	187.4	8.4	242.2	7.0	254.6	6.9	269.3	7.4
United Kingdom	105.1	4.7	150.3	4.4	155.7	4.2	175.4	4.8
Denmark	106.1	4.7	118.2	3.4	129.9	3.5	161.6	4.4
Lithuania	76.7	3.4	96.6	2.8	110.8	3.0	127.0	3.5
Norway	58.4	2.6	81.0	2.4	103.4	2.8	123.1	3.4
Netherlands	58.4	2.6	84.6	2.5	102.4	2.8	124.9	3.4
Russian Federation	75.7	3.4	81.7	2.4	101.3	2.7	121.5	3.3
United States of America	43.4	1.9	46.1	1.3	67.6	1.8	81.6	2.2
Ukraine	43.0	1.9	40.9	1.2	53.0	1.4	61.9	1.7
France	32.0	1.4	46.5	1.4	40.2	1.1	49.5	1.4
Japan	6.2	0.3	6.5	0.2	36.5	1.0	12.7	0.4
Italy	25.3	1.1	34.3	1.0	36.1	1.0	38.7	1.1
Hungary	5.0	0.2	25.9	0.8	34.8	0.9	44.6	1.2
Poland	15.4	0.7	22.0	0.6	27.1	0.7	34.7	1.0
Belgium	26.6	1.2	30.7	0.9	25.0	0.7	29.4	0.8
Korea Republic	11.5	0.5	29.3	0.9	23.7	0.6	29.6	0.8
Switzerland	11.1	0.5	15.9	0.5	22.8	0.6	26.6	0.7
Other countries	119.0	5.3	178.6	5.2	344.9	9.3	306.6	8.4

Source: Foreign Trade, 2002; Statistical Office of Estonia[22]

In 2000 and 2001, the share of Finland in Estonia's special exports[23] was one-third while the contribution of Sweden was almost one-quarter in 1999 (and 14-15% in 2001-2002).

According to the World Bank data, the Estonian high technology exports had a very high (almost 30%) contribution to exports in 2000 (Table A12) but dropped to 19.1% in 2001 when subcontracting to Nordic ICT companies squeezed.

[21] In order to exclude from Estonia's foreign trade flows of transit goods that are temporarily declared in customs warehouses (in ports, mainly) the special trade principle is used.

[22] http://gatekeeper.stat.ee:8000/px-web.2001/dialog/statfileri.asp

[23] In the case of special trade system (compiling foreign trade statistics which takes into account goods crossing the boundary of the free circulation area) special exports comprises normal exportation (exportation of goods produced in Estonia or owned by Estonian legal persons), re-exportation after inward processing and supplies for foreign vessels and aircraft stores (re-exportation from customs warehouses is excluded) (Statistical Office of Estonia)

Table A12.: High-technology exports (% of manufactured exports) in EU member and candidate countries

	1996	1997	1998	1999	2000	2001
Austria	10.0	11.4	11.4	12.6	13.7	13.9
Belgium	7.6	7.7	8.1	9.4	10.1	10.1
Denmark	16.2	17.2	17.6	19.4	20.7	20.5
Finland	16.3	19.2	22.0	23.9	27.3	23.1
France	18.5	21.3	22.4	22.9	24.3	22.8
Germany	12.8	13.6	14.6	15.9	17.7	…
Greece	6.2	5.5	8.0	9.0	…	8.1
Ireland	46.6	46.2	44.1	46.7	47.5	47.5
Italy	7.7	7.4	7.9	8.1	9.2	9.5
Luxembourg	...	...	...	14.6	16.8	17.2
Netherlands	26.5	26.6	30.0	32.9	35.5	31.5
Portugal	4.3	4.2	4.0	4.9	6.3	…
Spain	7.4	6.8	6.7	7.6	7.6	…
Sweden	17.0	19.0	20.0	21.0	22.0	17.8
United Kingdom	26.4	25.7	28.8	29.8	32.0	31.4
EU15						
EMU	*14.4*	*15.3*	*16.3*	*17.6*	*16.1*	…
Bulgaria	3.8	3.6	...	...	...	…
Czech Republic	6.9	7.3	7.9	8.3	8.2	10.1
Cyprus	6.2	3.9	4.2	4.1	2.5	2.5
Estonia	**8.8**	**9.0**	**11.6**	**13.4**	**29.8**	**19.1**
Hungary	5.7	18.0	20.6	22.6	26.4	23.4
Latvia	5.2	6.4	4.0	4.1	4.0	3.4
Lithuania	3.5	3.7	3.2	3.1	4.2	4.9
Malta	58.9	56.0	60.4	61.7	71.7	61.5
Poland	2.9	2.6	2.9	2.6	3.3	3.0
Romania	1.6	0.9	1.5	3.1	5.6	5.7
Slovak Republic	4.0	4.0	4.0	4.0	...	4.2
Slovenia	4.0	4.0	4.0	4.0	5.0	4.9
Turkey	2.0	2.0	2.0	4.0	5.0	…
CC13	**4.9**	**6.0**	**6.7**	**8.0**	**9.3**	**…**

Source. The World Bank. Data Query[24]

However, the situation is actually not as good as it looks. Volatility of exports to Finland and contribution of high-tech exports to total manufactured exports are largely dependent on subcontracts allocated to Estonian economy.

In order to analyse the dynamics of technology level of Estonian special exports we rearranged official statistics to distinguish high-tech manufacturing, medium-high tech manufacturing and knowledge–intensive services (KIS) according to the Eurostat definitions[25]. After regrouping data of Estonia's special exports (originally declared according

[24] http://www.worldbank.org/data/dataquery.html

[25] The classification of high and medium-high technology manufacturing sectors is based on the OECD's classification (itself based on the ratio of R&D expenditure to GDP). Since the CLFS only allows reporting of NACE at the 2 digit level, the following NACE Rev 1 sectors are included:
High tech Manufacturing
30 Manufacturing of office machinery and computers
32 Manufacturing of radio, television and communication equipment and apparatus
33 Manufacturing of medical precision and optical instruments, watches and clocks

to the Estonian classification of goods that corresponds to the Combined Nomenclature 2002 used in the EU) we got data presented in Table A13.

Table A13.: Contribution of high tech exports and re-exports after processing in total exports of commodities

	1996	1997	1998	1999	2000	2001	2002
Total export of commodities (bill. EUR)	1.4	1.9	2.2	2.2	3.4	3.7	3.6
From this in per cent							
High tech exports	9.2	14.0	18.2	18.4	31.7	26.7	…
Medium-high tech exports	14.8	13.6	12.6	12.0	11.5	12.3	…
Other commodities	76.0	72.4	69.2	69.6	56.8	61.0	…
Re-exports after processing (subcontracting)	23.0	26.8	31.8	32.7	43.8	38.1	31.0

Source: Authors' calculations on the basis of the Statistical Office of Estonia data

The data in Table A13 confirm that there was a sharp growth in high tech exports in 2000 indeed, but the high level reached then was not sustainable. As a matter of fact, the sharp growth of high tech exports in 2000 resulted by authors' opinion from the almost two-fold growth of subcontracting that was mainly driven by contracts allocated by Nordic ICT companies. Worldwide difficulties in ICT sector reduced the volume of subcontracts and contribution of high tech exports in 2001. Although the share of high tech exports remained quite high in 2001 it indicated that Estonia's high tech export is vulnerable. The share of medium-high tech exports has been almost stable or declined slightly.

In trade with Finland, re-exports after processing (subcontracting) contributed 68% of Estonia's total special exports to Finland in 2001. The contribution of re-exports to Sweden was 45% of special exports and to Japan even 81% (Statistical, 2002c). However, Japan was not among the main export markets of Estonia. But subcontracts allocated by *Nokia* and

Medium-high tech manufacturing
24 Manufacture of chemicals and chemical products
29 Manufacture of machinery and equipment n.e.c.
31 Manufacture of electrical machinery and apparatus n.e.c.
34 Manufacture of motor vehicles, trailers and semi-trailers
35 Manufacturing of other transport equipment
Knowledge-intensive sectors (KIS). Following a similar logic as for manufacturing, Eurostat defines the following sectors as KIS:
61 Water transport
62 Air transport
64 Post and telecommunications
65 Financial intermediation, except insurance and pension funding
66 Insurance and pension funding, except compulsory social security
67 Activities auxiliary to financial intermediation
70 Real estate activities
71 Renting of machinery and equipment without operator and of personal and household goods
72 Computer and related activities
73 Research and development
74 Other business activities
80 Education
85 Health and social work
92 Recreational, cultural and sporting activities
Of these sectors, 64, 72 and 73 are considered high tech services.
Source: Laafia, I. (2002). National and Regional employment in high tech and knowledge intensive sectors in the EU 1995-2000. Eurostat. Statistics in focus. Theme 9 – 3/2002.

Ericsson into *Elcoteq Tallinn* and other enterprises had a remarkable impact on Estonia's export structure.

The high dependence on subcontracting raises a question of classifications and criteria used to distinguish high tech industries and products – in the case of subcontracting actual R&D as the knowledge-intensive part of product development is done in Sweden or Finland. Much lower qualification is needed for mass production of these ICT products in Estonia. There are also some concerns about transfer prices that are used in subcontracting (especially if subcontracts are allocated to affiliates) as these may differ from real market prices and may depend also on differences in taxation between countries (and include a different profit margin).

Modernisation of production technologies has been one of the preconditions for rapid growth of export. This has brought along high import volumes of machinery and equipment (the share of these in special imports increased from 18.4% in 1993 to 38.7% in 2000 and fell to 29.7% in 2002 (constituted nevertheless the biggest share of the total imports of Estonia) (Table A14, Table A22 in Annex)) and is mostly identical to foreign capital inflow. The import volumes have been exceeding export on constant basis.

Table A14.: Special imports (1993 and 1994 general imports) by HS commodity section at current prices, %

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Commodities total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
I Live animals; animal products	1.2	2.1	2.1	2.8	3.1	2.5	1.9	1.7	2.0	1.9
II Vegetable products	2.3	2.7	3.2	3.4	2.6	2.7	3.0	2.4	2.4	2.4
III Animal or vegetable fats and oils	1.2	1.2	1.2	0.9	0.7	0.6	0.6	0.4	0.5	0.7
IV Prepared foodstuffs; beverages,	10.6	9.9	7.3	7.3	6.4	5.5	5.4	4.2	4.5	4.7
V Mineral products	12.4	14.1	10.6	9.2	7.9	5.8	6.0	6.1	6.2	6.1
VI Products of the chemical or allied industries	6.7	7.6	8.2	8.5	7.6	7.2	7.9	6.6	7.0	7.3
VII Plastics and articles thereof; rubber and articles	3.4	3.9	4.6	4.6	4.6	4.4	4.9	4.5	4.8	5.1
VIII Raw hides and skins, leather, furskins and articles	0.7	0.9	0.8	1.1	0.9	1.0	1.1	1.0	1.2	1.2
IX Wood and articles of wood; wood charcoal;	0.8	1.4	1.5	1.5	1.5	1.8	2.1	1.8	2.3	2.4
X Pulp of wood or of other fibrous cellulosic material;	2.1	2.7	3.5	3.4	3.2	3.2	3.1	3.0	2.9	2.7
XI Textiles and textile articles	10.9	10.3	10.8	10.1	8.8	8.8	8.9	7.5	7.9	8.2
XII Footwear, headgear, umbrellas, sun umbrellas,	1.0	1.6	1.4	1.3	1.3	1.3	1.3	1.1	1.2	1.1
XIII Articles of stone, plaster, cement,	1.3	1.8	2.2	2.2	2.0	2.0	1.9	1.6	1.7	1.9
XIV Natural or cultured pearls, precious or	0.5	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2
XV Base metals and articles of base metal	5.2	6.0	7.1	8.1	8.5	9.3	8.2	8.1	8.1	9.0
XVI Machinery and mechanical appliances; electrical	18.4	19.7	22.6	22.7	25.3	29.5	30.7	38.5	33.5	29.7
XVII Vehicles, aircraft, vessels and	14.7	8.5	6.9	7.3	10.6	9.6	7.6	6.9	8.9	10.8
XVIII Optical, photographic, cinematographic,	2.5	2.4	2.6	2.6	2.3	2.2	2.6	2.2	2.0	2.0
XIX Arms and ammunition; parts and accessories	0.3	0.2	0.0	0.0	0.0	0.0	0.2	0.1	0.0	0.1
XX Miscellaneous manufactured articles	3.0	2.8	3.0	2.9	2.6	2.6	2.6	2.3	2.6	2.5
XXI Works of art, collectors' pieces, and antiques	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
XXII Supplies for foreign vessels	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0

Source: Statistical Office of Estonia[26]

Due to the soaring domestic demand the import growth reached 10.6% and contributed to the very high current account (CA) deficit. The fastest growing commodity group was transport equipment (mainly cars). The main trading partners remained Finland, Germany and Sweden while the total share of EU was 58%. The most important risk factor for the economy is the high current account deficit generated by the trade balance. The CA deficit accounted for 12.2% of GDP in 2002 (5.8% and 6.1% in 2000 and 2001, respectively). The net FDI inflow fully covered the current account deficit before 2002. But in 2002, the deficit was four times higher than the net FDI inflow. The most important consequence is the growing foreign debt of private sector, which exceeded 60% of GDP. At the same time, the government deficit is a strong point of the economy because it is equal only to 4.4% of GDP (ICEG, 2003).

[26] http://gatekeeper.stat.ee:8000/px-web.2001/Dialog/statfileri.asp

In Estonia's imports we can also notice a remarkable growth of the contribution of Finland (one-third of total imports) in 2000 and 2001 (Table A15). The contribution of Sweden is slightly declining.

Table A15.: Special imports from main trading partner countries, 1999–2002 (at current prices)

	1999		2000		2001		2002	
	MEUR	%	MEUR	%	MEUR	%	MEUR	%
TOTAL	3223.6	100.0	4615.7	100.0	4798.4	100.0	5 078.8	100.0
Finland	835.7	25.9	1266.0	27.4	866.0	18.0	869.7	17.1
Sweden	345.8	10.7	454.6	9.9	442.2	9.2	484.3	9.5
Germany	335.3	10.4	437.2	9.5	525.7	11.0	570.7	11.2
Latvia	76.2	2.4	118.7	2.6	107.5	1.9	120.3	2.4
United Kingdom	82.6	2.6	105.5	2.3	113.3	2.4	125.2	2.5
Denmark	90.1	2.8	114.8	2.5	121.1	2.5	123.2	2.4
Lithuania	57.7	1.8	75.7	1.6	124.7	2.6	169.0	3.3
Norway	33.3	1.0	62.7	1.4	51.2	1.1	54.7	1.1
Netherlands	83.6	2.6	97.5	2.1	118.6	2.5	135.6	2.7
Russian Federation	258.4	8.0	391.4	8.5	389.7	8.1	375.2	7.4
United States of America	90.5	2.8	101.4	2.2	109.5	8.7	160.6	3.2
Ukraine	31.6	1.0	36.6	0.8	48.9	1.0	69.8	1.4
France	74.0	2.3	98.0	2.1	117.4	2.4	133.9	2.6
Japan	173.2	5.4	279.4	6.1	213.5	4.5	194.8	3.8
Italy	114.5	3.6	131.6	2.9	158.5	3.3	235.0	4.6
Austria	25.2	0.7	29.6	0.6	45.2	0.9	56.2	1.1
Poland	67.0	2.1	84.0	1.8	108.2	2.3	140.8	2.8
Belgium	56.5	1.7	77.9	1.7	91.4	1.9	104.2	2.1
China	41.6	1.3	163.7	3.5	418.2	8.7	264.9	5.2
Czech Republic	24.2	0.7	43.9	0.9	57.2	1.2	51.7	1.0
Other countries	326.6	10.1	445.3	9.6	570.7	11.9	639.1	12.6

Source: Foreign Trade, 2002; Statistical Office of Estonia[27]

The growth of special imports (and imports from Finland) in 2000 was also related to the aforementioned subcontracting. Imports of goods for processing and later re-exports (not levied with VAT and thus not allowed for free circulation) grew from 0.7 billion euros in 1999 to 1.4 billion euros in 2000. In 2001 and 2002, imports for processing and re-exports declined to 1.2 and 1.0 billion euros, respectively.

Thus, Estonia's success in high technology and ICT exports is largely dependent on subcontracting to Finnish and Swedish companies. Parallel to high tech export flows similar high tech import flows occurred (components for assembling). Value added in Estonia remains rather low and so is the direct impact of subcontracting on economic growth. But the adverse shock caused by the burst of ICT bubble and squeeze in subcontracting on ICT companies also remained low.

[27] http://gatekeeper.stat.ee:8000/px-web.2001/dialog/statfileri.asp

A.3. Labour market

The population decrease (see Chapter H) has influenced also the situation in the Estonian labour market. In the transition period, Estonia was characterised by the decrease of labour force, which besides changes in the population were caused also by changes in the economic situation. Despite the considerable decrease in the population number, the first signs of unemployment also revealed themselves in 1991. The labour force released in the process of fast restructuring of the economy had to find new employment that however did not always succeed. The establishment and expansion of small and medium-sized enterprises, being the main area providing new jobs, is not active enough in Estonia. Therefore, the share of employed people in the population aged 15-64 decreased from 72.3% in 1992 to 61.7% in 2002 and in the population aged 15-74, the employment rate declined from 58.5% to 55.9% in the period 1997-2002 (Table A16). The EU average share of employed persons as a percentage of total population aged 15 to 64 was 63.2% in 2000 (Eurostat, 2002). This happened in Estonia at the time when technological changes demanded endless re-qualification. At the same time, younger generation was due to longer school time also longer engaged in education. The lower birth rate is a reason why the students' generation is increasingly smaller. To enable older generation to stay longer in the labour market they need to upgrade and train themselves and participate in life-long learning, especially in such fields of knowledge and skills as technology, use of computers, setting up and management of one's own firm, etc.

Table A16.: Labour market in 1997-2002, thousand

	1997	**1998**	**1999**	**2000**	**2001**	**2002**
Working-age population [28]	1055.8	1051.1	1046.8	1046.5	1047.2	1047.2
Labour force	683.0	672.6	659.8	662.4	660.8	652.7
Employed	617.2	606.5	579.3	572.5	577.7	585.5
Unemployed	65.8	66.1	80.5	89.9	83.1	67.2
Not active	372.8	378.5	387.0	384.1	386.4	394.4
Employment rate	58.5	57.7	55.3	54.7	55.2	55.9
Unemployment rate, %	9.6	9.8	12.2	13.6	12.6	10.3
Monthly gross wages, EUR[29]	228.0	255.0	284.0	313.0	352.0	390.0
Annual real growth of wages, %	7.7	6.7	6.9	6.3	6.2	7.0
Real growth of productivity, %	10.2	6.5	4.0	8.4	4.1	4.3

Source: Labour Force, 2003; Estonian National Development Plan 2004-2006[30]

By age groups, the employment rate has decreased, compared with 1993, most in the age group 15-24 (by 15.9 percentage points), but in older age groups, especially in the age group 50-69, has even risen (by 1.4 percentage points) (Table A17, see more detailed Table A24 in Annex). Compared with 1989, the employment rate has declined remarkably, amounting from

[28] Population aged 15-74

[29]

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Exchange rate, EEK per ECU/EUR	15.464	15.348	14.819	15.074	15.670	15.783	15.647	15.647	15.647	15.647

Source: Bank of Estonia

[30] http://www.fin.ee/index.php?id=5119

21.8 percentage points in the age group 15-24 to 14.7 percentage points in the age group 50-74.

Table A17.: Employment rate by age groups, percentages

Age group	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
15-24	49.6	48.0	47.9	46.3	43.7	45.7	40.7	38.6	38.6	37.1	32.1	31.5	31.1	27.8
25-49	93.5	92.0	90.8	88.2	84.9	83.5	81.3	80.5	80.4	79.3	76.8	76.2	76.6	77.4
50-69	65.9	64.8	61.4	55.2	49.5	47.8	44.8	45.4	45.8	46.5	46.1	46.0	47.3	50.9
50-74	58.7	58.2	55.3	49.3	43.8	41.9	38.9	38.9	40.1	40.4	39.8	39.7	40.9	44.0

Source: Statistical Office of Estonia, 2003

From the early 1990s till 2000, the tendency of declining employment and increasing unemployment and inactivity was dominating. In 2001, the trend of employment and unemployment changed – employment started to rise and unemployment to fall. But the inactivity was still increasing. The unemployment rate, being about 10% in the middle of the 1990s, went up rapidly after the economic crisis in Russia in 1999. After that, the labour market had to get adjusted to the changed economic situation. Since 2001, the number of unemployed has decreased rapidly due to the economic growth and the unemployment rate dropped to 10.3% in 2002 (EU average 8.2% in 2000) (Eurostat, 2002).

So, the labour market situation in Estonia was less favourable than in the EU in 2002. The main problem experienced by the Estonian labour market is the non-conformity of labour demand and supply. Shortage of qualified labour and high unemployment are concurrent. Long-term unemployment and unemployment among young people (Table A18) are also considerably higher.

Table A18.: Unemployment by age group in 1993-2002, %, annual average

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
15-24	11.2	11.7	14.4	16.1	14.5	15.8	19.7	23.8	22.2	17.6
25-49	6.5	7.6	9.7	9.6	10.0	10.0	12.3	12.9	11.9	9.7
50-69	4.2	5.1	6.9	7.3	6.1	6.2	8.5	10.6	9.9	9.2
50-74	4.2	5.1	6.9	7.3	5.9	6.1	8.3	10.3	9.6	8.9
Total 15-74	6.6	7.6	9.7	9.9	9.6	9.8	12.2	13.6	12.6	10.3
16 until pension age	6.9	7.9	10.0	10.4	10.2	10.4	12.7	14.2	13.1	10.8
15-64	6.7	7.7	9.7	10.0	9.8	10.0	12.4	13.8	12.8	10.5
15-69	6.6	7.6	9.7	9.9	9.7	9.9	12.3	13.7	12.7	…

Source: Statistical Office of Estonia, 2003[31]

There was a large disparity in the unemployment rate of Estonians (7.9%) and non-Estonians (14.9%) in 2002 (Statistical, 2003d). The gender inequality on the labour market is slightly lower than in the EU on average. The employment rate of men was by 10.3% percentage points higher than that of females in 2000 (EU average by 18.5 percentage points, respectively) (Püss and Viies, 2002). But unlike the EU average, the unemployment rate of men in Estonia has been slightly higher (by 1.9 percentage points in 2000) than that of females over the last decade (in the EU female unemployment rate was higher by 2.7 percentage points than men's in 2000). Unemployment has a structural character as there are not enough jobs for poorly qualified workers. At the same time, modern companies are difficult to establish or develop due to the lack of qualified labour force. The educational system does not provide people with training essential for working life and flexibility of the

[31] http://gatekeeper.stat.ee:8000/px-web.2001/dialog/statfileri.asp

labour force in the labour market is low. It also fails to support opportunities and willingness of population for life-long learning. The national labour market policies have been insufficiently funded and remain passive (unemployment benefit) (Estonian, 2004[32]).

The relatively low-cost labour resource is one of the attractive features of Estonia, e.g. the average wage level in Estonian industry is 26% of the EU average (Estonian, 2004[33]). The Eurostat estimates that the price of Estonian labour force is 7.5 times cheaper than the EU average (News, 2003) and the Federation of European Employers has judged Estonia and Croatia the most favourable countries from the employers' point of view. At the same time, the real wages have risen much quicker than the overall productivity of Estonian economy (see Table A16 and Chapter C). Although Estonia will still enjoy some cheap labour related competitive advantages in the short term, this may lead to the loss of this competitive advantage. There are in Estonia already cases of re-location of high tech manufacturing to cheaper labour cost areas, e.g. to Russia. The increasing labour costs as a result of the rapid rise of wages probably cause a decline in subcontracting in Estonia and ultimately, also a decline in ICT sector exports, because subcontracting contributes a high share in this sector. Therefore, in the medium and long term, the Estonian industry will be probably locked in the activities of low technological and low income level if the current trend of specialisation continues (Tiits *et al*, 2003).

A.4. Regional development

There are regional differences in economic development within Estonia that could hinder IST development to some extent despite the small territory of the country and the relatively high share of urban population (66.6% as of January 2003 (Regional, 2003)). More than half of the GDP is produced in Northern Estonia (Table A19). Although Northern Estonia (that includes the capital city Tallinn) concentrates also 38% of Estonian population (44% of urban population), its high GDP contribution is supported also by 50% higher GDP per capita level than Estonia's average and approximately 80% of foreign investments.

[32] http://www.fin.ee/index.php?id=5119
[33] http://www.fin.ee/index.php?id=5119

Table A19.: Regional[34] development indicators in Estonia 1997–2001[35]

	Year	Northern Estonia	Central Estonia	North-eastern Estonia	Western Estonia	Southern Estonia	Estonia total
Gross domestic product at market prices, MEUR	1997	2 369	296	361	376	686	4 087
	1998	2 758	334	375	426	766	4 659
	1999	2 866	369	379	445	819	4 878
	2000	3 334	391	420	502	928	5 575
	2001	3 819	429	444	540	1 024	6 256
Contribution of regions to GDP, %	1997	58.0	7.2	8.8	9.2	16.8	100.0
	1998	59.3	7.2	8.0	9.1	16.4	100.0
	1999	58.7	7.6	7.8	9.1	16.8	100.0
	2000	59.8	7.0	7.5	9.0	16.7	100.0
	2001	61.0	6.9	7.1	8.6	16.4	100.0
Mean annual population, thousand	1997	533.4	147.6	187.0	170.2	361.4	1 399.5
	1998	529.7	146.2	183.9	168.6	357.7	1 386.2
	1999	527.1	144.9	181.3	167.0	355.3	1 375.7
	2000	525.6	144.1	179.5	166.2	354.1	1 369.5
	2001	524.3	143.5	178.2	165.4	352.7	1 364.1
GDP per capita, ECU/EUR	1997	4 441	2 003	1 930	2 208	1 899	2 920
	1998	5 207	2 286	2 037	2 528	2 142	3 361
	1999	5 437	2 549	2 089	2 665	2 305	3 546
	2000	6 343	2 715	2 339	3 023	2 621	4 071
	2001	7 284	2 993	2 492	3 263	2 904	4 587
GDP per capita, % of Estonian average	1997	152.1	68.6	66.1	75.6	65.0	100.0
	1998	154.9	68.0	60.6	75.2	63.7	100.0
	1999	153.3	71.9	58.9	75.2	65.0	100.0
	2000	155.8	66.7	57.5	74.3	64.4	100.0
	2001	158 8	65.2	54.3	71.1	63.3	100.0
Employment rate, %	1997	62.9	56.6	55.7	59.6	53.2	58.5
	1998	62.6	56.2	52.9	58.3	52.7	57.7
	1999	61.3	54.0	49.0	52.7	51.2	55.3
	2000	59.6	53.0	48.7	55.8	50.3	54.7
	2001	60.4	56.0	49.7	53.1	50.5	55.2
	2002	62.0	54.7	49.2	54.4	51.1	55.9
Unemployment rate, %	1997	8.5	8.9	13.3	7.0	11.0	9.6
	1998	9.1	8.4	14.7	7.9	10.0	9.8
	1999	10.2	12.0	20.0	11.8	11.6	12.2
	2000	11.5	14.9	21.1	11.8	13.4	13.6
	2001	11.6	11.0	18.0	11.0	12.8	12.6
	2002	8.6	9.7	18.9	9.2	9.3	10.3

Source: Statistical Office of Estonia, 2003[36],

Thus, compared with GDP per capita at PPS in EU, Northern Estonia (Tallinn and Harju county) may reach about 60% of the EU-15 average while other regions are on the level of

[34] Groups of counties presented on the 3rd level of the Estonian nomenclature of territorial units for statistics confirmed by the Government of the Republic Regulation No. 126 of 3 April 2001 differ from groups with the same name formerly used by the Statistical Office of Estonia.
Northern Estonia: Harju county (incl. Tallinn);
Central Estonia: Järva, Lääne-Viru and Rapla counties;
Northeastern Estonia: Ida-Viru county;
Western Estonia: Hiiu, Lääne, Pärnu and Saare counties;
Southern Estonia: Jõgeva, Põlva, Tartu, Valga, Viljandi and Võru counties.
In calculations, revised population numbers for the years between 1989 and 2000 population censuses have been used.

[35] Employment and unemployment data are available also for 2002

[36] http://gatekeeper.stat.ee:8000/px-web.2001/Dialog/ statfileri.asp

25-30%. Besides fulfilling administrative functions (government, majority of ministries) Tallinn is also an important centre of services (hospitals and health care services, education services in many state and private universities) and attracts about 90% of foreign tourists to Estonia. The Port of Tallinn concentrates remarkable passenger and freight flows, financial institutions are also located in Tallinn.

Central Estonia is mainly an agricultural area (the share of rural population is highest – 64%) with many producers of foodstuffs. However, it has various other manufacturing enterprises as well. Thermal power plants (see Chapter C) in the Northeast Estonia supply electricity for almost all Estonia by burning oil shale that is mined in the region. The urban population share is highest in this region (88%). Southern Estonia is also mainly an agricultural region (50%); however, the university town Tartu (with Tartu University and Agricultural University) has a great impact on the allocation of IST knowledge potential. Islands (Saaremaa, Hiiumaa and others) on the Western coast of Estonia give specific features to western Estonia (the share of rural population 48%). Recreation is of high importance in Pärnu (also called Summer Capital of Estonia) and in Haapsalu.

Thus, differences in the GDP per capita levels are to a large extent caused by differences in economic structures. Some of activities (recreation, tourist services, fishing, agriculture and forestry) have a seasonal character; oil shale mining and thermal power plants depend on the location of oil shale deposits. Large regional differences in the level of employment and unemployment (see Table A19) may be inherited from the past or/and introduced during economic restructuring after the beginning of the transition. There is still a relatively higher incidence of unemployment in the former agricultural and industrial regions. However, these have started to diminish gradually, facilitated by accelerating entrepreneurship development in many counties. In Chapter C, we have summarised the processes that most strongly affected Estonian regional development.

Estonia has also several advantages for balancing regional development. The small size of the country can be seen as one of the most important factors. Considering the small territory of Estonia (about 45 thousand square kilometres only) the negative impact of regional differences on IST has been avoided mainly in the sense of public access. Maximum distances in Estonia are about 300 km and it takes the maximum of 4 hours to reach even the most remote places by car (islands on the West cost of Estonia are an exception because one has to consider also ferryboats' timetables). However, due to the greater concentration of population and ICT sector businesses in Tallinn better ICT services are offered there and some evidences of regional digital divide (see Chapter B) can be find.

Conclusions

Estonia has a well-performing market economy that is based on a stable macro-economic framework. Rapid market economy reforms have developed a favourable economic environment in Estonia, providing for a considerable progress made in the process of convergence towards the developed industrial countries. Estonia is currently getting ready to meet the competition requirements of EU.

Since 1994, Estonia has enjoyed rather high economic growth rates that in recent years have exceeded those of EU15 and the Eurozone. Nevertheless, if compared by GDP per capita at PPS, the Estonian level was below the EU average and many acceding countries in 2002.

The main factors of success in macroeconomic stabilisation and economic growth can be summarised as follows:

- Liberal and competitive economic environment,
- High capital formation ratio promotion by foreign capital inflow,
- Rapid development of foreign trade in goods and services.

The structure of Estonian economy has converged towards the industrial countries. The most common characteristic of the structural changes has been the decreasing importance of agriculture and post-soviet industries and a rapid surge of the service sector and some other new industries.

Until 2000, the tendency of decreasing employment and increasing unemployment and inactivity was dominating. In 2001, the trend of employment and unemployment changed – employment started to rise and unemployment started to fall.

Regional disparities in socio-economic development within Estonia could serve as a basis for a digital divide on the demand side of IST development despite the small territory of the country and the relatively high urbanisation of the population.

A.5. A SWOT analysis

Strengths	**Weaknesses**
Liberal and open economic policy High growth rates of GDP Strong monetary policy and competitive financial sector Stable tax policy supporting investments Stable budgetary policy Liberal and competitive economic environment Liberal trade policy and movement of capital Market controlled wages and prices No state-owned banks and no risks for political allocation of credits Remarkable share of FDI in economy	Low level of GDP per capita Large current account deficit High structural unemployment Low flexibility of labour force High share of subcontracting in manufacturing Regional differences in economic development Low added value in exports Mismatch between labour demand and supply High exposition to external shocks and changes in international economic environment Dependency in foreign investments (mainly on Sweden and Finland) makes economy extremely vulnerable High-tech exports of total manufactured exports are largely dependent on subcontracts
Opportunities	**Threats**
Opening of European markets conduces to development of export High FDI contribution of technologically advanced neighbours (Finland, Sweden) to investment Contribution of fast development and implementation of new technologies in business and industry	Decreasing competitive advantage of labour cost Re-location of high tech manufacturing to cheaper economy areas due to rising wages and labour costs High current account deficit

The factors considered by the authors as most relevant to the IS development of the country are underlined in the above SWOT.

Liberal and open economic policy and high growth rates of GDP, opening of European markets and technologically advanced neighbours paved ground for fast development of ICT in Estonia. Induced by these developments, the growth of numerous subsidiaries and affiliates of foreign companies brought along IST applications, which domestic enterprises began to use in order to stay competitive and which created good opportunities for moving towards the IS. The high share of subcontracting despite its low value added has an important role in the development potential of manufacturing. At the same time, subcontracting makes the economy extremely vulnerable to external shocks and changes in international economic environment, especially due to the dependency of foreign investments mainly on two countries (Sweden and Finland). As high-tech exports of total manufactured exports are largely dependent on subcontracts, re-location of high tech manufacturing to cheaper economic areas in connection with the rising labour costs is a big threat.

B. NATIONAL AND REGIONAL INFORMATION SOCIETY POLICIES

B.1. Institutional settings

Institutional settings for supporting IT development in Estonia are resulting from the main principles of the Estonian information policy, the aim of which is to guarantee everybody (e.g. citizens, businesses etc) an equal access to information. The state in co-operation with the business sector and the third sector has played an important role in co-ordinating building up of the information society in Estonia (Principles … 2004-2006). The Research and Development Council (RDC)[37], being an advisory body to the Government, is consulting the Government on issues regarding research and development, prepares documents on research and development policies of Estonia. In its activity, RDC relies on two permanent committees that focus on research, development and innovation policy (see more in subsection B.2 and Table B1 in Annex).

IT development in public administration was initially co-ordinated by the State Chancellery, Government Department of Communications. In 2000, co-ordination of the state information systems was transferred under the governance of the Ministry of Transport and Communications – Department of State Information Systems and Estonian Informatics Centre. In autumn 2002, the Ministry of Transport and Communications and the Ministry of Economic Affairs were merged under the name of Ministry of Economic Affairs and Communications. The joining of ministries brought transition processes into the organisation of state information systems co-ordination. By the end of 2002 a new organisational structure of ICT management was created (Figure B1). The development of information systems also caused some organisational changes in 2003, for example changes in the organisation of the Estonian Informatics Centre. A councillor responsible for IT was recruited in the Ministry of Economic Affairs lately, which strengthened the level of political administration.

The co-ordination of IT development is centralised under the Ministry of Economic Affairs and Communications. The Department of State Information Systems of the Ministry of Economic Affairs and Communications is responsible for co-ordination of state IT-policy actions and development plans in the field of state administrative information systems: state IT budgets, IT legislation, co-ordination of IT projects, IT audits, standardisation, IT procurement procedures, and international co-operation in the field of state information systems. The Estonian Informatics Centre, which is a subdivision of the Ministry, is responsible for the co-ordination and implementation of the development of state registers, computer networks and data communication, standardisation, IT public procurement, monitoring of the Estonian IT situation and others (ICA Country Report, 2003).

[37] http://www.tan.ee/tan/en/

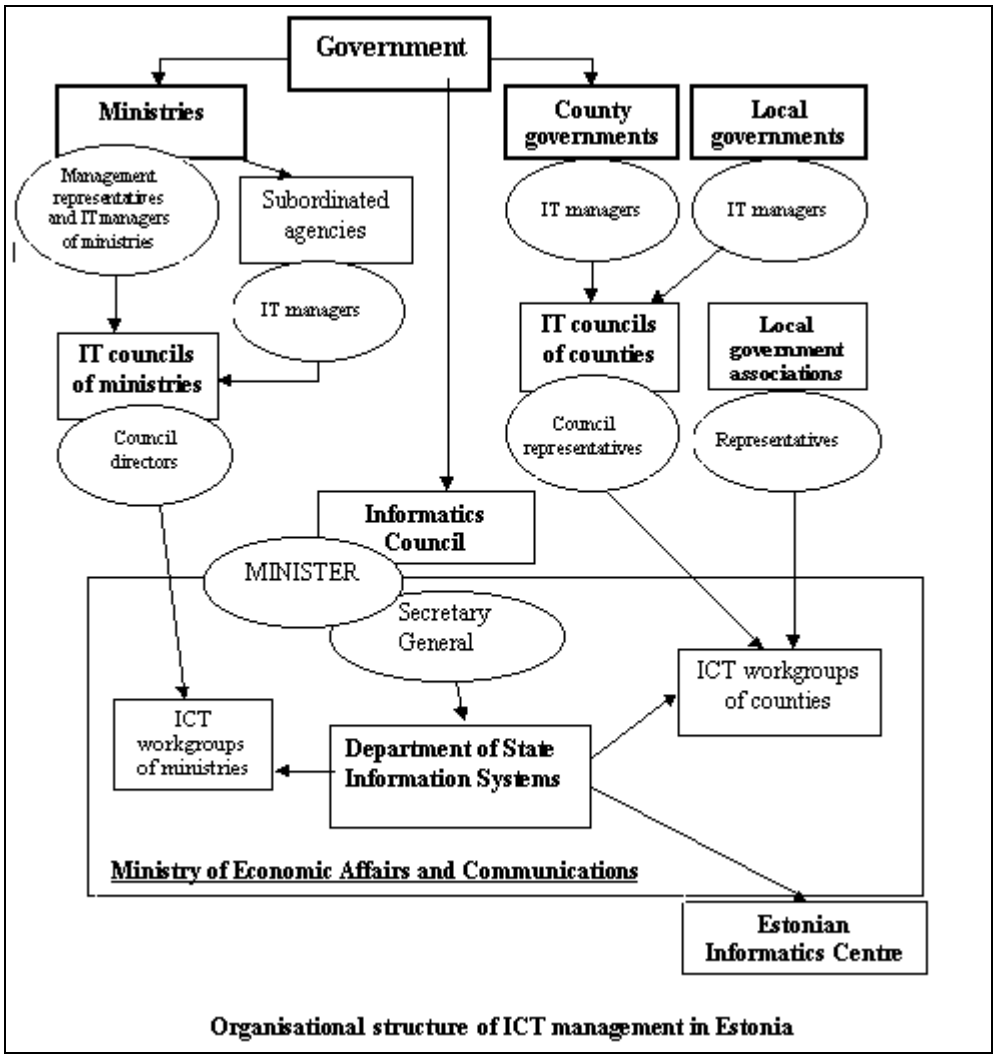


Figure B1.: Structural Scheme of ICT Management System in Estonia
Source: IT in Public Administration, 2002

The Estonian Informatics Council, a government committee of experts (acting since 1997) is the implementing body in the horizontal co-ordination of state information policies (between the public, the private and the third sector). The representatives of all three sectors (public, private sector and third sector) have been involved in the work of the government committee of experts (Estonian Informatics Council) as well as in the activities of several working groups. The tasks of the Council are: work out the proposals for preparing general principles and strategies for informatisation of the Republic of Estonia; look through the relevant draft laws and express opinions about them; counselling of the Government in the issues of implementing informatics development plans considering the integration to the European Union; examine national development plans of the information systems. The technical maintenance of the Council is provided by the Ministry of Economic Affairs and Communications (i.e. Department of State Information Systems - RISO).

In the Ministry, the development of information and communication technology is co-ordinated by the Information Technology Council, who approves of the IT development strategies in the domain of the Ministry and envisages measures to implement these strategies, based on the information policy principles. The development of information and communication technology on the regional level is co-ordinated by the regional information technology council at the county governor. The regional IT-council organises the elaboration

of IT development strategies in the county and plans measures for implementing these strategies, based on the general principles of information policy. In order to engage the private and third sector (incl. the Association of Estonian Information Technology and Telecommunications Companies – ITL) in the implementation of the action plans, an organisational and financial mechanism will be established (according to the information policy general principles for 2004-2006) at the Estonian Informatics Centre (Principles…, 2003).

The Ministry of Economic Affairs and Communications is organising the implementation of information policies on the basis of the information policy action plans. The action plan is prepared at the beginning of every year for the next year and this aggregates the activities of the different ministries involved in the development of information society, indicating those responsible for the activities, the measurable objectives for evaluating success of the actions and estimates of the financial resources needed for implementing the action plans.

The Ministry of Economic Affairs and Communications prepares the action plans based on the purposes and priorities presented in the general principles and on the strategic documents of the European Union about information society development. Representatives of the public and private sector and research institutions are invited to join in the preparation of the action plans. The action plan aggregates the plans of the ministries for the next fiscal year, which helps to accomplish information policy objectives. The action plan is submitted for approval to the Central Government before the start of the state budget planning process and this serves as a basis for planning the IT expenditure in the state budget. The Ministry of Finance in co-operation with the Ministry of Economic Affairs and Communications work out and submit to the Government an act of law for financing the implementation of the action plan and for organising supervision.

B.2. Chronological description of national and regional IS policies

In information technology development, Estonia has already had some spectacular achievements for a long time, even in the Soviet period. The first national information development program *The Estonian Way to the Information Society* was prepared in 1994.

The Estonian Parliament approved the *Principles of the Estonian Information Policy* in 1998. This document serves as a basis for making public policy decisions concerning the development of information society and also as a basis for the action plans. The preparation of the Estonian information policy framework was concentrated on the following four fields (IT in Public Administration, 2002):

- modernisation of legislation,
- supporting the development of the private sector (e.g. through creating a favourable legal environment; liberalisation of markets; promotion of R&D etc),
- development of communication between the state and citizens,
- acknowledgement of problems related to information society (e.g. personal data protection).

A draft[38] of the new policy document – *Principles of the Estonian Information Policy for 2004-2006*[39] was completed by the end of 2002. It takes into consideration the changes in the

[38] Not yet adopted.

development of information society, the principles fixed in the documents that discuss the development of information society (eEurope 2005) and it envisages trends and guidelines for planning new activities in sectoral development plans. According to the new document, the public authorities shall carry out their activities based on the following main principles: (1) Implementation of digital administration and e-services in all public sector, providing relevant information and training for the whole society; (2) Keep the level of ICT usage at least on the EU average level; (3) Create preconditions for the development of an export capable information technology sector (e.g. support SME export activity and development of the firms' competency). The information policy aimed at the development of information society is a subject which involves many spheres and which is therefore closely connected with other development spheres implemented on the state level, including educational strategy "Learning-Estonia", research and development strategy "Knowledge-based Estonia" and the national policy to promote small and medium-sized enterprises ("Enterprising Estonia"). The principles of information policy seek to guide and devise a framework for planning activities in sectoral development plans that are aimed at the development of information society (IT in Public Administration, 2003).

The new version of information policy principles includes supplements to previous principles, according to which (IT in Public Administration, 2003):

- development of information society is based on the co-ordinated activities and co-operation of public authorities, private sector and the third sector;
- information society is created for all Estonian citizens and supports regional development and local initiatives;
- development of information society provides an opportunity for equal access to information for all citizens;
- development of information society ensures continuity of the Estonian language and culture;
- development of information society must not decrease the security of citizens;
- development of information society is related to national research and development activities;
- activities of information society development are brought out as separate elements in the national education, culture and social policies;
- development of information society takes into account the information society building programs of the European Union;
- public authorities have equal attitude towards different hardware and software platforms and solve the issue of compatibility by establishing general standards.

The overall goal lies in the development and integration of the ICT infrastructures of the central and local governments into a common citizen-friendly service environment that would observe the principles and requirements of the development of democracy.

The National Development Plan (NDP) has IS development among its top priorities. The specific objectives are: (1) to develop e-services for enhancing the efficiency of the public sector and society as a whole, and (2) to develop information and simplify public access to information (Estonian National Development Plan…, 2003). NDP also emphasises to continue the promotion of a regionally balanced development, i.e. financing and co-ordination

[39] http://www.riso.ee/et/Infopoliitika2_12_11_03.doc

of co-operation between the state and local governments in developing e-services in regional programs and county governments' development functions (a common environment for administration, training of officials, standards, systems). Within the development of information technology solutions, e.g. e-democracy, they are preparing an electronic voting system for the 2005 local government elections.

In December 1999, the State prepared the Estonian Research and Development Strategy 2002-2006 - *Knowledge-based Estonia*, which is focused on the following main areas: user-friendly Information Society Technologies; bio and gene technologies and their applications; innovative industrial and environmental technologies. The Strategy sees the future of Estonia as a knowledge-based society where the development of human capital, research and adoption of new knowledge and skills is the source of growth of the competitiveness of the economy (Knowledge-based Estonia…, 2001). For the strategy implementation, the Spinno program was launched in co-operation between *Enterprise Estonia* (the foundation of enterprise development) and in 2001-2003 the Ministry of Economic Affairs is one of the connecting mechanisms furthering liaisons between entrepreneurship and science. The objective of the Spinno program is to promote the implementation of the results of scientific research in business. The budget of the program was 29 million kroons in this period. Continuation of the program beyond 2003 will be decided on the basis of the program evaluation carried out upon the completion of the program.

The *Public Information Act* entered into force on 1 January 2001, stipulating what information should be generally accessible. Documents must be available systematically and all legislative acts can be accessed electronically. Priorities are set for two years ahead on a rolling program: Document Management in Government; Implementation of Digital Signature; ICT in Education; Service layer for state registries for both citizens and businesses. Services must be provided for Russian-speaking minorities as well.

Most of the necessary IT legislation has already been elaborated in Estonia (see Table B1.). Although the laws listed in the table have been amended by today by a number of acts, the rapid development of ICT field requires further improvement of legislation. This applies, for example, to the Database Act (1997), which needs revision according to the introduction of new trends in data processing. As a future EU member state Estonia is harmonising its legislation with that of the European Union. Currently, the work on transporting the European Union's new telecom package into Estonian legislation is under way (ICA Country Report, 2003). The Telecommunications Act will be changed into a law regulating liberalised telecom market. Personal Data Protection Act has been amended during 1998-2003 and its last version entered into force on 1 October 2003[40]. The Ministry of Economic Affairs and Communications is also continuing the elaboration of legislation for e-commerce to cover the missing part of information society legislation therefore to comply with the information society related package of directives of the *acquis communautaire*.

[40] RT (State Gazette) I 2003, 26, 158

Table B1.: The list of most relevant legislation related to information society in Estonia

Name	Passed on:
Archives Act	25.03.1998
Broadcasting Act	19.05.1994
Copyright Act	06.01.2000
Cable Distribution Act	31.05.2001
Citizenship Act	19.01.1995
Consumer Protection Act	15.12.1993
Databases Act	12.03.1997
Digital Signature Act	08.03.2000
Official Statistics Act	11.07.1997
Personal Data Protection Act	12.06.1996
Population Register Act	31.05.2000
Principles of Estonian Information Policy	13.05.1998
Public Information Act	15.11.2000
Public Procurement Act (new)	19.10.2000
Riigi Teataja Act (new) (Riigi Teataja = State Gazette)	20.01.1999
State Liability Act	02.05.2001
State Secrets Act	26.01.1999
Telecommunications Act	09.02.2000

Note: Texts of legal acts are translated into English by the Estonian Legal Language Centre and are available in the Internet.[41]
Source: IT in Public Administration of Estonia, 2003

The *Information Policy Action Plan* was approved in June 1999. The following areas are covered: education, research and technological development, telecommunications and audio services. The Action Plan is the basis for all government agencies to make specific proposals to the Government: proposals with schedules, sources of finances, and responsibilities for the implementation of information policy programs. Every year the information policy framework has been developed further and the Government has been defining general priorities[42] for implementing information policy resulting from legislative action. The priorities for implementing information policy for 2001-2003 are presented below:

For 2001 the main priorities were[43]:

- Implementation of the tasks stipulated in the Public Information Act (creating procedures to get access to public information, e.g. registers);
- Establishment of integrated support systems for digital records management (including digital signature and ID-card);
- Document management in public administration;
- Organisation of state registers and their cross-use.
- Launching the Tiger Leap Program in higher education.

The purpose is to develop and to integrate the ICT infrastructures of the state and local governments into a general citizen-friendly service environment.

[41] http://www.legaltext.ee/indexen.htm
[42] http://www.publicsectorinfo.com/summary_results/10a.html)
[43] http://www.riso.ee/et/raamk.htm

Information Policy Priorities for 2002/2003[44]

According to the Government decision of 14 May 2002, the information policy priorities for 2002/2003 were:

- development of services for the citizens, business sector and public administration, especially elaboration of ID-card applications, also based on the list of e-government services defined in the eEurope+ Action Plan;
- improvement of skills and access of social groups in unequal position to services provided electronically;
- elaboration and introduction of systems for digital document management and archival processing;
- development of the system and infrastructure of state registers, including the development of systems that ensure the maintenance of databases and the introduction of the data exchange layer (project "X-road") of information systems;
- better provision of computers for schools to achieve the ultimate goal – one computer per 20 students;
- launching of the Tiger University program to support the development of information and communication technology (ICT) infrastructure and academic ICT staff, and the infrastructure for post-graduate training (see financing in Chapter G).

In parallel with specifying the priorities of actions, applications shall be submitted for financing these activities from the government budget. Finances are allocated through specially targeted programs and projects and also include state institutions expenditure on information technology and relevant legislative activity.

Programs for introducing ICT in education also deserve attention (i.e. Tiger Leap; Tiger Leap+; Tiger University). The Estonian Tiger Leap+ action plan for 2001-2005 focuses on 4 fields: ICT competence, virtual learning, sustainable development of infrastructure and collaboration of all parties (more in Chapter G). These programs are available for schools in all regions.

The ICT financing from the state budget has stayed around 1 percent of the overall figure of the state budget (IT in Public…, 2003) and in absolute value it has increased together with the increase in the overall amount of the state budget (Table B2). The resources allocated for ICT in public administration include fixed costs (maintenance of ICT infrastructure components, annual fees of software licences, outsourced hardware and software services and data communication expenses) and expenses on subcontracting ICT development projects (Estonian Research and Development Strategy 2002-2006). The actual expenditures[45] on IT in public administration are larger, as the expenditure item does not include the salaries of ICT staff, grants from the state budget, training cost of ICT education and the ICT expenditures of local governments[46] (IT in Public Administration…, 2003). Therefore, Estonia's expenditures on ICT have been rather modest (compared with other countries where expenditure on IT is estimated at 2.5%-4%).

[44] http://www.riso.ee/en/index.html
[45] Including activities for preparing the environment for supplying services for citizens and businesses.
[46] The amount of these expenditures is not specified and is not available in statistics

Table B2.: IT costs in State Budget

Year	MEUR	% of State budget
1999	15.1	1.3
2000	14.5	0.8
2001	17.1	0.9
2002	23.0	1.1
2003*	28.5	1.2

Note: *according to the proposal of expert committee formed by the Ministry of Economic Affairs and Communications for the co-ordination of IT development in public administration
Source: IT in Public Administration of Estonia, 2003

Other sources of finance for introducing information society technologies include local government budgets, funds and support programs (e.g. Phare, Innovation Foundation); enterprises' own funds; as well as personal income (for buying computers and paying for services). Local governments are forced to join their resources when creating information systems under national projects and programs. Private enterprises have invested into computers and computer systems[47] over 57 thousand euros, which is 4.2% of all investments into private sector (Statistical Yearbook, 2003). Though, people's interest in new technologies has been an advantage – they have spent nearly 6 percent of their income on telecom equipment and services[48]. In addition, foreign investments have played an important role, mainly from Finland and Sweden, also support from EU programs (e.g. Phare for Tiger Leap Program, see in Chapter G).

The Informatics Council has discussed the access to broadband connection and the need to increase it as an important priority of eEurope 2005, as well as providing access to leased line Internet connection in smaller rural districts to create more value added from using the Internet (IT in Public Administration, 2003). The Council has approved the draft law of the state database systems. The perspectives of the citizen portal and development opportunities of the national information society program are still on the agenda. They have discussed the possibility of introducing the European Network and Information Security Agency (ENISA) in Estonia. The Council has supported accession to a new initiative for ICT development of the Baltic Sea region[49].

B.3. Implementation and assessment of the IS policies

The implementation of IS policies can be assessed taking into account the national strategic priorities and the actions resulting from the priorities (as objectives) (see B2). The Estonian government has taken a leading role in co-ordinating building up of the information society. The public administration projects have had a decisive role in the development of Estonian information infrastructure and in shaping the corresponding attitudes in the society. The IS development co-ordination is centralised at the highest level (IT councillor of the Ministry of Economic Affairs and Communications, Department of State Information Systems; Estonian Informatics Centre) and the funding mechanism for actions is created partly at that level, too (central IT budget). Activities regarding co-ordination include strategic planning, defining the priority spheres and issues of providing financing for them. The central IT budget includes only direct expenditures for IT equipment, IT project design and maintenance of databases. It does not include salaries for IT staff, IT training costs, exploitation costs of information

[47] The information about other expenditures on IST development is not available.
[48] Calculations of the Statistical Office of Estonia
[49] "Baltic Sea – the Smart Region"

systems of public administration agencies, data communication costs etc. IT managers of the ministries, county governments and agencies are responsible for organising development activity of information systems. The IT implementation mechanism is weakly developed for regions.

Based on the strategic purposes to provide all citizens and institutions with equal access to government information, efforts have been made to realise communication with citizens, public sector, businesses and other stakeholders through the creation of a government portal (www.riik.ee). On this portal information on and links to all public administration levels (i.e. county and local governments) are provided. Another important activity has been the development of state information systems (e.g. ID cards, records management system etc) with the aim of making information equally available in all regions, while guaranteeing integrity and security at the same time. Therefore, the government's goals (priorities) for the use of IST are not only meant for the public administration and the public sector, but are aimed at the development of the whole society. Such strategy of the government in guiding the information society development inevitably increases its traditional role in the society although it has to co-operate with the private sector (IT solutions) so as to fulfil its tasks, and with the representatives of the citizen society (to identify mutual interests) and the state has to offer services that would lead to economic growth (use of IST, e-commerce) and would improve the life quality. It should be emphasised that the success in implementing IS policies has to a large extent been achieved with the support of the private sector, particularly in the development of infrastructure (IT in Public Administration, 2003). The government has also been innovative in introducing IS technologies to create a cabinet of e-government (see E.2.5).

Some progress should be noted regarding the implementation of IS policy priorities by the government. Hence, the IS policies can be evaluated based on the results accomplished (these estimates are presented below). Although not all objectives are directly measurable, it is possible to describe the results of the actions.

In general, the development of the Estonian information society has been estimated to be successful, which has been due to the co-operation of various institutions (Principles…, 2003). As a result:

- legislative framework of the information society, including new Telecom policy, has been developed,
- telecommunications infrastructure has been growing rapidly and the Internet has spread extensively,
- movement of public information has been regulated,
- supply of public services has been simplified,
- public administration mechanisms have been modernised with the help of information technology solutions.

Head of the department of state information systems (A. Ott) has estimated that Estonia is trending from *back-office*-oriented developments increasingly more towards *front-office* or unified service layers developments, where a computer connected to the Internet may be a terminal for many information systems (IT in Public Administration, 2003). The development of databases is trending from data collection to become services-oriented on the basis of these, and from institutional governance-oriented to become inter-institutional systems-oriented. Recent years have witnessed a clear trend from the development of infrastructure toward that

of information systems. Public core infrastructure along with the rapid growth of the number of ID-card owners has created new outlooks for creating unified identification mechanisms of the users of e-services and for the introduction of digital signature. On the international level, Estonia has a leading role here — even though these possibilities are still used quite moderately. In this field, Estonia has, according to A. Ott, reached in the ”race of ideas and possibilities” the same level as other advanced information society countries (IT in Public Administration, 2003).

The report of McConnell International (2001) has pointed out Estonia's success in the application of IT. The report states that the Estonian situation in the spheres of e-government, human capital and e-business environment is favourable (McConnell.., 2001). The research undertaken by the World Economic Forum on the use of Information technology in 82 countries (The Global Information Technology Report 2002-2003 – The Network Readiness of Nations) also indicates a strong Estonian standing in government readiness to employ ICT (Estonia is in the 13th place) and in the use of ICT by the Government (Estonia is in the 8th place).

Considering the eEurope+ Action plan and eEurope 2005 goals, Estonia has made progress in a number of areas of eEurope benchmarking process. According to the SIBIS General Population Survey (conducted in Accession Countries in 2003), Estonia is already close to EU-15 levels in ICT diffusion: citizens' access to and use of PC and the Internet as well as mobile penetration (eEurope Benchmarking…, 2003; eEurope 2003+ Progress Report, 2002). In the areas of e-learning (e.g. digital literacy), e-health as well as in broadband access at home, Estonia and Slovenia have taken a significant lead before the rest of the accession countries. Considering the fast development of information infrastructures (e.g. record high sales of computers in 2003[50]) and the development of the electronic market and electronic services we can predict convergence of Estonian benchmarking indicators to at least the European Union average level. Attention should be focused on the access of leased line Internet connection in smaller rural regions and on the development of broadband strategies.

Rapid implementation of the Internet in Estonia and the relatively high level of its use in comparison with the Central and Eastern European countries is largely due to an early application of the Internet in research and education, as well as to the existence of well-developed telecommunications network. As a result, ICT infrastructure has developed during the last ten years along with people's enthusiasm to take advantage of new technologies. Estonia has achieved one of the highest Internet (45%), mobile phones (over 60%) and PC (47%) penetration rates in CEE and can compete with a number of EU countries (see more in Chapter E). Although the penetration rate growth stopped in 2000-2001, it continued to increase slightly in 2002. This can be explained by the fact that the number of IT-users in Estonia has reached a certain level of saturation for various reasons (e.g. economic possibilities; lack of skills) (see E.2.6). However, the record high sales of computers at the end of 2003 (*Äripäev*, 22.01.2004) allow assuming the development of penetration rates. Despite of this, the issue of digital divide is one of the problems for IS policy implementation and a threat to IS development. Various political measures have been introduced to reduce this divide (e.g. see B.6).

To provide for further development of the information society and to overcome the digital divide, the implementation of new technology in Estonia must become even more convenient

[50] “Äripäev”, 22.01.2004

and effective than before. The creation of new jobs based on information technology depends on the ability to provide motivation for the non-users of today. For that purpose a suitable training system should be developed and people should be provided with various applications necessary for their everyday life. The attempts of the public sector to create e-government solutions and the activities of the banks in developing Internet banking services have been the main landmarks in the Estonian IT landscape. The improved convenience and efficiency of new IT solutions and substantial Internet services have also contributed to the spread of the Internet (Estonian National…, 2003-2006).

The development of Estonian ICT environment has been progressive. In addition to various private sector ICT services, which are based on modern data communication networks and tools, government-established and state-financed ICT structures have also developed rapidly their information technology possibilities, and the nomenclature, scope and quality of services (IT in Public Administration, 2003) (more in E.2.5). In 2003, technological development was primarily related to the fast development of web technology, which provided new opportunities for the integration and globalisation of information systems and caused a greater need for the centralisation of development of applications. This has also created a new situation for the organisation of information systems of state agencies and for legal framework.

An ICT environment enabling mutual information exchange in the public as well as in the private sector has been developed in Estonia owing to numerous measures and activities that have been applied for the co-ordination of IT developments over years by institutions established and policy documents elaborated (more in E 2.4). It is needful to elaborate a long-term strategy and strengthen co-operation between the main actors in the future.

Short-term plans include elaboration of a framework for the government-wide IT architecture and standards (IT in Public Administration, 2003). Most of the current state information systems and registers have been established independently of each other. Insufficient attention has been paid to the interaction of the systems. The principal task of the public IT sector is to make the systems citizen- and service-oriented, to join all information systems into a whole to serve the citizens and organisations. This requires from the state fixing of clear rules and agreements in co-operation with public and private sector IT experts and using of common intermediate software. The government-wide architecture seeks to make the Estonian public sector performance more effective, improving services offered to the citizens and business sector in Estonia and in the European Union. Therefore the implementation of this framework will (IT in Public Administration):

- reduce public sector IT costs through repeated use of the centrally realised standard solutions;
- accelerate introduction of new projects with the help of centrally developed infrastructure and intermediate software (PKI, X-tee, KIT, XML project, etc);
- improve co-ordination and administration of state IT systems and elaboration of solutions.

The private sector and third sector have initiated projects for stimulating ICT usage among population. This means that along with the economic growth of society there is still room for modernisation and improvement of ICT infrastructure.

One of the reasons for rapid development of the telecommunications market may be the fact that the fast development of infrastructure was achieved because of the surrender of special

rights by concession. The Government of the Republic of Estonia and *AS Eesti Telefon* (ET) signed the concession agreement in 1992. The contract provided ET with special rights for the provision of main services (provision of national and international telephone, telex and telegraph services, together with their installation and interconnection) for eight years (until 01.01.2001). Investments amounting to 4.55 billion kroons (290 MEUR) were made into the development of Estonia's telephone networks pursuant to the concession agreement (Estonian National…, 2003-2006). In January 2001, after the privatisation of the Estonian Telecom, the agreement terminating the concession agreement was passed (in Dec 2000) and market was liberalised and opened to free competition.

The increased labour productivity of the existing jobs, based on the implementation of information technology (both in public and private sector) is mostly dependent upon the capacity to develop new IT solutions and to apply these as effectively as possible. The aim of such innovation processes is the simultaneous improvement of the quality of products and services, accompanied by a decrease in expenditures related to the reorganisation of activities. Therefore, it is the task of government policy to create enterprise environment conditions that would promote the introduction of IST technologies in production and in other spheres to increase enterprises' competitiveness.

To facilitate the implementation of information technology it is very important to improve the efficiency of training of IT specialists. Extensive implementation of IT in all stages of life, beginning from elementary education and extending to re-training and in-service training, is also very important for the maintenance of the existing jobs and modernisation of the educational system. Considering the shortage of skilled labour, a priority of IS policy is to raise the quality of advanced training and to plan this based on the practical needs.

Estonia has participated actively in the development of eEurope and Northern *e*Dimension action plans and is very much interested in achieving the goals established. Therefore it is important for Estonia to create new, user-friendly IT solutions to be used in e-government, e-education, e-health care, e-economy, etc. to motivate people for using information technology and to provide access for people living in less-favourable conditions.

Focusing on a goal-oriented implementation of information technology can conduce to Estonia's socio-economic development and to improvement of labour productivity. As the necessary measures are designed, attention will be paid to the need to improve Estonia's competitiveness through information technology by increasing the capacity of domestic enterprises to develop innovative technological solutions that are competitive on the international level (Estonian National…, 2004-2006).

B.4. Driving motivation of IS policies

Since the reestablishment of independence in 1991, ICT infrastructure and the use of ICT in society has developed fast in Estonia. As a result, Estonia has become one of the most successful countries in the development of communication technologies in CEE (e.g. ICT penetration; e-government cabinet; see more in Chapter E). In the private sector, the driving motivation is the improvement of efficiency and competitiveness along with the reduction of transaction costs. In the public sector, the driving motivations are not so very obvious. There may be various possible motivations:

- improving ICT education to raise competitiveness of labour resources;
- raising efficiency of the public sector transactions;

- improvement of the decision-making quality of the government and the parliament;
- make the aforementioned decisions more transparent, improve public control.

IS policies elaborated and carried out by the state and government are targeted to comply with the increasing requirements of the society.

The main reasons that played a role in the development of ICT in society can be assessed from the supply as well as from the demand side. The industrial structure is most probably influenced by the proximity of technologically advanced Finland and Sweden, the large amount of foreign direct investments into Estonian companies, given the labour force with a high level of technical education. The increase of Internet users is connected with the motivation of population (as well as businesses) to use ICT and adopt modern technology as a part of one's lifestyle (Krull, 2003). This in turn has been facilitated by the ICT environment and opportunities created with the implementation of IS policies (e.g. lower prices by companies for Internet connections; increasing number of PIAPs; popularity of Internet banking).

Successful co-operation between the government, companies and non-governmental organisations should be mentioned if to assess development motivations of the information society. For example, flexible financing systems offered by the banks to purchase computers and mobile phones have improved the uptake of new technologies (increased demand for Internet connection and mobile phones, see results in Chapter E).

B.5. Commitment of private and public actors, main actors and their tasks

The parties involved in the elaboration and implementation of information policies are (see also Table B1 in Annex):

1) public sector, including central and local governments and academic institutions
2) private sector, including producers and providers of services
3) non-profit sector
4) organisations representing the public, e.g. professional, consumer protection and trade unions

The task of the *public sector* is to develop legislation and policy, to organise implementation of the projects and supervision of them, and to create declaratory documents. Estonia's developments in the public sector have been largely initiated and supported by the central government, i.e. computerising schools and public administration, generating legal bases for ID-card infrastructure and developing e-services, although the government has not invested in ICT (around 1% of the budget) as extensively as other countries of Europe.

The Ministry of Economic Affairs and Communications is responsible for information and communication (ICT) as a branch of economy as well as co-ordination of ICT activities between public administration institutions (agencies). Based on the government budgetary policy and the tax base of different government level, the central government functions include the responsibility for law enforcement, funds and public policy issues, county governments are responsible for healthcare service delivery, local governments are responsible for education services delivery. The limited budget resources of local

governments have been an obstacle to using (financing) all information technology possibilities (services) on the local level.

The *private sector* is not only taking part directly in the introduction of new technologies, but also in developing policies through its representatives in expert commissions, work groups and in the elaboration of documents regulated in the form of lobby work (information policy principles, laws etc). The development of ICT in private sector[51] has been mainly driven by banks, telecommunication companies, Internet service providers, retail and wholesale traders etc. Banks introduced first electronic authentication services to enable Internet banking and also offered their customers access to Tax Board, health insurance fund, state-owned electricity provider *Eesti Energia*, to various insurance companies and others.

Availability and development of telecommunication infrastructure can be regarded as an important issue behind the policies. A growth of the use of computers and the Internet would be inconceivable without the development of relevant infrastructure. The main part of the ICT infrastructure has been developed by the private sector, e.g. *AS Eesti Telefon* (Estonian Telephone Company Ltd., since summer 2003 - Elion[52]), a company with a big market force providing telephone, leased line and interconnection services (IT in Public Administration, 2003). The main competitors for Elion (ET) are *Tele2* and *Uninet* (*Radiolinja Group*). After the liberalisation of the telecom market also for fixed and basic services, new operators have entered the Estonian market (see more in Chapter C). The mobile operators' market is divided mainly between three operators - EMT (Estonian Mobile Telephone), *Radiolinja Eesti* and *Tele2*. Today EMT struggles to maintain half of the market (see more in Chapter C).

Commitment of public and private actors can be described by the fact that besides the public sector programs (e-government, DMP, x-rod, e-county, e-citizens, e-enterprises, e-Tax board, Village Road) private sector runs an ambitious project Look@World.

[51] There is no statistics on the costs of IST development in private sector
[52] www.elion.ee

Box 1. Look@World Foundation's Internet Teaching Project

Four private sector companies (2 major banks and 2 telephone companies) started in April 2002 to provide free of charge basic computer and Internet training for 100 thousand persons (about 10% of Estonia's adult population). During 2 years, the budget of the project - 2.9 million Euros - is fully financed by private companies. 220 teachers and nearly 200 classes were involved in the project. As of 11 March 2004 the task was accomplished and 100,000 persons had been trained to use a computer. 29% of the residents of Tallinn and 71% from other counties participated in training courses. 62% of the participants in courses were factory and office workers and specialists, 29% were pensioners, unemployed and other inactive people; by age 65% were under 50 years of age; 75% were females; 8% had basic, 68% had secondary and 24% had higher education.

The post-training studies indicated that 73% of those who had finished the courses also used computer after the courses, including 86% for looking for information, 71% for reading periodicals, 56% for communicating by e-mail and as many (56%) with Internet banks, 7% for ordering goods.[53]

In addition to the training, priorities of the Look@World project are to increase public access to the Internet (e.g. PIAPs, price policies) and to encourage the use of Internet among non-users (e.g. easier services, raising of awareness). However, it should be considered that the same companies (banks and telecommunication companies) are also the main beneficiaries from broader IT penetration. It helps banks to attract clients (majority of bank transactions are made using ICT devices) and telecommunication companies are the main Internet service providers who gain from offering Internet access. In order to raise motivation to use computers and the Internet, Look@World has planned to participate in organising a mass campaign and to finance the development of services that are more often used (e.g. e-school, see in E.4).

Sources: http://www.vaatamaailma.ee; Look@World Foundations's …, 2003; Progress Report …, 2002.

The public institutions, private sector actors (ICT companies and infrastructure) and non-profit organisations, including universities and research centres, professional associations and other institutions representing the public intervene in the policy making process (through the mechanisms described in B2; main actors see in Annex Table B1). The main advisory and executive actors in the public sector are: *Tallinn Technical University*[54] *and University of Tartu*[55] in the system of higher education, which have a long-term experience in software improvement. The Research and Development Council (RDC) is advising the government, preparing documents on research and development policy of Estonia.

The task of promoting business competition in the fields of telecommunication and postal services, ensuring the quality of services and rational use of resources, is guaranteed by the *Estonian National Communications Board* (ENCB).

[53] Koolitusprojekti vahekokkuvõte, märts 2004, www.vaatamaailma.ee
[54] www.ttu.ee
[55] www.ut.ee

The private sector is represented by several professional unions. For example, *the Association of Estonian Information Technology and Telecommunications Companies*[56] (ITL), whose primary objective is to unite the Estonian information technology and telecommunications companies, to promote their co-operation in Estonia's development towards information society, to represent and protect the interests of its member companies and to express their common positions. Main activities of the association include popularisation of information and communication technology (ICT), promotion of vocational education and amendment of legislation. *The Estonian Computer Association*[57] is a non-profit professional organisation formed by the initiative of Estonian IT companies.

The enterprises' support structure includes a number of non-profit organisations, which can help find proper partners for R&D projects, or they might be themselves good partners in such projects: The Foundation Archimedes, Enterprise Estonia, The Estonian Science Foundation. The state supervisory organisations include several inspectorates like Inspectorate of Data Protection[58]**.** *The Tiger Leap Foundation*[59] was established for improving IT knowledge in education.

E-governance academy[60] (EGA) is a regional learning centre in Estonia, set up in 2002 by the Republic of Estonia, United Nations Development Program (UNDP) and Information Program of Open Society Institute (OSI). The centre aims to promote the use of ICT in the work of governments and in democratic practices. The centre provides training in e-governance and e-democracy, serves as a platform for exchange of experience and conducts related research in the home country as well as in other countries (e.g. Russia, CIS countries, etc) (see more in E.2.4.).

Other organisations representing the public include *Open Estonia Foundation*[61] (AEF), which is a charitable foundation founded on 19 April in 1990 with the support of George Soros, an American businessman and philanthropist of Hungarian heritage. The Foundation seeks to create conditions for the development of an open society in Estonia. AEF was the main organisation in the third sector active in raising the awareness of people until 2000, who through project calls has financed several innovative information society projects (for example, the creation of Public Internet Access Points, development of on-line information services, organising seminars and conferences).

B.6. A SWOT analysis

In conclusion, the state has played an important role in co-ordinating building up of the information society in Estonia. According to the Principles of the Estonian Information Policy, the main goal of the Estonian information policy is to provide everybody (e.g. citizens, businesses etc) with equal access to information through nation-wide projects. In performing its task of information society development co-ordination, the state has created co-operation frameworks and provided for their operation by a co-ordinated elaboration of IT legislation. In this, the government has been relying on co-operation with the private and third sector through its advisory body – a committee of experts and various work groups. This has

[56] www.itl.ee/english/general/index.asp
[57] www.afa.ee
[58] www.dp.gov.ee
[59] www.tiigrihype.ee/eng/index.php
[60] http://www.ega.ee
[61] www.oef.org.ee

led to the development of information society legislation, fast growth of the telecommunications infrastructure and wide penetration of the Internet, regulation of public information movements, simplification of the public services supply, modernisation of public administration mechanisms through information technology solutions.

The liberalisation of telecommunication's market has taken place in since 2001. The creation of e-government solutions and activities of the banks in developing Internet banking services have been the main landmarks in the Estonian IT landscape. The improved convenience and efficiency of new IT solutions and substantial Internet services have also contributed to the spread of Internet. The success in implementing IS policies in terms of infrastructure has been largely due to the private sector.

Although most of the necessary IT legislation has already been elaborated in Estonia, the rapid development of ICT field requires further improvement of the legislation. The accession to the EU requires transporting of the European Union's new telecom package into Estonian legislation, the elaboration of legislation for e-commerce and a number of other improvements to comply with the information society related package of directives of the *acquis communautaire*. The accession to the European Union has increased the government's co-operation with other countries and its participation in international projects.

The information technology development priorities have been financed from the state budget through targeted programs and projects that cost around 1% of the GDP, which is quite modest compared to many other countries. Other sources of finance for introducing information society technologies are local government budgets; funds and support programs (e.g. Phare, Innovation Foundation); enterprises own resources (4.2% of investments into computers); as well as personal income (5% of income for buying computers and paying for services). The limited budget resources of local governments have been an obstacle to using (financing) all information technology possibilities (especially services) on the local level.

Based on the strategic goal to provide all citizens and institutions equal access to government information, efforts have been made to perform interaction with citizens, public sector, businesses and other stakeholders through the creation of government portal (www.riik.ee), The portal joins information on and links to all public administration levels (i.e. county and local governments). Another important activity has been the development of state information systems (e.g. ID cards, records management system etc) with the aim of providing equal access to information in all regions, guaranteeing the integrity and security at the same time. Short-term plans include elaboration of a framework of the government-wide IT architecture. The main goal in Estonia is to create new, user-friendly IT solutions for e-government, e-education, e-health care, that would motivate people to use information technology and also to provide access for people living in less favourable conditions.

Recent years have witnessed a clear trend from the development of infrastructure towards the development of information systems. Public core infrastructure along with the rapid growth of the number of ID-card owners has created new possibilities for creating unified identification mechanisms of the users of e-services and for the introduction of digital signature. In the international scale, Estonia has a leading role here. According to the eEurope 2005 goals, Estonia has made progress in a number of areas of eEurope benchmarking process. Estonia is already close to the EU-15 levels in ICT diffusion: citizens' access to and use of PC and Internet, mobile penetration. Also, progress has been made in other areas (e-learning, e-health, broadband). Nevertheless, the number of IT-users in Estonia has reached a kind of saturation

for various reasons (e.g. economic, skills). Digital divide is one of the biggest problems for IS policy implementation and a threat to IS development. Various political measures have been introduced to reduce this divide. The private and third sector have initiated projects for stimulating ICT usage among population. Along with economic growth of society, preconditions are created for modernisation and improvement of ICT infrastructure and its access.

In the private sector**,** most of the enterprises are provided with computers, which are used mostly for finding information, communication with clients and settling accounts with banks, but less so in production. Therefore it is the task of government policy to create in the enterprise environment conditions that would promote introduction of IST technologies in production and other spheres to increase enterprises' competitiveness. Considering the shortage of skilled labour, a priority of IS policies is to raise the quality of advanced training and its planning based on actual needs.

The main parties involved in the elaboration and implementation of information policies are the public, private and non-profit sector and organisations representing the public, i.e. professional unions, consumer protection board etc. The results achieved in the development of IS in Estonia need to be encouraged by elaborating a long-term strategy and strengthening co-operation between the main actors in the future. The reduction of the digital divide, continuous application of IST in the public and private sector and finding resources for R&D would be the important priorities in IS policy development in the future.

Strengths	**Weaknesses**
Government's initiative in co-ordinating building up of the information society with the aim of providing equal opportunities for all stakeholders The existence of organisational structures for co-ordination IT development A progress in elaboration of the relevant legislation and its continuous improvement Awareness and readiness of society for the implementation of contemporary technologies and experimenting new solutions Liberalisation of TC market The experience of private, public and non-profit sectors in IST development and their co-operation	IS development is concentrated on the development of TC infrastructures, and less on the supply of services Modest financing of ICT development from the state's budget, particularly on local level Weak information policy implementation mechanism in regions Implementation of some IT systems has been slower than expected. Insufficient R&D in private sector Short-term policy priorities are prevailing
Opportunities	**Threats**
Providing motivation for non-users – respective training programs are developed. Following Lisbon targets Commitment of private and public actors in IS policy elaboration, its implementation and in different actions The experience in e-government implementation is promoting the export potential (e.g. e-governance academy)	Digital divide between the users and non-users of IT may become a problem in the implementation of IS policy goals Possible standstill in IST implementation for different reasons (e.g. economic; co-ordination etc)

C. INDUSTRIAL DEVELOPMENT AND COMPETITIVENESS

C.1. Changes in industrial and service sectors

C.1.1. Structure of industrial production

The main change in the GDP structure – growth of the contribution of services in parallel with the decline of agricultural output, was caused as mentioned above by the Russian 1998 default. Difficulties in export of foodstuffs to CIS markets squeezed demand for foodstuffs and agricultural exports. It resulted in changes in GDP (see Chapter A) and industrial output structures.

Industry contributes approximately one-fourth of Estonia's total value added (Table C1). In 1993-1999, the share of industry in value added dropped to 21.2%, but in 2000 began to increase slightly. Industry also accounted for about one-fourth of the employment rates in 2002 (see Chapter I).

Table C1.: Share of industries in value added at current prices, %

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Value added total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Industry	25.9	25.4	24.5	23.8	23.0	22.6	21.2	22.7	22.7	22.9
Mining and quarrying	1.8	1.8	1.6	1.6	1.5	1.2	1.1	1.0	1.0	1.1
Manufacturing	20.5	20.3	19.0	18.1	18.0	17.7	16.5	18.1	18.4	18.6
Electricity, gas and water supply	3.6	3.3	3.9	4.1	3.5	3.7	3.6	3.3	3.3	3.2

Source: Statistical Office of Estonia, 2003[62]

The aforementioned Russian 1998 default caused a contraction in manufacturing in 1999. However, the burst of ICT bubble and decline of Nordic oriented subcontracting in 2001 and 2002 was survived rather well with smaller growth rates in manufacturing only. The contribution of manufacturing in total value added followed the U-curve. Along with the deindustrialisation and decay of CIS-oriented exports the share of manufacturing declined from 20.5% in 1993 to 16.5% in 1999 and then grew again to 18.6% in 2002. The growth of value added in transport, storage and communication as well as in real estate, renting and business activities was mainly responsible for the general GDP dynamics.

Since 1996, the feature characterising the development of industrial sector was high adaptability with external shocks, which was mainly due to successful privatisation and the ensuing active process of reconstruction that followed. Most of the large industrial enterprises in Estonia were privatised before 1997. The relative share of private sector in Estonia's GDP has exceeded 75% (Estonian, 2004[63]). Other distinguishing features of Estonia's industry are the high share of traditional branches (food, light and machinery and equipment) and dependence upon developments in the world business environment.

Within industry, the most important structural change was the declining contribution of foodstuffs that was simultaneous with the growing contribution of wood products. The share of food products and beverages in total industrial output declined from 37.7% in 1993 to 20.6% in 2001, but the share of wood increased from 3.5% to 10.7% in the same period

[62] http://gatekeeper.stat.ee:8000/px-web.2001/Dialog/statfileri.asp
[63] http://www.fin.ee/index.php?id=5119

(Table C2). The shift from exports of logs to processed wood products and final goods is going to add more value to forest resources. Nevertheless, as compared to Nordic countries, much more value might have been added to timber. There are already concerns related to over-exploitation of Estonian forests.

Table C2.: Structure of industrial production, % of output at current prices

	1993	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**
Economic activities total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Energy supply	12.7	14.6	13.5	13.3	11.5	11.0	12.2	8.5	11.5
Mining	4.7	4.6	4.5	4.9	4.4	3.8	4.1	3.5	3.8
Manufacturing	82.6	80.7	81.9	81.7	84.1	85.2	83.6	88.0	84.8
.. manufacture of food products and beverages	37.7	32.8	28.9	27.2	27.0	24.5	20.2	18.9	20.6
.. manufacture of textiles	4.6	4.6	5.9	6.9	6.4	6.3	6.0	6.5	6.9
.. manufacture of wood	3.5	4.6	6.7	6.5	8.3	9.1	11.2	12.1	10.7
.. manufacture of pulp, paper and paper products	0.3	0.6	1.0	1.3	1.6	1.7	1.8	2.1	2.4
.. manufacture of machinery and equipment	2.3	2.5	2.0	2.2	1.9	2.1	2.2	2.7	2.7
.. manufacture of metals and fabricated metal products	2.7	3.1	3.8	4.5	4.8	5.9	4.9	6.2	4.9

Source: Statistical Office of Estonia,2003[64]

The role of various manufacturing sectors has changed considerably. The number of rising sectors in industry is relatively bigger than that of declining sectors and the share of the rising sectors in industrial output has increased more than the share of the declining sectors has decreased (Table C3.). The share of manufacture of machinery and equipment (including office machinery and computers, electrical machinery and apparatus) has increased from 3.8% to 5.4% of industrial production in 2001.

[64] http://gatekeeper.stat.ee:8000/px-web.2001/Dialog/statfileri.asp

Table C3.: Share of industrial output at current prices, %

	1993	1994	1995	1996	1997	1998	1999	2000	2001
Rising									
..manufacture of wood	3.5	4.6	6.7	6.5	8.3	9.1	11.2	12.1	10.7
..manufacture of paper and paper products	0.3	0.6	1.0	1.3	1.6	1.7	1.8	2.1	2.4
..manufacture of textiles	4.6	4.6	5.9	6.9	6.4	6.3	6.0	6.5	6.9
..manufacture of rubber and plastic products	0.9	1.0	1.2	1.3	2.2	1.9	2.0	2.7	2.5
..manufacture of other non-metallic mineral products	3.7	4.7	3.8	3.8	3.9	4.6	4.2	4.4	4.2
..manufacture of metals and fabricated metal products	2.7	3.1	3.8	4.5	4.8	5.9	4.9	6.2	4.9
..manufacture of machinery and equipment	2.3	2.5	2.0	2.2	1.9	2.1	2.2	2.7	2.7
..manufacture of office machinery and computers	0.1	0.2	0.5	0.4	0.5	0.9	0.6	0.5	0.5
..manufacture of electrical machinery and apparatus	1.4	1.5	1.6	1.6	1.5	1.3	1.7	2.0	2.2
..manufacture of radio, television and communication equipment and apparatus	0.5	0.3	0.4	1.0	1.1	1.2	1.5	2.3	2.2
..manufacture of medical, precision and optical instruments, watches and clocks	0.8	0.7	0.6	0.6	1.0	1.7	1.7	2.0	1.4
..manufacture of furniture and other manufactured goods	5.0	5.0	5.3	5.4	6.4	6.5	6.8	6.6	6.9
Declining									
..manufacture of food products and beverages	37.7	32.8	28.9	27.2	27.0	24.5	20.2	18.9	20.6
..publishing, printing and reproduction of recorded media	3.0	2.5	3.6	3.7	3.5	4.5	5.0	4.3	1.6
..manufacture of chemicals and chemical products	6.7	7.6	8.0	7.2	6.1	5.2	4.2	4.6	5.3
..manufacture of motor vehicles, trailers and semi-trailers	2.4	2.1	1.8	1.6	1.7	1.3	1.6	1.6	2.1
..manufacture of other transport equipment	1.6	2.0	1.9	1.7	1.5	1.6	1.7	1.7	1.5

Source: Statistical Office of Estonia, 2003[65]

In manufacturing, a more than 9-fold output growth (at comparable prices) can be traced in the manufacture of paper and paper products (in 1993-2002), a more than 6-fold growth in the manufacture of wood, an almost 6-fold growth in the manufacture of rubber and plastic products and a 5-fold growth in the production of office machinery and computers (Table C4). Output of food products and beverages has stabilised approximately at the level of 80% of the 1993 volume, output of chemicals at about 90% of the 1993 volume.

[65] http://gatekeeper.stat.ee:8000/px-web.2001/Dialog/statfileri.asp

Table C4.: Industrial production by some sectors, volume indices at comparable prices (1993 = 1)

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Economic activities total	1.000	0.969	0.989	1.017	1.164	1.212	1.172	1.342	1.434	1.499
Energy supply	1.000	0.976	0.957	1.016	0.985	0.949	0.897	0.902	0.912	0.923
Mining	1.000	0.989	0.945	1.000	0.996	0.953	0.822	0.864	0.902	1.036
Manufacturing	1.000	0.968	0.996	1.018	1.206	1.275	1.242	1.450	1.561	1.630
..manufacture of food products and beverages	1.000	0.896	0.867	0.796	0.931	0.886	0.720	0.772	0.817	0.820
..manufacture of wood	1.000	1.449	1.770	2.454	3.359	4.110	5.060	6.011	6.492	6.751
..manufacture of paper and paper products	1.000	1.667	2.437	2.782	3.839	4.609	4.908	7.149	7.743	9.315
..manufacture of chemicals and chemical products	1.000	1.133	1.228	1.197	1.203	1.006	0.950	0.958	0.932	0.881
..manufacture of rubber and plastic products	1.000	1.728	1.874	2.322	3.509	4.026	3.731	4.781	5.641	5.901
..manufacture of office machinery and computers	1.000	2.088	2.383	2.938	4.221	4.517	4.011	3.570	4.276	5.311
..manufacture of radio, television and communication equipment and apparatus	1.000	0.373	0.343	0.373	0.428	0.620	0.759	1.187	0.560	0.550

Source: Statistical Office of Estonia,2003[66]

Subcontracting for foreign producers has important role in the development of Estonian industry. This can be characterised as follows: Estonian industry relies upon exports (approximately 50% of total production) and approximately 50% of the export of goods goes through subcontracting for contemporary machinery and equipment, mostly managed by subsidiaries of large Nordic corporations in Estonia (Estonian, 2004[67]). Despite the importance of subcontracting in the economic development until now, some replacement of subcontracting with original Estonian production is needed. In order to change the status of cheap subcontractor, Estonia needs a comprehensive economic policy aimed at increasing technological and organisational efficiency via using of new knowledge and technologies. The most important factors of that are transparent innovation policies in strategic development plans and well-targeted education and training policies

Although concentration of industry in the Northern Estonia (Harju county including Tallinn) has decreased over last years, in 2001, still more than one-third of industrial output was produced in Northern Estonia (45.7% in 1995) and 15.9% in North-eastern Estonia (Ida-Viru county) (Table C5).

[66] http://gatekeeper.stat.ee:8000/px-web.2001/Dialog/statfileri.asp
[67] http://www.fin.ee/index.php?id=5119

Table C5.: Structure of industrial production by counties at current prices , %[68]

	1995	1999	2000	2001
Whole country	100.0	100.0	100.0	100.0
Harju county	45.7	42.8	38.8	39.0
..Tallinn	39.2	33.4	30.3	30.5
Hiiu county	0.4	0.3	0.3	0.3
Ida-Viru county	17.0	17.5	17.8	15.9
Jõgeva county	1.2	0.8	0.8	0.9
Järva county	2.3	2.2	3.0	2.7
Lääne county	1.0	1.2	1.0	1.2
Lääne-Viru county	5.6	5.3	4.9	4.9
Põlva county	1.7	0.8	1.2	1.5
Pärnu county	5.0	5.6	5.8	5.9
Rapla county	1.7	2.1	2.3	2.2
Saare county	1.9	1.2	1.2	1.5
Tartu county	5.6	7.0	6.0	6.1
Valga county	1.5	1.7	1.5	1.6
Viljandi county	2.3	2.8	2.9	3.2
Võru county	1.2	2.2	2.0	2.2
Not divided by county	6.0	6.7	10.5	10.9

Source: Regional Statistics of Estonia, 2003[69]

The processes that most strongly affected Estonian regional economic development (Estonian, 2004[70]) can be summarised as follows:

- The re-orientation of foreign trade to the West and the increasing inflow of foreign investments have been positive, above all, for Tallinn and its hinterlands and Western Estonia (about 80% of foreign investment have been made in Tallinn), problems with the access to the Eastern market have had the most negative impact in South-Estonia and North-eastern Estonia due to the structure of economy and relatively low level of entrepreneurship development in these regions,
- Private business has been more active in Tallinn and other major cities (Pärnu, Tartu) and Western Estonia. Entrepreneurship has been rather low in North-eastern Estonia where the population is still mentally attached to large-scale industry and should be considered as being in a special situation both culturally and linguistically. As the relative share of Russian-speaking population amounts to 80% in this area, better access to Internet and broader use of computers should serve as the basis for development of entrepreneurship and social inclusion of Russian-speaking population in this region,
- Agricultural production and employment in agriculture have dropped drastically. This process has caused a decline of income and increase of unemployment in rural areas. In the counties where the development of other economic sectors has failed to compensate for the regression of agriculture the socio-economic situation has become rather unfavourable – especially in Põlva, Jõgeva, Valga, Võru and Viljandi counties,

[68] Data on totally surveyed enterprises have been presented by counties. Data on enterprises surveyed by simple random sampling have not been divided by counties

[69] http://gatekeeper.stat.ee:8000/px-web.2001/Dialog/statfileri.asp

[70] http:// www.fin.ee/index.php?id=5119

- The development of transit trade has, above all, facilitated the development of the area surrounding Tallinn and a transit corridor going to St. Petersburg. The development of tourism has, above all, facilitated the development of Tallinn and West-Estonian counties,
- Development of education and culture has increased the opportunities for self-realisation and entertainment in Tallinn and other larger centres and simultaneously, the availability of high-quality education and opportunities for enjoying cultural life have become rather scare in the outermost regions.

For better expression of disparities across counties, socio-economic indicators were transformed into a county development index (Estonian, 2004[71]). The development index was derived by adding up a series of numbers of net sales, revenues of enterprises, investments made into capital assets, monthly income of household member and employment rate indicators (the smaller the value of the county development index, the better the socio-economic situation in respective county). The analysis indicates that the county development index varies substantially - from 6-7 (Tartu and Harju (together with Tallinn) to 41-43 (Jõgeva and Põlva counties).

Attempts have been made in Estonia to balance regional development with some assistance from regional policy. Since 1996, regional development programs have used to channel financial assistance to rural areas, mono-functional settlements and several outermost regions. Since 1997, the co-ordination of **regional development** in Estonia has been conducted by the Regional Development Agency (ERDA) (Enterprise Estonia, 2004[72]). ERDA (see the main areas of activity of the ERDA in Table C6 in Annex) is a subunit of Enterprise Estonia (EAS) whose main purpose is to organise the targeted, flexible and co-ordinated use of state funds and other funds allocated for regional development of the country and to the **Business Support System** (see more information Table C7 in Annex), based on the basic documents of the national business development policy and regional development policy. The business system network consists of the Regional Development Agency (ERDA), business support centres providing minimum services on contractual basis, and the business consultants belonging to the list of consultants of the ERDA.

While the production growth of Estonian industry has been fastest among the candidate countries, the productivity of labour is low (only 26% of the EU average), and in addition, real growth of productivity is much lower than the real growth of wages (see Table A16). Value added per employee in Estonian industry varied from 4.347 thousand EUR in manufacture of leather and leather products to 11.030 thousand EUR in manufacture of pulp, paper and paper products in 2000 (Table C6).

[71] http:// www.fin.ee/index.php?id=5119
[72] http://www.erda.ee

Table C6.: Industrial production, value added per employee, EUR thous. (calculated on the basis on SNA value added data and employment in industry)

Code		1994	1995	1996	1997	1998	1999	2000
D	**Manufacturing**	2.268	3.075	4.042	4.609	5.549	6.147	7.591
DA	**Manufacture of food products,**							
	beverages and tobacco	3.255	4.313	4.847	4.983	5.796	7.212	8.552
DB.17	**Manufacture of textiles**	1.446	2.024	4.606	6.544	4.449	5.195	6.042
DB.18	**Manufacture of wearing apparel;**							
	dressing and dyeing of fur	1.583	2.334	2.401	2.804	3.438	3.424	4.436
DC	**Manufacture of leather and leather products**	1.552	1.816	2.865	3.056	3.591	4.400	4.347
DD	**Manufacture of wood and wood products**	1.493	2.097	3.283	3.394	4.983	5.956	8.618
DE.21	**Manufacture of pulp, paper and paper products**	1.537	3.248	4.428	8.455	9.840	8.457	11.030
DE.22	**Printing and publishing**	2.426	4.654	5.709	5.004	7.822	7.786	10.665
DG	**Manufacture of chemicals, chemical products**							
	and man-made fibres	3.389	2.813	4.771	4.416	4.700	7.189	10.429
DH	**Manufacture of rubber and plastic products**	1.753	4.458	4.233	7.862	7.712	6.334	9.185
DI	**Manufacture of other non-metallic mineral products**	2.741	3.161	4.312	6.705	9.429	9.735	10.221
DJ	**Manufacture of basic metals and**							
	fabricated metal products	2.345	3.184	4.086	4.091	6.480	7.649	8.604
DK	**Manufacture of machinery and equipment n.e.c.**	1.403	2.441	3.601	3.390	4.464	4.006	7.243
DL	**Manufacture of electrical and optical equipment**	1.427	2.382	3.261	4.841	6.215	6.317	6.923
DM	**Manufacture of transport equipment**	4.540	5.192	5.719	7.283	8.828	9.334	10.203
DN.36	**Manufacture of furniture**	1.525	2.226	2.911	3.511	3.862	4.851	5.397
DN.37	**Recycling, manufacturing n.e.c.**	8.111	8.057	15.306	27.206	23.348	6.345	8.184

Source: Statistical Office of Estonia, 2003[73]

During the period 1993-2001, the growth of productivity of labour was fastest in 2000 compared with 1999 (17.6%), especially in the manufacture of grain mill products (2.2 times), and in the manufacture of machinery and equipment (1.6 times) (Table C7). According to the Ministry of Economic Affairs and Communications (2002b), the stable growth in light industry has been due to the relatively high external demand. The slower growth of wood processing industry in 2001 compared with previous years was due to the decline in felling volumes and fall of sawn timber prices. The growth of furniture industry has been quite stable in recent years. Slowing down of the paper industry growth was also due to the lower external demand. The decline in external demand also curbed the engineering industry growth compared with 2000.

[73] http://gatekeeper.stat.ee:8000/px-web.2001/Dialog/statfileri.asp

Table C7.: Industrial production per employee by economic activity at constant prices, previous year = 100

	1994	1995	1996	1997	1998	1999	2000	2001
Economic activities total	109.4	108.4	105.8	115.4	102.2	104.2	117.6	115.3
Energy supply	186.3	97.2	110.7	99.0	84.2	95.3	144.2	137.3
Mining	100.5	99.0	107.6	105.6	100.5	97.1	123.4	108.9
Manufacturing	102.0	110.4	105.1	118.7	104.4	105.6	115.3	114.4
..manufacture of food products and beverages	90.7	103.1	96.9	114.5	98.3	98.3	114.3	118.7
....manufacture of grain mill products	107.3	95.4	81.5	104.0	142.9	81.4	220.6	214.8
..manufacture of textiles	104.7	157.8	150.6	127.2	98.1	144.2	114.8	111.2
..manufacture of wearing apparel	87.0	100.6	93.4	92.8	103.3	105.5	118.0	112.7
..tanning and dressing of leather and manufacture of footwear	105.3	110.8	101.8	120.9	116.6	103.4	114.6	101.2
..manufacture of wood	151.1	123.2	135.3	134.3	110.7	120.3	127.5	111.1
..manufacture of paper and paper products	210.9	104.4	94.8	134.9	116.1	110.5	125.3	104.5
..publishing, printing and reproduction of recorded media	104.4	95.5	89.7	105.2	105.6	113.3	114.3	121.4
..manufacture of chemicals and chemical products	148.6	127.2	100.9	110.5	99.9	101.1	99.8	116.9
..manufacture of rubber and plastic products	159.3	114.1	116.9	133.2	107.6	93.8	108.7	121.1
..manufacture of other non-metallic mineral products	113.8	98.8	101.7	129.9	106.1	93.8	109.3	106.2
..manufacture of metals and fabricated metal products	121.4	116.8	110.1	119.7	123.2	93.6	110.6	115.9
..manufacture of machinery and equipment	116.4	126.6	108.3	125.3	110.8	100.2	156.4	123.5
..manufacture of office machinery and computers	155.1	80.9	102.8	124.1	85.8	79.0	97.9	100.3
..manufacture of electrical machinery and apparatus	94.9	124.2	99.9	112.6	127.0	120.2	97.3	111.2
..manufacture of radio, television and communication equipment and apparatus	47.0	91.1	97.5	82.0	116.4	102.2	108.5	125.7
..manufacture of medical, precision and optical instruments, watches and clocks	79.8	109.4	102.1	163.5	187.7	128.9	125.1	79.9
..manufacture of motor vehicles, trailers and semi-trailers	70.4	89.0	114.2	125.7	94.5	130.1	115.7	125.4
..manufacture of other transport equipment	80.4	79.0	111.9	115.7	125.3	109.6	121.9	144.7
..manufacture of furniture and other manufactured goods	130.2	117.7	115.5	126.0	100.8	110.5	112.8	113.9
....manufacture of furniture	128.2	118.7	114.1	118.8	102.6	109.4	112.0	113.9
..other manufacturing n.e.c.	101.9	113.8	143.9	75.2	115.0	82.4	138.0	91.5

Source: Statistical Office of Estonia[74],

According to the labour productivity indicator of Estonian industry Estonia belongs to the lowest group of EU and candidate countries (share of labour productivity indicator 20-40% of EU average) (Statistics, 2001). Among candidate countries, Estonia appears to be the laggard together with Poland by the level of labour productivity (Facchini, 2003). The labour productivity is low mostly because of insufficient product development, limited search for innovative solutions and a large number of employees with qualification not matching the changed demand of the labour market, and also because most of the industrial output is produced in labour-intensive sectors of industry. Specific factor contributing to the low

[74] http://gatekeeper.stat.ee:8000/px-web.2001/Dialog/statfileri.asp

productivity in Estonia is production of electrical energy on the basis of oil shale (91% of the electricity in 2001, (Estonian, 2004[75]).

The efficiency of mining and processing of oil shale and production of electricity has been considerably lower than these processes in other fossil fuels. In order to increase the efficiency and competitiveness of electricity production from oil shale, reconstruction with introduction of new technology of the whole sector has been launched, during which process the hazardous waste emissions into the environment will be reduced to the minimum and the labour productivity will grow. It is significant that as a result of the reconstruction, electricity production will be continued in Estonia instead of importing electricity or producing electricity on the basis of imported fuels. This will create preconditions for exporting electricity in the future. From the regional aspect, the continuing of electricity production will help to solve the employment problems in Northeastern Estonia. In reference to the opening of the electricity market, it was provided in the Treaty of Accession that Estonia would gradually open the electricity market: 35% by 31 December 2008 and by 31 December 2012 in line with the Decisions of the Barcelona European Council. An open market gives for Estonia opportunity to participate as a partner in the Baltic and Nordic electricity market and to influence electricity prices in the market (Laur *et al*, 2003).

Tiits *et al* (2003) have classified Estonian industries belonging mostly into the groups 'supplier-dominated activities' (agriculture, textile industry, forestry)[76] and 'production-intensive activities', the most significant factor to enable growth of productivity has been the introduction of new foreign technologies. However, the quality of foreign investments and technology transfer is growing to be increasingly important, and the latter largely depends on the quality of domestic industry and labour market. So far, investments in Estonia have been mainly resource intensive and low-skilled labour targeted. Mainly owing to technology transfer, but also due to organisational changes and introduction of new methods of management and reorganisation of business processes, the annual growth of productivity in manufacturing has been on average 8%. The industries with the highest productivity growth is characterised by the decreasing employment (jobless growth industries) because it is based on capital investments, which indicates that the Estonian economy is in the investment-based development phase (Tiits *et al*, 2003).

C.1.2. Structure of service sector

The most important development in the distribution of economic activity in Estonia has been the substantial increase in the share of services sector over the last decade. In a changed economic situation, services have become critical for the survival of a business. In Estonia like in all candidate countries, trade, marketing, juridical services, real estate and business services, transportation and communications, financial intermediation and insurance have become increasingly more important, providing network-like connections between producers as well as between producers and consumers. While in 1996 the share of employment in tertiary or service sector was 56.5% of total employment, then by 2001 it had increased to 60.1% (Estonian, 2004[77]). The share of the service sector in provision of value added increased during the same period from 61.7% to 65.4%. In the period 1993-2002, the share of transport, storage and communications in total value added increased from 12.9% to 15.9%,

[75] http://www.fin.ee/index.php?id=5119
[76] see Pavitt, K. (1984). Sectoral Patterns of Technical Change: Towards a Taxonomy and a Theory. Research Policy, 13. pp. 343-373.
[77] http://www.fin.ee/index.php?id=5119

real estate, renting and business activities from 7.8% to 11.1% and financial intermediation from 3.8% to 4.4%, respectively (Table C8).

Table C8.: Share of service sector in total value added, %

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Wholesale and retail trade of vehicles, motorbikes and personal items and home appliances	15.2	13.9	14.8	15.8	15.1	14.9	14.4	13.9	14.2	14.6
Hotels and restaurants	1.4	1.2	1.2	1.4	1.3	1.3	1.4	1.5	1.4	1.5
Transport, storage and communication	12.9	11.9	10.9	11.4	12.8	14.3	15.2	16.3	16.4	15.9
Real estate, renting and business activities	7.8	8.8	10.3	10.0	10.4	11.1	11.2	11.0	11.3	11.1
Financial intermediation	3.8	4.2	3.6	3.9	4.2	3.6	4.0	4.1	4.3	4.4
Public administration and defence; compulsory social security	3.4	4.5	4.9	4.7	4.6	4.4	5.1	4.7	4.5	4.6
Education	5.6	5.7	6.1	5.7	5.5	5.5	6.1	5.7	5.4	5.5
Health and social work	2.6	3.6	4.1	4.3	3.9	3.7	4.0	3.6	3.4	3.3
Other community, social and personal service activities	3.9	3.9	4.4	4.5	5.0	4.8	4.8	4.6	4.5	4.5
Service sector in total	56.6	57.7	60.3	61.7	62.8	63.6	66.2	65.4	65.4	65.4

Source: Statistical Office of Estonia, 2003[78]

In the structure of total net sales, the sales of services have constituted about ¾ (Table C9). In sales of services, business services (advertising services, architecture and technical engineering consultations, security and guard services) have had the highest share (about 75%). The share of renting and particularly personal services declined to 6.2% of sales of services, but the share of computer services rose (from 9.6% to 11.5%) in the period 1994-2000. During these years, the structure of computer services changed significantly – the share of creation of databases declined from 47.3% to 12.2%, but the increase in the share of other computer services (maintenance and repair of office equipment and computers and others) was notable (from 32.4% to 73.7).

Table C9.: Changes in the structure of services (sales of renting, computer, business and personal service activities) at current prices, %

	1994	1995	1996	1997	1998	1999	2000
Sales of services total	68.5	73.4	72.6	70.9	78.9	75.1	72.8
Renting services	4.6	3.3	3.0	2.8	4.9	4.7	4.5
Computer and related services	6.6	10.7	8.9	9.6	8.0	8.2	8.4
..data processing	1.1	0.8	1.5	1.1	0.9	0.6	0.7
..creation of databases	3.1	4.8	3.9	2.4	1.4	1.0	1.0
..maintenance and repair of office equipment and computers	0.3	0.3	0.7	0.8	0.7	0.7	0.5
..other computer services	2.1	4.8	2.9	5.6	5.0	5.9	6.2
Business services	50.8	55.1	56.5	54.9	62.2	58.5	56.4
Personal services	6.4	4.3	4.1	3.7	3.8	3.7	3.6
Other sales revenue	31.5	26.6	27.4	29.1	21.1	24.9	27.2
Net sales	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Statistical Office of Estonia, 2003[79]

[78] http://gatekeeper.stat.ee:8000/px-web.2001/Dialog/statfileri.asp

The development of services sector is characterised by the improved quality and rapid growth of prices – the prices of services are approaching the world market prices and in 2001, were twice as high as in 1995. The development of the tertiary sector has been encouraged both by domestic and foreign demand. In the period 1996-2001, the productivity (GDP in fixed prices per employee) of services sector increased by one-third, while the export of services increased threefold (Estonian, 2004[80]). The trade balance deficit was balanced by export of transport and travel services. Tourism has turned one of the more important branches of the economy. If to assess direct indicators, the share of foreign tourism in GDP comes to 8% (7% of employed) and the indicator may even total 15% if to consider the indirect impacts.

In the small and very open Estonian economy, not only output of manufacturing is tradable on foreign markets. So are transport services (Estonia earns a lot from servicing Russian transit flows and there is severe competition between ports and shipping companies to attract these flows). A similar competition goes between cities and regions for attracting tourist flows. Within the context of this study it is to be mentioned that for attracting foreign tourists (and local visitors) many Estonian hotels and restaurants offer WiFi Internet access to their customers and quite often this access is free of charge[81].

As many Finns have real estate in Estonia, they are customers of real estate brokers, construction companies etc. Simultaneously, several Finnish construction companies work in Estonia and Estonian companies do some works in Finland. Small Estonia cannot offer all kind of medical treatment – for some very rare diseases medical doctors have not enough experience and these patients are to be treated abroad. Simultaneously, as many medical procedures are cheaper in Estonia than in Nordic countries, these services are offered to Finnish and Swedish patients in Estonian hospitals and spas (from dental treatment to plastic or cardiovascular surgery). There is international competition between universities both for students and professors; the same applies to research grants and researchers etc. Thus, international competition is practically everywhere and almost every economic activity can be competitive in a liberal and unprotected economy. Therefore it is difficult to attribute competitiveness to the structure of economy or some activity only.

C.2. Investments and innovation activity

Investments are the main precondition for ensuring and improving competitiveness of the Estonian economy. The yearly growth rate of gross fixed capital formation has been about 10% since 1997 (except 1999) and its share has increased to 94.1% in gross capital formation, forming 1 611 MEUR in 2001 (90.7% in 1993) (Table C10). The steps to open the Estonian economy and achieve macroeconomic equilibrium in the second half of 1990s gave an impetus to a fast development of Estonia into an investment-based economy. Similarly to other countries in the same development phase, privatisation opened up a way to foreign capital inflow that signified so much for the economic growth in Estonia. Privatisation has been one of the main factors that have influenced the inflow of foreign investments: in the period 1997-1999, 60% of Estonia's privatisation proceeds were foreign capital and privatisation to foreign capital accounted for 70% of the foreign direct investments into Estonia (EBRD, 2000).

[79] http://gatekeeper.stat.ee:8000/px-web.2001/Dialog/statfileri.asp
[80] http://www.fin.ee/index.php?id=5119
[81] http://www.wifi.ee/?p=area&lang=eng

Table C10.: Changes in investment

	1993	1994	1995	1996	1997	1998	1999	2000	2001
changes in investment at current prices, MEUR									
Gross capital formation	376.4	533.2	734.3	967.2	1266.5	1366.8	1196.1	1550.0	1711.2
Gross fixed capital formation	341.4	521.5	713.7	929.8	1146.3	1378.8	1215.8	1418.4	1611.0
Change in inventories	35.0	11.8	20.6	37.4	120.1	-12.0	-19.7	131.6	100.2
changes in investment at constant prices, % change y-on-y									
Gross fixed capital formation		6.3	4.1	11.4	17.6	11.3	-14.8	13.3	9.1
Change in inventories		-72.2	41.3	53.5	225.7	..	..	..	-26.0

Source: Statistical Office of Estonia, 2003[82]

The Estonian industry has not been the main attraction for foreign investors, which is due to the weakness of the sector, on the one hand, and the relative strength of the transport and financial sector, on the other hand. By 1998, the Estonian industry had not increased much on account of new foreign investment based enterprises. The main growth had been due to the expansion of the existing foreign investments based enterprises. Estonia as a country with small contemporary industrial experience had not yet developed into a foreign capital export targeted production base. The developments in this direction have been detected only in recent years when various Scandinavian enterprises have started more extensively to transfer more labour-intensive productions from their country to Estonia. The presence of foreign capital in 1995-1999 generally provided modernisation of domestic enterprises with a positive spill-over. In most of the industrial sectors, foreign participation in sales and capitalisation is higher than in employment (Tiits *et al*, 2003).

The presence of foreign capital has had different effects on Estonian enterprises. Large domestic firms work out their development plans themselves and they gain from investment into intellectual property, new equipment and human resources rather than the new technology related spill-over. Small enterprises, however, benefit a lot from the spill-over effect by demonstrating and imitating new technology and from co-operation with foreign capital based enterprises, because they are not themselves capable of increasing the advantage of the spill-over of investing into intellectual property, equipment and human capital but instead, may even lose some skilled labour force (Sinani and Meyer, 2001).

Estonia like other Central and Eastern European transition countries has a revealed comparative advantage mostly in resource-intensive wood and furniture industry, to a less extent in labour-intensive textile and oil shale industries. Capital- and technology-intensive industries (chemical industry, machinery and equipment) are at the same time relatively less competitive. Tiits *et al* (2003) has stated that openness of the economy and foreign investments do not automatically induce a change in the structure of industry toward higher knowledge and skills intensity - rather vice versa.

Due to the different innovation processes taking place in different countries, we cannot use a common indicator of innovativeness in the same way for all of them. Therefore, in international comparisons we should discuss countries in the investment and innovation phase separately as in the former, the main motive power of the technological development is introduction of new technology (technology transfer), in the latter, research and development for the elaboration of new technologies (Tiits *et al*, 2003). Rearrangements and large capital investments in the Estonian industrial and service sectors explain the high rate of innovative

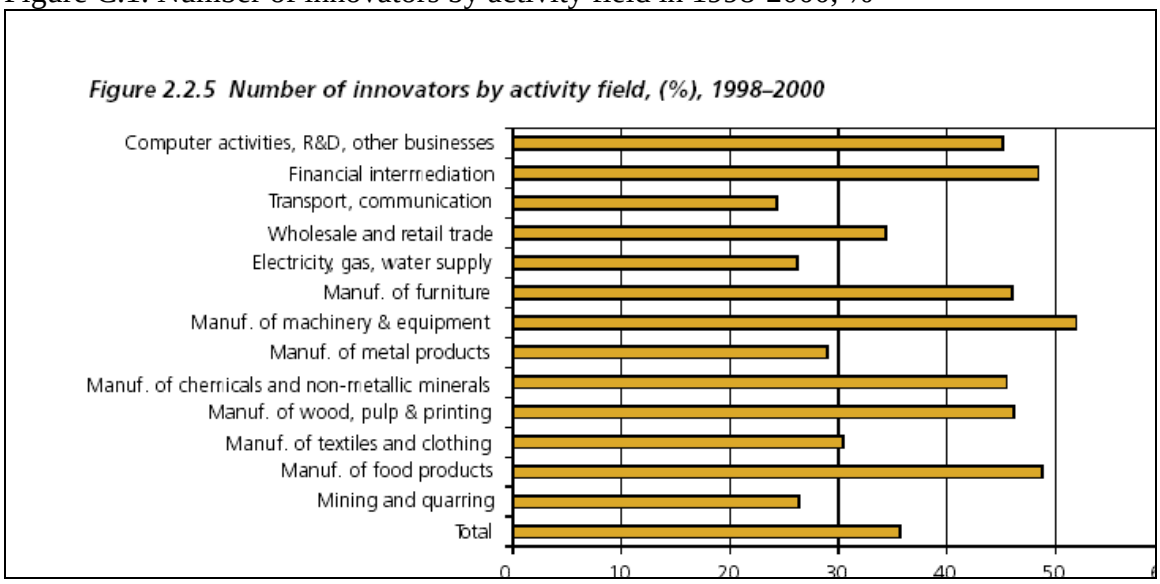
[82] http://gatekeeper.stat.ee:8000/px-web.2001/Dialog/statfileri.asp

enterprises in Estonia, which was 36% of the total number of enterprises in 2002 (Kurik *et al*, 2002). According to this survey (based on the EU Community Innovation Survey methods), the Estonian industrial sector spent 2.3% of its turnover on innovation, the service sector only 0.8%. Innovative or modernised products for enterprises accounted for 17% of the industrial sales.

The most innovative economic sectors in Estonia (Figure C.1) are financial intermediation, computer and R&D related business on the services side and manufacturing of machinery and equipment, food, furniture and wood processing in manufacturing (Kurik *et al*, 2002). Financial enterprises in general are active and expansive in Estonia and outstanding especially in implementing new ICT solutions. Also, the biggest innovators among the machinery producers are tele- and communication apparatus developers and producers of medical-optical instruments.

It can be noticed that enterprises with foreign capital are 1.5 times more innovative than enterprises without it. The enterprises that belong to a concern are almost two times more innovative than those outside the concerns. The first mentioned result is not unique as several surveys conducted in other Central and Eastern European countries have also indicated that foreign capital is the leading agent of innovation in post-socialist countries. The second conclusion is also rather logical: small enterprises are usually not capable of carrying out serious innovations on their own.

Figure C.1. Number of innovators by activity field in 1998-2000, %



Source:Kurik *et al*, 2002

By the type of dominating market, enterprises with domestic and foreign orientation are almost on the same level of innovativeness (respectively 38.6% and 30.1% of all enterprises), but the share of innovators among the enterprises oriented to the local market (within 50 km radius) is by one-quarter lower (27.4%). It is surprising that enterprises oriented to Eastern (Russian and CIS) markets are even more innovative than those oriented to Western markets (41.8% and 38.7% respectively). 38% of the enterprises oriented to Eastern markets and only 30% of the Western-oriented firms made innovation expenditures in 2000. The above-mentioned empirical results are rather surprising as usually the Western markets are presumed to be more demanding compared to Eastern markets. One possible explanation could be that some enterprises working for Western oriented exports are based on rather stable products,

which do not need frequent changes. And if innovations are made the innovation costs are carried by parent companies or clients. In Russian and CIS markets there have been more rapid changes and turbulence in recent years and adaptation to these changes has initiated some types of innovative behaviour. The dominantly export oriented enterprises are not as a rule very innovative, but such enterprises are mainly oriented to Western markets in Estonia. If the share of exports is over 90%, the intensity of innovation is lower than in enterprises (especially manufacturing) where the share of exports is 10%–90%.

Notwithstanding the increasing contribution of high tech manufacturing, the volume of high tech output is still quite small (Table C11). The contribution of high tech output has grown in parallel with the decline in the contribution of medium-high tech output while the share of output on lower technical levels has remained almost unchanged. Stable growth can be traced in the output of radio, television and communication equipment and apparatus (NACE code DL 32), of medical, precision and optical instruments (NACE code DL 33), while the manufacture of office machinery and computers (NACE code DL 30) has declined after the peak in 1998.

Table C11.: Technological structure of the Estonian manufacturing[83]

	1993	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**
Output in manufacturing, MEUR at current prices	776.5	1043.4	1444.1	1703.4	2167.8	2385.1	2252.2	2899.6
From this in per cent								
High tech manufacturing	1.7	1.5	1.8	2.5	3.2	4.3	4.6	5.4
Medium-high tech manufacturing	17.4	19.5	18.7	17.4	15.1	13.7	13.7	14.4
Other manufacturing	80.9	79.0	79.5	80.1	81.7	82.0	81.7	80.2
Total employment, thousand persons		692.6	656.1	645.6	617.2	606.5	579.3	572.5
From this in per cent								
High tech manufacturing**		0.76	0.85	0.83	0.90	0.93	1.05	1.44
Medium-high tech manufacturing**		4.01	3.80	3.53	3.30	2.88	2.56	2.56

Source: Authors calculations[84]

The low contribution of high tech manufacturing is partly due to the aforementioned subcontracting. Due to the statistical methodology, subcontracting is included in output and sales with the value added only while other output is reported at current prices (that include also value of intermediate consumption).

The data on employment in manufacturing (24.8% of total employment) were calculated on the basis of output and output per employee by NACE codes. The results for 2000 matched quite well with data available from the population census of 31 March 2000. This calculation enabled to depict in Table C11 the dynamics of high tech employment in manufacturing.

Notwithstanding the declining employment in manufacturing by 17.5% during 1993-2002 (see Table I1 in Chapter I and more detailed Table I2 in Annex), the number of people employed in high tech manufacturing has increased. By calculations of authors the employment rate of activities that were classified as high tech manufacturing was 7% of total manufacturing employment.

[83] Official data of the Statistical Office of Estonia are rearranged according to Eurostat's classification of activities based on the technical levels brought in the endnote of the paper

[84] Number of employees in manufacturing is calculated on the basis of industrial output and output per employee

Compared to EU-15 member states (unfortunately we do not have comparable data for other candidate countries) Estonia's percentage of employment in high-tech manufacturing in total employment (1.44% in 2000) is even slightly higher than the EU-15 average and it places Estonia between France and Sweden (Laafia, 2002).

However, we already expressed some concerns related to the content of the work in enterprises making subcontracts mainly, or whether it really classifies as high tech labour (with almost no R&D). Another problem is that employment in medium-high tech manufacturing is declining and was only 2.6% of total employment in 2000 while the EU-15 average was 6.2% of total employment. Employment in Estonia's high tech manufacturing grew by less than 3 thousand persons in 1994-2000 while more than 13 thousand jobs were lost in medium-high tech manufacturing. Medium-high tech manufacturing (machinery and mechanical appliances, articles of metal) was responsible for more than half of the total employment decline in manufacturing. Estonian manufacturing does not seem to be an intensive IST or computer user.

According to the Estonian National Development Plan (Estonian, 2004[85]), in order to realise the industry's potential for development, the Estonian industry should shift the focus from traditional industrial branches to manufacture of products with higher value added. It is important to apply new industrial technologies and to implement an innovative approach. The focus should be on development and establishment of technology-consuming enterprises with good potential for growth. It is important to switch from sub-contracting for foreign companies to development of original products. It would make sense to specialise in production of single products with a high potential as Estonian industry is too small to manufacture products, extending to whole branch. The potential of food processing industry is based on availability of domestic raw material supply – milk – and its conformity with EU quality requirements. Wood processing industry should advance the technological processes to manufacture complicated products, asking for higher processing level, as this is important for changing from raw material export to more profitable export of processed wooden products. Manufacture of apparatus has the best prospects as Estonia can make use of great number of researchers, engineers and relatively well-educated labour force of Estonia (Estonian, 2004[86]). Further potential is seen in the girth and growth of completely new industries, such as microbiology, pharmacy and ICT (Estonian, 2004[87]). The objective would be to turn from a country with low technological level and cheap labour resource into a country with high technological potential and qualified labour. Such a development can only be achieved with technological development promoting and supporting innovation. Further development has to be mostly supported by fast technological development and increased productivity. By the authors' opinion in general, institutional development with efficiently performing markets and low transaction costs combined with transparency of decision-making and credibility of economic policy may serve as cornerstones of competitiveness of Estonian industry.

C.3. The role of ICT industry

In the area of information technology, Estonia has traditionally been mainly user and less producer. From the socialist period Estonia inherited a rather highly concentrated economy with a few hundreds of state-owned industrial enterprises and several hundreds of agricultural

[85] http://www.fin.ee/index.php?id=5119
[86] http://www.fin.ee/index.php?id=5119
[87] http://www.fin.ee/index.php?id=5119

enterprises. A majority of them had their computing centres with some kind of electronic data processing. Thus, there was some knowledge and experience in data-processing before economic restructuring and introduction of personal computers. In the result of the shift towards market economy, a completely new entrepreneurship structure was formed. New privately owned enterprises were eager to implement new information technology solutions to be more competitive. The process was also promoted by high involvement of Finnish and Swedish capital in Estonian economy. The Estonian subsidiaries of the Nordic companies tried to implement similar IT solutions as their host companies. Otherwise it would have been difficult to comply with the management and accounting culture of Nordic companies.

The development of the Estonian ICT sector has been gradual throughout the last decade, from low value added computer assembling activity to higher value added software production and telecom services. The ICT market is shared between a few large corporations, which consolidate a substantial economic power and account for a dominant part of the entire Estonian ICT sector, and many small IT enterprises with lower market relevance, which specialise either in subcontracting, sell hardware and software or develop niche products. A brief description of eight most influential ICT companies is presented in Table C12 in Annex. These companies are *Elcoteq Tallinn, Estonian Mobile Telephone, Estonian Telephone Company, Radiolinja, Ritabell, JOT Estonia, Tarkon* and *MicroLink*. These top 8 enterprises account for up to 80% of the total Estonian ICT market and thus shape to a large extent the main trends and developments in the ICT sector.

Among the telecommunication infrastructure *AS Eesti Telefon* (Estonian Telephone Company Ltd., since summer 2003 - Elion), a company with a big market force providing telephone, leased line and interconnection services. In the early 1990s, during the restructuring of the state enterprise for providing telephone services, a private company *Eesti Telekom* was established. Under the Concession Agreement from 1993 to 2001 the company's main telephone service provider *Eesti Telefon* (ET) established a new digital telephone network (72% of all lines were digital in 2001) and fulfilled the conditions for providing sophisticated telephone and Internet services across the country. As the company had held a monopoly position for 8 years, it was able to secure its position in the market even after the market was liberalised in 2001 (IT in, 2003). In 2002, ET succeeded to keep 89.2% of the fixed telephone market and more than half of the market of international calls. ET (Elion) has also established itself as the market leader for Internet dial-up service and ADSL connections (72.8% share of leased line services market). ET is a reseller of the international telecommunication services of the Infonet Services Corporation (www.infonet.com) in Estonia, providing access to services and infrastructure in more than 60 countries all over the world and to telecommunications networks in more than 180 countries (IT in, 2003).

The main competitors for Elion (ET) are *Tele2* and *Uninet* (*Radiolinja Group*). After the liberalisation of the telecom market also for fixed and basic services, new operators have entered the Estonian market. In 2001, 64 operators and 110 companies were added to the existing 47 operators and 146 service providers. The largest increase has been among the data communication service providers - 53 companies received a licence in addition to the existing 44 companies (IT in, 2003).

The mobile operators' market is divided mainly between three operators - EMT (Estonian Mobile Telephone), *Radiolinja Eesti* and *Tele2*. Today EMT struggles to maintain half of the market. The main operators have covered the entire country with mobile networks. In co-operation of EMT and ET, a joint service of wireless Internet connection was introduced in

December 2002, which enables to use the Internet without limit nearly anywhere in Estonia for a fixed monthly fee (IT in, 2003).

According to the European Information Technology Observatory (EITO) (2003), the estimated market for ICT products and services in 2003 was 857 MEUR (increase 17.2% compared with 2000). The short-term ICT market growth projection (for 2004 increase of 7.2%) is positive due to a number of factors driving investment, such as upcoming EU membership in 2004, infrastructure development and rising of FDI (EITO, 2003)

Based on EITO (2003) estimations, the value of the Estonian telecommunication market was 604 MEUR in 2003 (510 MEUR in 2001 and the share of telecommunication market value 8.2% of GDP). The telecommunication market value is predicted to grow 7.6% in 2004 (EITO, 2003). The share of telecommunications in ICT market has been about 70% (Table C12). Although further developments in the ICT sector are very much dependent on how dynamic the growth in computer services and software is, the share of software and services in total ICT market has been relatively low - about 12% over the last years.

Until the year 2000, the growth of ICT market was relatively fast with the annual average of approximately 20% and higher. However, in 2001 the growth rate declined to 0.1% coping with the global ICT downturn, but in 2002 rose again to 10% (Table C12). The software products growth rate dropped from 15.0% in 2001 to 7.7% in 2003, and that of IT services even more.

The telecom market decline stopped in 2002 (increased compared with 2001 9.9%) and being the engine of the ICT sector growth, is experiencing now a gradual stabilisation and even saturation in some domains (e.g. Internet subscribers).

Table C12.: Structure and change of Estonian ICT Market in 2000-2004, MEUR

	2000	2001	2002	2003	2004	2001/00 %	2002/01 %	2003/02 %	2004/03 %
Computer hardware	10.7	11.4	11.2	11.2	15.0	6.1	7.1	6.7	6.9
Office equipment	2.6	2.7	2.6	2.5	2.4	6.2	6.4	0.7	2.7
End user communi-cation equipment	4.7	5.3	3.1	2.6	2.4	15.9	-36.2	-11.1	0.0
Datacom and network equipment	18.4	19.6	19.5	19.8	19.9	5.7	10.5	8.2	7.6
TOTAL ICT EQUIPMENT	36.4	39.0	36.4	36.1	35.8	7.2	2.8	5.5	6.5
Software products	4.0	4.6	4.9	4.9	4.7	15.0	15.5	7.7	4.1
IT services	6.7	7.3	7.6	7.1	7.2	9.9	14.5	-1.0	9.2
Carrier services	52.9	49.1	51.1	51.9	52.3	-7.1	14.3	8.4	7.7
TOTAL ICT	100.0	100.0	100.0	100.0	100.0	0.1	9.9	6.6	7.2
TOTAL IT	27.9	30.2	30.3	29.5	29.2	8.3	10.0	3.9	6.1
TOTAL TELE-COMMUNICATION	72.1	69.8	69.7	70.5	70.8	-3.1	9.9	7.8	7.6

Source: EITO, 2003

A number of factors (EITO, 2003) influence the ICT market growth in the CEE region. Some of the most important ones for Estonia are the following:

- EU accession as the important driver of ICT market growth and importance of the EU will only increase over time as more funding is earmarked for new Member States,
- FDI remains a notable driver,

- Introduction of ICT solutions for rendering services,
- ICT market shifts away from a hardware-specific focus and demand for IT services is growing strongly,
- Internet continues to represent a key driver of ICT spending as companies invest in basic Internet-related IT infrastructure, applications and services.

Although Estonia's IT spending (excluding spending on telecommunications) share is only 2.1% of the average spending of the CEE region, the ratio of Estonian IT investments to GDP was in 2002 higher than Western European average, respectively 3.8% and 3.33% (CEE average 2.6%) (EITO, 2003). Despite that an increasing share of GDP is being allocated for IT, the per capita IT spending (162 EUR) remains quite low (higher than CEE average but only 21.5% of Western European average (755 EUR)).

As mentioned already, the Estonian economy is very open and enjoys broad international contacts. When discussing Estonia's ICT sector it is to be considered that all main ICT companies are at least partly in foreign ownership or subsidiaries of Nordic companies. Thus, Estonian ITC companies work mostly in international environment.

Estonian international co-operation is complemented through membership of different organisations. Estonia is a member of:

- *Joint High Level Committee (JHLC),* which is comprised of EU and CEEC government representatives;
- *International Council for Information Technology in Government Administration (ICA)* (http://www.ica-it.org/), established to promote the exchange of knowledge, ideas and experiences between Central Government IT Authorities;
- *Council of the Baltic Sea States (CBSS).* The aim of the council is to promote and co-ordinate co-operation between the Baltic Sea States (http://www.baltinfo.org/);
- *Baltic Council of Ministers (BCM)* (http://www.bcmvs.net/), an institution for facilitating the co-operation between the governments of Estonia, Latvia and Lithuania, formally established in 1994;
- *E-governance academy,* a regional learning centre in Estonia, set up by the Republic of Estonia, United Nations Development Program (UNDP) and Information Program of Open Society Institute (OSI). The centre aims to promote the use of ICT in the work of governments and in democratic practices. The centre provides training in e-governance and e-democracy, serves as a platform of exchange of experience and conducts related research;
- *European Environment Information and Observation Network (EIONET),* since January 2002 a full member.

Estonia has participated in the following international projects[88]:

- - *eEurope+ 2003,* the co-operation project for EU candidate countries to implement Information Society[89];
- - *Northern eDimension[90] (NeD),* a joint project of the Baltic Sea States (Denmark, Estonia, Finland, Germany, Iceland, Latvia, Lithuania, Norway, Poland, Russian

[88] Information of the Department of State Information Systems (http://www.riso.ee), 27. Nov. 2002 .

[89] Information on eEurope+ at http://www.europa.eu.int/eEuropeplus and relevant press releases together with the conclusions at http://europa.eu.int/comm/gothenburg_council/eeurope_en.htm

Federation and Sweden) and the European Commission. The aim of the project is to develop co-operation in IT field and accelerate transition to information society;

- *European Survey of Information Society91 (ESIS).* The survey is a part of ESIS II project, initiated and financed by the European Commission in 1999-2000. During the survey, several reports are produced, describing information society developments in Estonia and other European countries;
    - *Estonian eVikings*[92]. The project (2001) aims to strengthen the links between the Estonian and European IST research and development communities, starting with the closest neighbours around the Baltic Sea, but keeping still focus on Europe as a whole. It supports the strife of the Estonian R&D labs to become modern eVikings of the Information Society, through assistance to introduction of new European co-operative research and development projects;
- *Interchange of Data between Administrations (IDA)* since March 2003 (http://europa.eu.int/ISPO/ida/). The aim of IDA program is to create a secure electronic data exchange between EU institutions and administrations of the member states, including facilitate communication between institutions, support the decision-making procedure in the Union and increase administrative capacity. The IDA program is supporting the objectives of e-Europe initiative, primarily development of governments' electronic services93;
    - *eContent* since September 2002. The program facilitates access to public sector information and easier handling of this information, creating of information content in different languages and for different cultures, and development of a digital information content market[49].
    - *Participation in the information society (IST) program of the European Union 6th framework program for research and development* (the first project tenders were launched in December 2002)[49.]

Although it is rather difficult to link bilateral and multilateral agreements to IST development we reproduce in Table C13 in Annex the main agreements from the website of the Ministry of Foreign Affairs (country link takes reader to the overview of cross-country relations with the corresponding country on the Ministry of Foreign Affairs website).

As the Statistical Office of Estonia does not produce ICT sector-specific data, we have to use various studies for characterising ICT sector more deeply: the study of the Information and Communication Technology Sector (Sectoral, 2002) undertaken by the consulting company AS PW Partners at the request of the Estonian Foundation for Vocational Education and Training Reform, several studies of the Estonian eVikings and other sources.

ICT sector comprises approximately 450 enterprises, 250 of which are small (with a staff of 1-5 persons and a turnover of less than 65 thousand EUR) (Sectoral, 2002). A majority of ICT sector enterprises are located in large cities, particularly in Tallinn (about 70% of enterprises).

[90] NeD Action Plan and the joint statement of ministers were adopted at the ministerial meeting in Riga on 28 September 2001. Estonia is one of the leaders of the joint political initiative and leads the workgroup of action line "ICT security", http://www.riso.ee/nordic/.

[91] There is a comprehensive database of information society projects, actions and contacts established (http://www.esis.ee/index_eng.html)

[92] Special attention is paid to updating and giving advice for better focusing of the national research and technology policies. (http://www.esis.ee/eVikings/index.en.html)

[93] Infotehnoloogia avalikus halduses 2003. Aastaraamat (Information technology in public administration 2003. Yearbook) (http://www.ria.ee/it2003/

These enterprises are mainly active in a wide area of parallel activities, meaning that specialisation is not common practice amongst Estonian ICT related SMEs. Slightly more than half (57%) of the enterprises are Estonian-owned. Foreign owned are mainly enterprises with a turnover of more than 6 MEUR and 0.6 to 3 MEUR. Foreign partnership has been established more in the medium-sized company category and the share of foreign capital usually exceeds 50%.

More than half of the enterprises in the sector are service providers or mediators. Several enterprises are engaged in multiple activities, like manufacturing (producing) and sales. Sales of different products generate about one-third of the turnover. The next by the volume of turnover (17%) is manufacturing, production of computers/components accounting for almost 50%, the rest is production of various electronic and telephone devices and microchips. On the basis of sectoral study on ICT we can say that product development in the ICT sector is relatively underdeveloped, and in many companies (85%) it is lacking. ICT sector enterprises do not feel the need to elaborate modern solutions themselves. Many companies do not engage in product development themselves in the classical sense of the word, but they take the first opportunity to use new products and technologies developed somewhere else. ICT enterprises' product development is oriented mostly to the domestic market (about 2/3 of ICT enterprises see domestic firms as their direct competitors), which does not exactly require world class leading solutions (Tiits and Pihl, 2002). Thus, they do not deem long-term strategic planning important either. The ICT sector international innovation system is characterised by an extremely small co-operation between academic and entrepreneurial circles while only a few institutions are creating high value added (only 9% of the firms have used professional help of research institutions). Like in all economy, big risks are involved in investments in research and development in the ICT sector. Due to the currently low science intensity, the ICT sector is not capable of creating a productivity growth, neither inside the sector nor in other sectors of the economy (Tiits *et al*, 2003).

The driver segments in ICT sector are telecommunication services, telecom equipment production and computer services (Estonian eVikings[94]). Telecom spans both IT hardware and software and services, produces a substantial output in terms of ICT. Computer services are a generic heading for a number of sub-activities that all embrace primarily immaterial aspects of adding value i.e. maintenance, integration etc. This is also the reason why this sector is overwhelmingly interconnected with the rest of business activities.

Estonian ICT cluster comprises IT hardware production that incorporates also electronics sector, IT software production and services, also some fields of manufacturing, banking, wholesale and retail and governmental structures as final users and is based to a large extent on the development in telecom, as telecom provides substantial input to computer services and equipment production. An important role in ICT cluster's development is also associated with governmental structures, which obviously are the target groups for several ICT sector segments such as software production (Pihl, 2001).

In the cluster framework, the main products demanded but also supplied by other sectors are telecom equipment related. Interactions are tight with manufacturing and computer services sectors.

[94] http://www.esis.ee/eVikings/evaluation/index.en.html

Export of Estonian ICT goods (30.9% of special exports of commodities in 2000) increased rapidly until 2000. Most of the rise can be ascribed to Elcoteq's activity (provided 83% of total ICT export in 2000) as well as the decrease in 2001, but in 2001, first positive net exports were detected (Table C13). The service sector has played quite a marginal role (about 4% of total ICT goods and services in 2000) in ICT exports. The high share of ICT production in total exports outlines relatively high foreign demand for these products, reaffirming a potentially good starting point for sustained competitive position in the ICT cluster. The largest export partners for ICT goods are Finland and Sweden (84% of total exports) that can serve as the basis for the Estonian ICT cluster to be part of the larger Scandinavian ICT cluster (Pihl, 2001). The dynamics of ICT imports in special imports of commodities has had a slightly declining trend, the respective ratio was 25.1% for 2000. The relatively large export and import shares refer, as mentioned already many times, to a large subcontracting (imported goods are partly used for re-exports) in ICT sector.

Table C13.: Trade balance of ICT industries. Special exports and imports of ICT goods, MEUR (EU Combined Nomenclature (2002) codes and commodity groups)

	1995	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**
Total of ICT special exports	120.9	133.6	271.1	427.0	443.1	1143.0	1043.2
Total of ICT special imports	234.2	281.2	443.9	607.7	601.9	1202.6	979.9
NET EXPORTS	-113.4	-147.5	-172.8	-180.7	-158.8	-59.6	63.3

Source: Foreign Trade, 2002

On the basis of Sectoral study (2002), we can say that the financial situation in the sector as a whole is not very strong. Based on the survey results conducted within the above-mentioned research, a large proportion of the companies with the exception of market leaders are balancing at the profit/loss borderline (the opinions can be trusted because the reinvested profit is income tax free in Estonia). Investors have not regained after the worldwide depression the trust in the ICT sector. This makes it difficult for companies to engage in product development, which in turn would ensure continuous capacity for the company.

The Sectoral study (2002) indicates that investments of companies increased in this sector almost by one-fourth in 2001, compared with 2000. Of total investments (39 MEUR were planned for 2002) large enterprises can afford largest investments (91%) while medium-sized and small companies lack the capacity to invest sufficiently in order to remain competitive in the long-term. By field of activity, investments of companies divide as follows: telecommunications 82%, IT 15% and other enterprises 3%. Major investments are made in the procurement of new machinery and equipment, mainly servers and computers. Investments in product development and services are considerably smaller.

Divergence of actual life from Estonia's pursuits to be a successful IT country is confirmed by the fact that public sector funding for IT R&D in 2000 accounted for approximately 5% of the public sector allocations for R&D (Tiits *et al*, 2003). The extreme fragmentation of the public sector funding, large number of small projects and relatively low competition clearly show the weakness of the current system of financing. The survey conducted within the eVikings project in 2001 indicated that one of the most serious problems for the ICT sector is that 56% of ICT enterprises had a shortage of R&D specialists for concrete products or technologies, 39% were looking for project managers and sales personnel, and only 10% needed R&D specialists, 20% presumed that the need for new research R&D personnel would rise in a long term. A large number of highly qualified specialists will be needed who can manage with the

development of sophisticated technologies and applications (Sectoral, 2002) (ICT-related tertiary education problems see in Chapter G).

Human capital is considered to be the most important strength as well as the most serious weakness of the sector because the value of a company depends mostly on people who work there, their knowledge and skills (Sectoral, 2002). The second most disturbing weakness can be identified as poor marketing. The bad location of the company in terms of visits by few people, high costs related to the fast development and long delivery time can be mentioned as other weaknesses (Sectoral, 2002). According to the Sectoral study (2002), the strengths of the ICT sector are considered to be the awareness about ICT companies and good relations with regular clients.

Total number of people employed in ICT companies was estimated to be 8793 in 2002 and 10 companies with more than 100 employees provide workplaces for 4950 people, 311 companies have 1-5 employees (Sectoral, 2002). 75% of all people working in the ICT sector have higher education (Sectoral, 2002). The majority of the staff in this sector who have higher education are graduates from Tallinn Technical University (TTU) (other educational institutions where higher IT education could be obtained are the mathematics and informatics departments of national universities – Tartu University, Tallinn Technological University, IT College, Estonian Business School). TTU is the largest educational establishment in Estonia providing ICT education. 70% of the graduates from diploma studies and 69% from bachelor studies come from TTU.

Approximately 700 new ICT specialists enter the Estonian labour market annually (Sectoral, 2002). The need for ICT specialists is estimated to be 600 people per year. Enterprises of the sector need about 400 specialists, the others go to work to companies outside the sector and ca 100 people do not work in their speciality. These figures show that the demand and supply of specialists balanced. In reality, however, there is a deficit of specialists in the labour market due to the fact that employers refuse to accept vocational schools as educational establishments producing ICT specialists (see composition of ICT graduates in the Chapter G). Consequently, it is necessary to raise the quality of education of those graduating from vocational schools. In the long term, the need for specialists may increase (Sectoral, 2002). According to the expectations of the enterprises surveyed, the need for software specialists possessing a relevant academic qualification will be the first occupational group to be recruited.

The important employers for the IT personnel are banks and telecommunication companies. According to the Sectoral study (2002) Business newspaper *Äripäev* listed Estonian the important IT employers (by main field of activity) as follows (Äripäev, 2003):

Hansapank	(bank)	- 248 persons
Eesti Telefon	(communications, holding company)	- 230 “
MicroLink	(PC production, PC services, trade)	- 169 “
Ühispank	(bank)	- 139 “
BCS	(PC production, PC services, trade)	- 132 “
Eesti Energia	(electric power generation, distribution)	- 73 “
Abobase Systems	(PC production, PC services, trade)	- 60 “
Helmes	(PC production, PC services, trade)	- 40 “
EMT	(communications, mobile services)	- 40 “
Radiolinja	(communications, mobile services)	- 30 “
Ordi	(PC production, PC services, trade)	- 20 “.

Considering this allocation of IT related intellectual potential it is understandable why banking and communications are leading in Estonia's IST development.

The key factors influencing the development of the sector are:

- the progress of the sector's enterprises is first of all affected by qualification of the staff;
- the rapidly developing environment requires ongoing development of specialists;
- the Estonian market has a limited purchasing power. The largest enterprises of the sector do not export extensively (except for re-export), but they sell products and services in the Estonian market;
- to increase export potential, more investments in production development are necessary.

Estimates of the IT market outlooks (Viik, 2002) indicate a growth of approximately 10% a year; demand will increase in the service sector, trade and industry by 20%, in SME by 15% and in public sector will not change. The future of the ICT sector in Estonia depends on the developments and the opportunities that worldwide ICT sector offers. The purpose of ICT applications has in connection with the immense increase in using the Internet reached a new phase – from specialists (in 1970's) and organisations (in 1980's) to clients (since 2000), and therefore, the strategic planning of ICT must be based mainly on the external needs (Viik, 2003a). IT investments so far have been strategically focused on the organisation´s own needs rather than those of clients. These should be followed by client-oriented IT strategic action plans that would help to increase business incomes (Viik, 2003a).

For increasing the economic competitiveness, imported technology should be converted to export of products and services. As Estonia with its low volume of research and development could not be a technology exporter, neither in the world nor in the region, but has successfully implemented imported technologies, then Estonia could rather turn into a potential exporter of technology applications (Viik, 2003b). For that it must continue to implement high technology in different spheres, focusing increasingly on mapping lessons and experiences of implementations, trying simultaneously to export experiences gained here.

Conclusions

In Estonia, the economic structure is converging to that of advanced economies: the share of agriculture decreased to 3.0% while the share of services sector increased to 65.5% of value added in 2002. Industry provides approximately one-fourth of Estonia's total value added and the share of industry in employment rates also accounts for more than one-fourth. The feature characterising the development of industrial sector is high adaptability with external shocks, being mainly related to successful privatisation and active reconstruction process that followed. Other distinguishing features of Estonia's industry are the high share of traditional branches (food, timber, machinery, equipment, light industry), its dependence upon developments in the world business environment, high share of subcontracting in total exports and low level of labour productivity.

The development of the Estonian ICT sector has been gradual throughout the last decade, from low value added computer assembling activity to higher value added software production and telecom services. The ICT market is shared between a few large corporations, which consolidate a substantial economic power and account for a dominant part of the entire Estonian ICT sector, and many small IT enterprises with lower market relevance, which specialise either in subcontracting, sell hardware and software or develop niche products. The

majority of Estonian ICT sector enterprises are active in a wide area of parallel activities, meaning that specialisation is not common practice among Estonian ICT related SMEs.

The driver segments in ICT sector are telecommunication services, telecom equipment production and computer services. The high share of ICT production in total exports is a potentially good starting point for sustained competitive position in the ICT cluster. Largest trade partners for ICT goods exports are Finland and Sweden, which can serve as the basis for the Estonian ICT cluster to become part of larger Scandinavian ICT cluster. As a great majority of Estonia's ICT related exports is produced on the basis of subcontracting the main R&D expenditures are made abroad keeping Estonian R&D expenditures low. Subcontracting also enables to enter the parent company's marketing networks. There is another reason for regional cohesion with the Scandinavian ICT cluster, however at a price of being a somewhat lower value adding performer in the production value chain. Notwithstanding the quite acceptable development until now, some replacement of subcontracting with original Estonian production is badly needed. In order to escape from the status of cheap subcontractor, Estonia needs a comprehensive economic policy aimed at increasing technological and organisational efficiency via using of new knowledge and technologies. In this sense, the most important factors are transparent innovation policies in strategic development plans and well-targeted education and training policies.

C.4. A SWOT analysis

Strengths	**Weaknesses**
Changed structure of economy towards market economy needs High share of ICT products in total exports due to the subcontracting Increasing contribution of high tech manufacturing High level of contribution of high technology exports Relatively high general educational level of workforce	Regional disparities of industry and services Low level of high tech output Estonia's high tech export is vulnerable due to subcontracting Status of cheap subcontractor Decrease of employment in medium-high tech manufacturing Product development in ICT sector is underdeveloped Mass production of ICT products requires lower qualification Estonian manufacturing not intensive ICT user Shortage of skilled workers Little investment in ICT industry
Opportunities	**Threats**
Broad international co-operation as a precondition for economic development Positive spill-over of foreign capital to modernisation of domestic enterprises Competition of domestic enterprises with subsidiaries of Nordic companies Cheap labour force based comparative advantage in the short term High share of innovative enterprises Revealed comparative advantage of resource-intensive industries High share of ICT goods in total exports Regional cohesion with Scandinavian ICT cluster Successful implementation of imported technology	Low level of labour productivity Concentration of ICT sector mainly in the capital city may cause regional digital divide Dependence of ICT sector development on economic success a few large enterprises ICT sector depressed because lack of further investment Difficulties of ICT sector to increase a productivity inside or outside the sector SMEs have lack of capacity to invest

The factors considered by the authors as most relevant to the IS development of the country are underlined in the above SWOT.

The changed economic structure of Estonian economy towards market economy, the increasing contribution of high tech manufacturing and the relatively high formal educational level of workforce are good preconditions for the ICT sector development. The positive spill-over of foreign capital has had remarkable importance in modernisation of domestic enterprises. Competition of domestic enterprises with subsidiaries of Nordic companies and successful implementation of imported technology has increased the domestic economic development and created conditions for regional cohesion with Scandinavian ICT cluster. In the short term, the cheap labour force has a comparative advantage. At the same time, due to the large share of subcontracting in ICT sector and ICT companies' lack of capacity to invest, the actual R&D as a knowledge-intensive part of product development is low. Consequently the product development in the ICT sector is relatively underdeveloped. ICT sector enterprises do not perceive the need to work out contemporary solutions themselves. Many companies do not engage in product development themselves but take the first opportunity to

start using new products and technologies developed somewhere else. Some replacement of subcontracting with original Estonian products is needful in order to escape from the status of cheap subcontractor. The high share of ICT production in total exports and largest trade partners from neighbouring countries can be seen as the basis for Estonian ICT cluster to become a part of a larger Scandinavian ICT cluster. On the basis of successful implementation of imported technology, Estonia can find its niche in exporting technology applications.

D. PRESENCE OF MOST RELEVANT ECONOMIC ACTIVITIES FOR IST APPLICATIONS

D.1. The most relevant potential spill-over effects of ICT

During the last decade, the Estonian economy and society as a whole has made considerable progress. Despite the high position in the international competitiveness reports[95], Estonia is still among the technologically underdeveloped countries. So far, Estonia has been attractive to foreign investors mostly because of cheap production inputs. A considerable factor of economic growth so far has been the inflow of direct foreign investments into Estonia. Considering the limited scope of the Estonian markets and accession to the EU, competitive advantages in the future must be based on the factors that further long-term economic growth, which depends primarily on R&D and ICT developments and spread.

D.2. Level of IT investment

The Estonian R&D strategy formulates three key areas for research and development: user friendly information society technologies, biomedicine and materials technology. ICT sector is considered one of the most rapidly growing sectors in the world. Like elsewhere, the Estonian ICT sector has developed very rapidly.

Though R&D development in the sphere of information technology is one of the key directions of increasing the competitiveness of Estonian economy, the public sector allocated only 1.4 MEUR in 2001 for IT R&D activity, which takes approximately 5.7% of the public sector allocations for R&D in Estonia. And financing of the IT projects has been quite diffused. Comparison of the funded projects portfolio with the vision of the Information Society Technologies Advisory Group – ISTAG led to a conclusion that most of the public sector funded research in Estonia is targeted primarily at ensuring the sustainability of higher education, but their innovative performance is weak. Estonian research groups alone cannot compete with large international enterprises in the sphere of software technology, microelectronics, etc.

In 1996-1998, enterprises invested actively in fixed assets[96] (Table D1).

Table D1.: Enterprises' investments in fixed assets, MEUR

	1996	1997	1998	1999	2000	2001
Fixed assets total	623.9	812.0	985.9	874.2	1212.3	1357.1
Buildings and structures	282.9	359.7	447.1	331.9	563.9	618.0
Equipment, machinery, inventory	238.0	290.1	376.2	361.4	403.1	415.8
Vehicles	58.7	86.1	92.6	83.8	97.8	123.6
Computers	18.5	30.7	34.9	51.2	60.8	76.3
Land	13.5	36.3	22.3	33.8	60.2	102.3
Other fixed assets	12.3	9.0	12.7	11.9	26.4	21.1

Source: Statistical Office of Estonia

[95] The Global Competitiveness Report 2001-2002. World Economy Forum, 2001; The World Competitiveness Yearbook 2001. Institute of Management Development (IMD), 2001.

[96] Investments in fixed assets – the cost of buildings, equipment, machinery, vehicles, computers, land etc. purchased in the reference period.

In 1998, the investments grew more slowly than in previous years. In 1999, investments in fixed assets decreased. In 2000, the investment activity recovered again and 3-5% of the investments were spent on computers (Table D2). Investments in computers increased nearly 2 times faster than general investments in fixed assets in 1996–2001. Investments are mainly made for buying new technology and equipment. Investments in product development are nearly 10 times smaller.

Table D2.: Enterprises' investments in computers

Year	Investments total, MEUR	from this: computers, MEUR	Share of computers, %
1996	623.9	18.5	3.0
1997	812.0	30.7	3.8
1998	985.9	34.9	3.5
1999	874.2	51.2	5.8
2000	1212.3	60.8	5.0
2001	1357.1	76.3	5.6

Source: Statistical Office of Estonia, 2003

In 2001, enterprises made investments in computer technology and equipment in the amount of EUR 76.3 million, which was 5.6% of all investments (Table D3 and Table D1 in Annex). The investments were the largest in the sectors "wholesale trade and commission trade" (30.7% of all ICT investments) and "post and telecommunication" (22.1% of all investments in ICT) in 2001.

Table D3.: Investments in tangible fixed assets of enterprises, in 2001

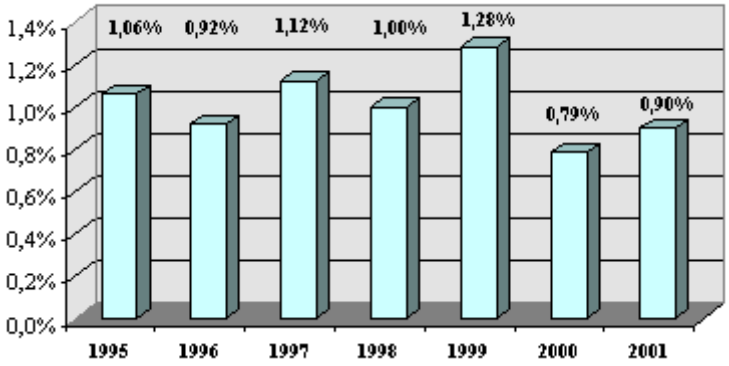
	Investments in tangible fixed assets, MEUR	from this: computers, MEUR	*Share of computers %*	Financial leasing, MEUR	..financial leasing: computers, MEUR	*Share of computers, %*
Economic activities total	1357.1	76.3	*5.6*	224.8	7.5	*3.3*
Agriculture, hunting	25.5	0.1	*0.6*	13.4	0.1	*0.5*
Forestry	23.2	0.9	*4.0*	12.5	0.3	*2.2*
Fishing	1.1	0.0	*0.7*	0.0	0.0	*0.0*
Mining	18.5	0.2	*0.9*	0.6	0.0	*0.0*
Manufacturing	273.6	9.9	*3.6*	49.2	0.4	*0.7*
Electricity, steam, gas and water supply	131.5	3.2	*2.4*	5.3	0.1	*1.1*
Construction	32.7	1.3	*4.0*	21.2	0.0	*0.2*
Wholesale and retail trade ...*	325.7	29.8	*9.1*	34.0	4.5	*13.3*
Hotels and restaurants	20.3	0.3	*1.4*	1.1	0.2	*18.0*
Transport, storage and communication	239.5	19.6	*8.2*	64.1	0.5	*0.8*
Real estate, renting and business activities	151.3	8.3	*5.5*	18.8	1.4	*7.4*
Education	2.9	0.5	*17.1*	0.1	0.0	*6.6*
Health and social work	8.8	0.3	*3.4*	1.1	0.0	*1.1*
Other community, social and personal service activities	32.9	1.9	*5.9*	3.5	0.1	*1.7*

Source: Statistical Office of Estonia.

The conclusions drawn on the basis of Table D3 indicate that across economic sectors, the tertiary sector enterprises invested in IT (79.6% of the total amount, with financial leasing 80.4%) the most in 2001. The primary sector spent for that purpose MEUR 14.4, or 18.8% of total IT investments.

The division of IT budget for 2001 by public administration agencies and ministries is presented in Table D4. The share of IT budget in the state budget has been about 1% during 1995-2001 (Figure D1).

Figure D1.: The share of IT budget in the State Budget in 1995-2001, %



Source: RISO

From 1996 to 2003, the ICT financing from the state's budget stayed around 1 per cent – 1.3 per cent at its peak in 1999 and 0.8 per cent in 2000. However, the resources allocated to ICT financing have grown almost 4 times – from 7.66 MEUR in 1997 to estimated 28.44 MEUR in 2003 (Krull, 2003). The costs include fixed costs (maintenance of ICT infrastructure components, annual fees of software licenses, out-sourced hardware and software services and date communication expenses), and expenses on contracting out ICT development projects.

Table D4.: Information technology costs in the State Budget in 2001

Name of PAA or its administrative area	**IT costs, MEUR**
Chancellery of the *Riigikogu*	0.57
Electoral Committee of the Republic of Estonia	0.01
Chancellery of the President	0.04
State Audit Office	0.09
Chancellery of the Legal Chancellor	0.02
Supreme Court	0.04
Administrative field of the State Chancellery	0.65
- of that the target program of document management	*0.26*
MINISTRIES' administrative areas	
Ministry of Education	0.26
Ministry of Justice	1.62
Ministry of Defence	1.17
National defence departments	0.03
Ministry of the Environment	1.28
Ministry of Culture	0.51
Ministry of Economic Affairs	0.63
Ministry of Agriculture	0.60
Ministry of Finance	1.57
Ministry of Internal Affairs	2.03
Ministry of Social Affairs	1.83
of that	
-to Ministry of Social Affairs	*1.04*
-to Social Insurance Board	*0.79*
Ministry of Transport and Communications	2.69
Ministry of Foreign Affairs	0.77
COUNTY GOVERNMENTS	0.49
Government of the Republic reserve capital	0.00
-digital signature costs	0.23
IT in total	17.13

Source: RISO, Ivar Odrats

The actual expenditure on ICT in public administration is larger, as salaries of ICT staff, ICT expenditures of agencies receiving only grants from the state budget, training of ICT education and the ICT expenditure of local governments are not included here.

D.3. Trends in innovation and R&D

In order to structure the presentation of the current baseline "context" indicators for the Estonian RTDI (Research, Technology Development and Innovation) and facilitate comparisons with the EU15 and other candidate countries, the European Innovation Scoreboard framework is adopted (Table D5). The following analysis is divided into four sections:

- **Human resource development** (educational levels of economically active population, education expenditures, educational level of entrepreneurs);
- the share of employment in high-tech manufacturing employment is approximately half the EU average and is allied to a low ratio of science and technology graduates suggesting the threat of a skills mismatch;

- **Knowledge creation** (expenditure on R&D; research output – patents);
- business expenditure on R&D was only 0.15% of GDP compared to an EU average of 1.2%. It is concentrated in a few large and foreign owned companies; however SMEs that do innovative do so more intensively than large firms;

- **Transmission and application of knowledge** (innovation activities in firms);
- Some 36% of Estonian companies declare themselves to be innovators; however, one fifth declared they made no expenditure on innovation in 2000; and only 21% had expenditure in excess of 1 MEEK (~63000 EUR).

- **Financing of innovation, output and markets**
- Only one-sixth of Estonian manufacturing sales is due to new or improved innovative products (two time lower than EU average); indicating a gap in potential for developing new higher value added products.

Table D5.: Innovation Scoreboard 2002 – Selected Accession Countries[97], data from years 2000 and 2001

Indicator	EU	CZ	EE	HU	LT	LV	PL	SI	SK
Human resources									
New S&E graduates (bachelor and master degrees, PhD) (% among population aged 20-29)	10.26	4.00	6.83	4.49	9.35	5.52	5.90	13.10	--
Population with tertiary education (% of population aged 25-64)	21.22	11.59	29.42	13.96	45.03	18.15	11.73	14.12	10.66
Participation in life-long learning (% of population aged 25-64)	8.5	--	5.3	3.0	3.7	16.3	5.2	3.7	--
Employment in medium-high and high-tech manufacturing (% of total workforce)	7.57	9.16	4.79	8.80	3.18	1.72	7.54	8.74	6.75
Employment in high-tech services (% of total workforce)	3.61	3.22	3.38	3.24	2.01	2.19	--	2.71	3.03
Knowledge creation									
Public R&D expenditures (% of GDP)	0.67	0.54	0.53	0.45	0.53	0.29	0.45	0.68	0.24
Business expenditures on R&D (% of GDP)	1.28	0.81	0.15	0.36	0.07	0.20	0.25	0.83	0.45
EPO patent applications (per million population)	152.7	12.1	6.9	16.1	1.1	2.5	2.3	20.6	5.9
Transmission and application of knowledge									
SMEs innovating in-house (% of manufacturing SMEs)	44.0	--	33.2	--	49.0	--	4.1	16.9	--
SMEs involved in innovation co-operation (% of manufacturing SMEs)	11.2	--	13.0	--	12.0	--	--	--	--
Innovation expenditures (% of total turnover in manufacturing)	3.7	--	2.4	--	--	--	4.1	3.9	--
Innovation finance, output and markets									
High-tech venture capital investment (% of GDP)	0.242	0.021	--	0.035	0.900	0.624	0.045	0.150	--
Sales of "new to market" products (% of total turnover in manufacturing)	6.5	--	6.0	--	--	--	--	--	--
Home internet access (% of all households)	31.4	13.6	30.1	14.8	6.8	7.2	9.8	30.0	16.7
ICT expenditures (% of GDP)	6.93	9.3	9.8	8.7	4.7	--	5.9	5.2	7.5
Inward FDI stock (% of GDP)	30.3	42.6	53.2	43.4	20.6	29.1	21.3	15.5	24.2

Source: European Innovation Scoreboard, European Commission

Development of human resources and educational level of labour force has been discussed in Section G. "Educational sector…".

[97] Main data source is EUROSTAT excl. 3.1-3.3, 4.3, 4.6 (National Statistical Offices), 4.1 (EVCA), 4.5 (WITSA/IDC (Digital Planet), 4.6A (UNCTAD (World Investment Report)

It is crucial to understand the connection between the overall weak innovation performance, productivity growth and the overall goal of improving competitiveness (defined as a sustained increase in real incomes and in the standard of living with jobs available for all those who wish to find employment)[98] of the Estonian economy. Despite the rapid growth of productivity since 1995, labour productivity in the Estonian manufacturing sector was only 27% of the EU15 average in 2000 (Eurostat, 2001)

Productivity growth depends, amongst other factors, crucially on research, technology development and innovation, ICT creation, up-take and diffusion and the match between skills base of the workforce and new types of jobs being created. Innovation Scoreboard 2002 results for Estonia indicate that the productivity focus of innovation activity is lower than in the EU (Research, 2002). Although as a result of changes in Estonian manufacturing industry, its capital intensity is lower than in other Central and Eastern European countries, Estonia has still in terms of overall capital intensity a leading position among the candidate countries. This is due to the active inflow of foreign owned enterprises to the Estonian market in the early 1990s. Foreign direct investments (FDI) accounted for over one-quarter of the new capital investments in fixed assets in the 1990s and have exerted positive influence on the elaboration of new products and introduction of technologies in Estonia (in greater detail, see Chapter A)

The important role of FDI in new capital investment could be an indicator of a positive effect in terms of new technologies. Openness towards trade and FDI is an essential feature of catching-up process. However, it is not openness by itself that matters but how a country uses inward investment to upgrade in technological and organisational practices and thereby increase its long-run competitiveness.

While foreign direct investments into Estonia have been increasing since 1992, domestic investments in R&D have remained modest (see section D.4). R&D and innovation policies in Estonia have gained increasing prominence since the end of the 1990s as policy makers and other stakeholders started to understand that longer-term growth prospects were dependent on fostering a “knowledge-based Estonia”. This strategy sets out a number of ambitious goals but remains somewhat thin in terms of linking quantifiable targets to instruments and to stated objectives. Two main objectives were set out in the knowledge-based Estonia strategy:

- updating pool of knowledge – “raising the quality and level of research”- notably in three technology areas: biotechnology, information technology and materials;
- increasing the competitiveness of enterprises – the precondition being to develop an “integration mechanism between research and business sector” (Estonian RTDI, 2001).

The studies on the National Innovation Systems tend to highlight two models: a model where one government ministry or agency is responsible for policy making across the breadth of science, technology and innovation issues; and “Bi-polar” set-ups where separate ministries of science/education and economy develop policy for their respective fields of competence (Research, 2002). Estonia has opted for the second model: the Ministry of Education is responsible for research and education policy and the Ministry of Economic Affairs and Communications is responsible for applied research and innovation. At the present time, the level of policy co-ordination is relatively good regarding both ministries. Both ministries are participating in the development of the national R&D strategy and with regular consultation

[98] The definition of Competitiveness used is that adopted by the European Commission in its Communication on Productivity: the Key to Competitiveness of European Economies and Enterprises (21.05.2002)

on developing measures. The institutional capacities of the ministries in terms of developing programs and projects, which could be eligible for Structural Fund support, are not equal. The Ministry of Education currently is not as advanced in developing policy schemes and appraising the existing funding mechanisms for academic research, as the Ministry of Economic Affairs and Communications is with the development of an overall policy framework for technology and innovation and appropriate schemes (see Figure D2).

From the perspective of supporting industrial (applied) research and innovation, the establishment of the Estonian Technology Agency (ESTAG) in 2001 has significantly improved the capacity of the Ministry of Economic Affairs and Communications to implement innovation policy. The stated aim of ESTAG is "to develop Estonian business through the support of technological and innovative projects"(Research, 2002). The creation of ESTAG is a good example of international policy learning since the strategic and operational planning of ESTAG was supported by a senior director of the Finnish Technology Agency (TEKES). At the present time, Estonia is the only candidate country, aside from Turkey, to have a dedicated governmental agency with a mission to provide support to enterprises for product and process development and innovation. This can considered a significant advantage with respect to the prospects for an effective implementation of a coherent RTDI measure within the future EU Structural Fund program.

Growth requires increasing of explicit technological efforts through R&D and industrial innovation, as well as diffusion of existing knowledge throughout the economy.

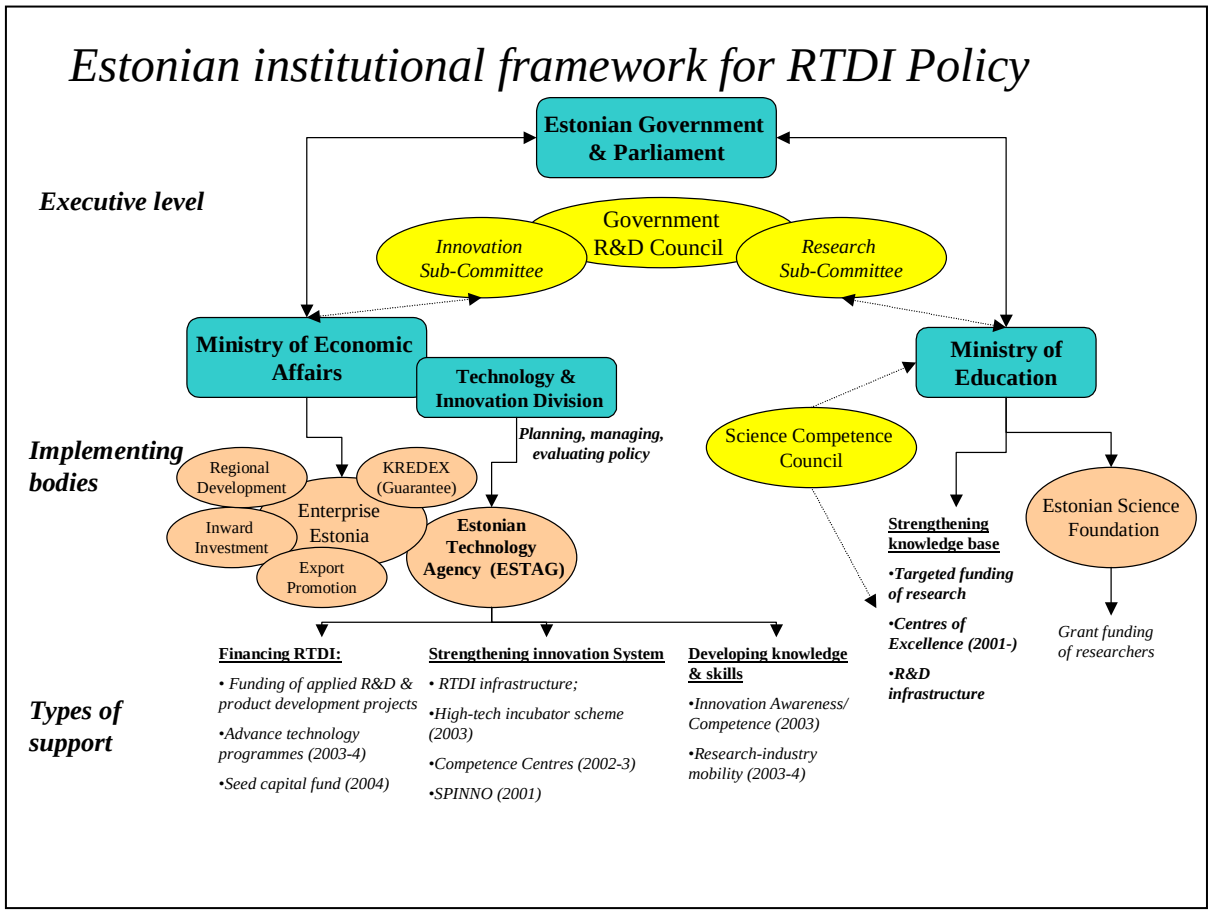


Figure D2.: Estonian institutional framework for RTDI Policy

D.4. R&D investment level

During the 1990s, Estonian R&D investments comprised approximately 1/3 of the EU average, increasing 13% annually in absolute terms. The total expenditures on research and development (R&D) activities were very low, amounting to only 763.5 million EEK (approximately MEUR 49) in 2001**.** The research intensity of the Estonian economy during the period of 1995-2001 fluctuated between 0.6 and 0.7% of GDP, amounting to only about 37% of the average for EU member states (1.95% of GDP, 2001).

The collapse of the Soviet Union affected RTD activities in Estonia, as many of the research institutions were closely tied into heavily centralised innovation system in the East. During the independence, liberal open market environment and privatisation have contributed to restructuring of the Estonian economy. The government intervention in the R&D activity of industries was non-existent and the role of science and technology policy has been also rather marginal in a wider policy context. Accordingly, industrial research was let to struggle along with reduced public funding, but no active support to reorienting R&D was provided (Dyker and Radoševic, 1999)

Table D6.: R&D expenditure by the type of R&D activity[99], 1993-2001, MEUR, %

	1993	1994	1995	1996	1997	1998	1999	2000	2001
TOTAL, MEUR	8.6	14.1	17.1	19.8	23.1	22.9	27.9	28.7	32.4
Basic research, %	61.7	56.0	52.7	56.3	49.5	48.0	49.8	50.7	51.2
Applied research, %	29.8	36.5	35.5	30.2	37.2	39.2	34.5	34.0	38.7
Experimental development, %	8.5	7.5	11.8	13.5	13.3	12.8	15.7	15.3	10.1

Source: Statistical Office of Estonia: Science

The distribution of RTD financing between basic and applied research and experimental development (Table D6.) has undergone gradual changes by type of R&D activity since beginning of the 1990s. In 1992, approximately 80% of RTD funding was allocated to basic research, in 1999 the dominance of basic research fell to 50%, but the link between research labs and industry is still very weak. Basic research alone does not keep up the economic as well as scientific competitiveness. Applied research and experimental development, which are comparatively more market tailored, should provide well functioning links between research, economy and society, having also a distinct income generating function for the universities and public research entities. On the other hand, basic research should not be undermined either, as it is a basis for higher education, applied research and experimental development.

The public sector is the largest investor in R&D activities. In 2001, the public sector contribution to R&D totalled 78% in Estonia, while in the EU 34% (in 2000) and the rest comes from the private business sector. Nevertheless, the public sector expenditures on R&D (0.53% of GDP in 2000) are still lower than the EU average (0.65% of GDP in 2000). The state has been rather research-focused when allocating the limited funds available (Table D7). Approximately 90% of the R&D allocations made from the state budget funds have been allocated for research activities while the national measures aimed at supporting technology development activities and stimulation of innovation are rather limited.

[99] The business enterprise sector not included

Table D7.: Financing of intramural[100] research and development in institutions, source of funds[101], million EUR

	1993	1994	1995	1996	1997	1998	1999	2000	2001
Total funds	8.6	14.1	17.1	19.8	23.1	22.9	27.9	28.7	32.4
Government funds	6.5	10.8	12.2	14.9	16.0	17.6	22.0	21.2	24.5
Enterprises' funds	1.2	1.4	2.2	1.9	1.8	2.0	2.6	2.7	1.7
Non-profit organisations' funds	0.4	0.4	0.4	1.0	1.2	1.3	0.6	0.8	0.2
R&D institutions own funds	0.3	0.6	0.6	0.0	0.6	0.7	0.2	0.6	1.0
Foreign funds	0.3	1.0	1.6	2.0	3.5	1.5	2.4	3.4	5.0

Source: Statistical Yearbook of Estonia, 2002, CD.

The advance in engaging private sources into R&D is essentially related to public sector's ability to pursue more market tailored RTD activities, providing the rest of the public co-funding with potentially higher returns. Breakdown of the RTD expenditures by type of activity follows in the EU countries frequently the rule of 1/3 to basic research and 2/3 for applied research and experimental development.

D.4.1. R&D in the business sector

Estonian enterprises' expenditure on R&D amounted to only 0.26% of GDP in 2001 (EU – 1.28% of GDP in 2001). Data collection from the business sector enterprises according to the international methods began only in 1999. It is very likely that the statistics on business enterprises' R&D we have so far are inconsistent. Enterprises' expenditures on R&D are discussed as part of investments for raising the enterprise's competitiveness. In 2001, expenditures of business sector enterprises on R&D activities accounted for approximately one-third – 16.4 million MEUR (Table D8), of which 88% they spent themselves (works were performed by enterprise's own employees). R&D works from outside were ordered only for 4 million EUR. R&D expenditure accounted for 0.11% of the business sector net turnover and 0.12% of all expenditure. Intrafirm R&D expenditures were the largest in the sector of computer services. Estonian IT enterprises are inclined to perform, according to the findings of a survey (Innovatiivne, 2003), specific application developments (e.g. tailor-made software, information systems) rather than systematic R&D activity in a broader sense.

[100] With respect to expenditures, the intramural (intra-institutional) expenditure on the research and experimental development, which are performed within each statistical unit by its employees. Otherwise, the date would be doubled as both the performer and the customer will record the amount.

[101] The business enterprise sector not included

Table D8.: R&D expenditure across economic sectors and sources of funding, 2001, million EUR

Sources of funds	Government sector	Higher education sector	Private non-profit sector	Business enterprise sector	Total
Total	6.87	24.66	0.86	16.41	48.80
State	5.85	18.31	0.37	0.86	25.39
Enterprises	0.30	1.26	0.09	14.42	16.07
Non-profit organisations	0.03	0.16	0.04	-	0.23
Higher education sector	0.01	0.97	0.01	-	0.99
Funds from abroad	0.69	3.96	0.34	1.13	6.12

Source: Research and Development 2001. Statistical Office of Estonia

The largest R&D expenditure maker in Estonia is the higher education sector, comprising after science reform also the majority of research institutions. The main donor of the higher education sector is the state. The largest expenditure maker in EU countries is the business sector. The role of business sector has started to rise recently also in Estonia, both in terms of R&D funding and R&D expenditure. Table D9 demonstrates that in the secondary sector, R&D expenditures are the biggest in manufacturing, including in manufacturing of chemicals and chemical products and in manufacturing of electrical and optical instruments.

Table D9.: Intramural R&D expenditures in business enterprise sector by economic sector, MEUR

Economic sector	1998	1999	2000	2001
TOTAL	5.7	8.8	8.3	16.4
Primary sector[102]	…	…	…	…
Secondary sector	2.6	3.2	4.0	10.6
…manufacturing	2.5	3.0	3.9	9.5
…electricity	…	0.2	…	…
…construction	…	0.1	…	…
Tertiary sector	3.0	5.5	4.4	5.8
…transport, storage, communication	1.0	1.1	1.2	0.3
…computer services	0.4	0.9	1.4	2.0
…research and development	0.4	0.6	0.7	0.7
…other business activities	0.9	2.4	…	2.1

Source: Research and Development 2001. Statistical Office of Estonia. CD

The main source of funding the intramural R&D expenditure is the enterprise's own resources, which accounted for 88% of total funding in 2001. State allocations accounted for 5% and external sources for 7%. Most of the outsourced R&D expenditures are also funded from own resources.

In order to provide a sustainable economic growth, Estonia needs a comprehensive economic policy that would be aimed at increasing the technological efficiency through introduction of new knowledge and technologies and a considerable increase of R&D activity that satisfies

[102] Statistics on the primary sector have not been collected

the needs of economic development. Creation of internationally competitive innovative research-intensive products in Estonia will depend in the short term mainly on foreign capital interests to bring part of their development activity over to Estonia. Importation and targeted use of new technology will be the main way of increasing competitiveness of the Estonian economy in the short term.

D.4.2. Patenting activities

A higher number of registered patents indicates the more intensive innovation activity alongside with market relevance of these new ideas. A patent is a formal document recognising the novelty of an idea, and provides official protection for unauthorised use of a certain technological solution. Table D10 (also see Table D2 in Annex) displays the results of the activities of the Estonian Patent Office.

Table D10.: Legal protection of industrial property by type of property[103], number

	1994	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**
Filed applications								
Trade marks	2733	2830	2659	3101	2963	4417	5737	6668
Patents	482	82	213	375	463	619	805	717
Utility models	32	52	31	45	47	31	50	43
Industrial designs	0	0	0	0	149	107	90	77
Layout designs of integrated circuits	0	0	0	0	0	0	1	0
Geographical indications	0	0	0	0	0	0	10	2
..applications from Estonian applicants								
Trade marks	543	589	513	666	637	723	884	910
Patents	16	16	12	15	20	13	12	19
Utility models	27	50	30	42	38	25	47	36
Industrial designs	0	0	0	0	33	24	20	21
Layout designs of integrated circuits	0	0	0	0	0	0	1	0
Geographical indications	0	0	0	0	0	0	10	1
Registered								
Trade marks	7500	3745	3726	3179	2848	2064	3105	2447
Patents	0	0	22	108	82	103	84	257
Utility models	15	55	28	36	51	32	40	26
Industrial designs	0	0	0	0	131	78	94	92
Layout designs of integrated circuits	0	0	0	0	0	0	0	0
Geographical indications	0	0	0	0	0	0	0	1

Source: Statistical Office of Estonia

[103] Data of the Estonian Patent Office.

We focus here on the number of patent applications, which is an internationally used high-tech indicator. The number of Estonian patent applications per year has varied between 12 and 20. The total number of patents applied during 1994–2001 is 3756, yet domestic patent applications comprise only 3.4% of these. There are no statistics available on Estonian patent activity abroad. In 1997-2001, 399 patent applications were made in the sphere of information and communication technology (17.6% of all applications), of which only 2 were made by Estonian applicants.

In terms of utility models[104] Estonian applicants are more active (Table D10, also see Table D2 in Annex). The total number of utility model applications for the period 1994–2001 was 331, 90% of them were made by Estonian residents. The largest group is applied and registered trademarks (Table D10 and also see Table D3 in Annex).

The patent application statistics indicated that research and development conducted in the Estonian innovation system is not organised so that they could produce innovations.

D.5.Major players of the ICT sector

The landscape of R&D activity in IT is limited by the shortage of qualified participants. Value added R&D activity is only a domain of few institutional players, while majority of R&D results deriving universities and RTD labs are mostly basic research oriented without significant market relevance. When mapping such R&D structures in Estonia one should remark the University of Tartu and Tallinn Technical University as representatives of higher education and research, and few private research based enterprises, as the key market players. The former ones are focused to a large extent on basic research with less substantial dedication also to applied research, the latter ones specialise for the natural reasons in the market tailored solutions, mainly pursuing experimental development activities.

Tallinn Technical University (TTU) is the second largest university in Estonia, providing interdisciplinary higher education and research. The Faculty of Information Technology incorporates 7 departments: Computer Science, Computer Engineering, Informatics, Electronics, Computer Control, Radio and Communication Engineering and Rehabilitation Technology Centre, IT Further Education Centre. The basic research in the Department of Informatics at TTU is quite diverse. The most important of them are: design and diagnostics of digital systems; elaboration of error-free digital systems; evaluation of the quality of software processes and elaboration of the software for machine design; monitoring and data acquisition systems an elaboration of system-integration methods; elaboration of high-technology rehabilitation appliances etc. The Faculty is active in establishing contacts with industry and is carrying out several highly application-oriented research projects: practical aspects of system modelling.

The Institute of Cybernetics at TTU (in 1960–1997 Institute of Cybernetics of the Estonian Academy of Sciences) is another leading public sector institutions in ICT. Its main areas of research are: information technology – knowledge-based software engineering tools, elaboration of software systems and computer networks, as well as theory of control systems, phonetics and high-technology analysis and application.

[104] An invention satisfying in terms of novelty the requirements stipulated by law, which is industrially applicable and is protected by a useful model law.

Most of the private sector IT enterprises are undercapitalised compared to their western counterparts both in terms of human capital and finances, to conduct any serious research and development work. Although only 10% of the Estonian IT enterprises are interested in foreign investment in their company (Porter, 2002).

Own development work is the main source for upgrading the products or processes for almost 70% of the enterprises covered by the study. In 1999 – 2000, half of the enterprises upgraded their production processes, 17% are relying mostly on inward technology transfer and 12% consider upgrading their products not important (Tiits, 2002).

Most of the product development-oriented companies are in the middle of the learning curve:

- imitating major development trends towards information society and selling their eBusiness, eGovernment, etc. related production predominantly domestically;
- or sub-contracting their resources to the foreign clients, while relaying on the relatively lower cost base in Estonia.

65% of the IT enterprises have contacted foreign enterprises with proposals for concrete co-operation agreements, and 34% have participated in foreign public tenders. Only 9% are actually co-operating with domestic universities. Altogether up to five companies with a few thousand employees can be identified, which are capable of subcontracting IT R&D work (Tiits, 2002).

The major IT R&D core institutions in the private sector are:

- Cybernetica Ltd., which is a part of the Institute of Cybernetics that split as a result of reorganising the Estonian Academy of Sciences. Cybernetica Ltd. is involved in several research projects: time-stamping and electronic document; Estonian ID card project etc.
- Estonian Telecom and especially its mobile telephone communications subsidiary EMT have recognised the convergence processes and changes very likely to influence the telecom markets worldwide in the next few years to come.
- *Radiolinja* has responded to value added services development in EMT with its own product development strategies. In co-operation with *Nokia*, developed and introduced mCatch system in Estonia for the first time in the world.
- *Hansabank* and *Eesti Ühispank*, which are the two largest banks in Estonia controlling together approximately 90% of the financial services market.
- Regio Ltd, in the early years Regio's main business activity was map publishing. Today Regio Ltd. has three different principal fields of activity: cartography, production of special data, and geographical information systems.
- Docobo Ltd. is the RTD based start-up focusing in telemedicine area.

Conclusions

Analysis of R&D and IT investment indicated again the contradiction that Estonia's contribution to ICT development is modest and the fast development has been possible mainly due to foreign investments and introduction of technological innovations worked out in other countries, which does not require spending of money on the financing of domestic research and development.

Estonia, similarly to all other countries, is adjusting to the new technological-economic paradigm, which consists of widespread implementation of ICT in different areas of life and

economic growth based on technological innovation. The preconditions for development of ICT services were created in the private sector through banks, communications sector and trade.

An overview of economic activities and IST applications in Estonia can be summarised as follows:

- Investments in computers increased in 1996–2001 nearly 2 times faster than general investments in tangible fixed assets,
- In 2001, enterprises invested in computers in the amount of EUR 76.3 million, which was 5.9% of total investments. The largest investments were made in "wholesale trade and commission trade" and "post and telecommunication",
- The share of IT budget in the State budget during 1995–2002 by public administration agencies and ministries was about 1%.

As the Estonian telecommunications sector is largely in the ownership of foreign companies, its development depends primarily on foreign direct investments in this sector. Foreign firms come to Estonia with their own ICT technology and do not make any direct expenditure on R&D and ICT in Estonia.

D.6. A SWOT analysis

Strengths Investments in ICT by enterprises have grown faster than general investments Major investments in ICT were made in the sectors that determine the growing use of IST	**Weaknesses** Insufficient financing of R&D, incl. ICT solutions State budget expenditure on public sector IT has decreased in two recent years Estonian enterprises' expenditure on R&D are small Low innovation
Opportunities Development of new ICT solutions to modernise the public sector Extensive introduction of new applications	**Threats** Satisfaction with achievements Decrease of public sector IT funding Jeopardised future competitiveness and sustainable growth due to low R&D and IT investment

The factors considered by the authors as most relevant to the IS development of the country are underlined in the above SWOT.

The share of expenditure on ICT in GDP is relatively high notwithstanding that overall expenditures on R&D in Estonia are moderate compared with EU countries. R&D has been financed mainly by the public sector. Analysis of R&D and IT investments indicated again the contradiction that Estonia's contribution to ICT development is modest and the fast development has been possible mainly due to foreign investments and introduction of technological innovations worked out in other countries, which does not require spending of money on the financing of domestic research and development.

E. INFORMATION SOCIETY TECHNOLOGIES (IST) PENETRATION

E.1. General trends

Information society technology and especially ICT is rather broadly used in Estonia. Its main trends have been:

- the wish of an increasing number of individuals, households and enterprises to take an advantage of developing IST technologies and make expenditure on buying this technology and have more experience in using this.
- predominant investment in the development of infrastructure, i.e. buying computers, their modernisation and introduction of contemporary software programs.
- this is followed by the increasing use of Internet induced by both the public sector policies and co-operation between the public and private sector with the objective to increase the use of Internet among individuals and enterprises.
- the main trend is still the increasing use of ICT whereas enterprises use new technologies quite moderately in production and other fields.
- increasing use of faster communication facilities (e.g. broadband).
- changes in the structure of the information communication types in connection with the development of new means of communication, e.g. decrease of fixed lines in connection with an extremely fast introduction of mobile communication.
- the development of infrastructure has caused a growth in demand for services.
- the main principle of the national information policy to provide everybody with equal access to information has served as the basis for the activity of the respective structure of public administration (e.g. ministries, IT departments, councils) the aim of which is to create a favourable environment for dissemination and exchange of information (e.g. target programs).
- provision of public administration agencies with computers and the growth of their internetisation,
- supply of new services to individuals and enterprises by public administration and public sector.
- changing of the public administration and public services sector more effective and open to people and private sector, development of e-democracy.
- increase in the use of services by citizens, private sector and public sector.
- considering the EU accession, national development plans have focused on the development of eEurope 2005 core areas (e.g. e-government, e-learning, e-health and e-business services; availability of broadband and secure information infrastructure).

E.2. Penetration and diffusion of information society technologies

E.2.1. IST at enterprises

There are different sources to estimate the penetration of information society technologies at enterprises. A survey was carried out in Estonia in 2002 based on the Eurostat questionnaire: “Community Survey on ICT usage in enterprises (e-commerce)“. The purpose of this survey was to collect data about information systems in enterprises, the use of Internet, e-commerce, electronic data exchange and problems in using the Internet. The survey covered manufacturing, wholesale and retail trade enterprises, hotels, transport, storage and

communication, real estate, renting and business enterprises. The survey analysis was based on the data of 5331 enterprises (using random sampling) (Statistical, 2003c).

The diffusion of information society technology is estimated in enterprises that use IT-systems for managing orders. Such systems were used by 25% of enterprises. 19% of enterprises used invoicing and payment systems, 13% of enterprises used systems for re-ordering replacement suppliers and 9% used systems managing production, logistics or service operations (Statistical, 2003c).

Internet has a growing importance in the communication between enterprises as well as between individuals. 14% of enterprises have teleworkers. Enterprises use Internet for marketing of their products[105]. About half of the respondents (of activities chosen) had their own website, which provides a good opportunity for marketing. The website of 65% of enterprises included information also in foreign languages. 30% of enterprises used Intranet to provide access to information to their employees, 7% of enterprises made information accessible also to some selected external users via Extranet.

In 2002, 83% of enterprises (of activities chosen) used Internet, which is 18% more than in 2001. 58% had permanent Internet connection (ADSL, SDSL), 22% of enterprises had dial-up connection, 5% of enterprises had wireless connection and 4% broadband cable connection.

Enterprises are using Internet to carry out money transactions via Internet web sites of all larger banks in Estonia. Almost all enterprises used Internet for looking for information. One-fourth of enterprises used digital products (ordered music, videos, games, computer software and read online newspapers). 8% of enterprises used Internet for training and education purposes. 82% of enterprises have used Internet for obtaining information from public authorities, 75% for obtaining forms and 56% for electronic case handling.

In the same survey, enterprises evaluated barriers to using Internet: security problems (48% of answers), expenditures are too high (14%), enterprise has no need for the Internet (11%), Internet connection is technically impossible (11%). Barriers to using computer: high cost of computers (25%), employees lack the necessary qualification (10%), technology does not meet enterprise's needs (6%) (Statistical, 2003c)..

Another survey by Emor Ldt. gives information about computers and Internet usage in companies of all activities. In April 2003, 73% of the companies (about 24 000) registered in the Estonian Business Register had at least one computer and 95% of them had also access to the Internet (74% using leased lines). 45% of the companies had 1-3 computers, 26% had 4-20 computers and 2% had more than 20 computers. 36% (about 8 300) of companies had Internet websites in April 2003 (Emor Ltd[106]).

About 3 200 enterprises had an intranet solution, and approximately 1 300 companies had both – a homepage and intranet (Baltic E-track survey, 2002).

The majority of companies have not integrated their Internet and intranet solutions with other IT systems in the company. Approximately 1 100 companies (around 4%) have integrated at least some systems and about 1 800 companies (around 6%) are planning to integrate the

[105] The information about using the Internet in enterprises is based on the above-mentioned Survey of Estonian Statistical Office in 2002.
[106] Survey by Emor Ltd. "Information technology and Internet in Estonian companies"

systems in the near future (Baltic E-track survey, Feb-March, 2002; IT in Public Administration, 2003).

E.2.2. IST in financial services

The history of Estonia's financial sector goes back to 1988 only. Thus, most of the commercial banks, insurance and leasing companies, investment and pension funds are quite young. When established, these institutions were open to new technological solutions and as they offered very competitive wages on Estonia's labour market they employed the best ICT experts available. It made Estonian banks and Estonian financial sector more innovative than rather conservative European banks. All banks, insurance companies, investment and pension funds are in private ownership and in the majority of them foreign ownership prevails.

IST use in Estonian banks traditionally includes telephone banking, credit cards, debit cards, ATMs. Clients of Estonian banks are used to electronic transactions. There were 1.17 million bank cards (of which 15% credit cards) emitted by Estonian commercial banks by the end of September 2003 or more than 1 bank card per 1 person aged 15-74 years. Estonian residents made 24.4 million card transactions in 1998 (with the total value of EEK 16.1 billion) and 66 million transactions with the total value of EEK 42 billion in 2001. Thus, an adult person made 1.25 card transactions per week, on the average. About two-thirds of the card transactions were cash withdrawals in ATM-s (Automated Teller Machines) and one-fourth of the transactions were Points of Sale (POS) terminal payments[107].

More recent developments include Internet banking, mobile banking and digital TV banking. Electronically initiated payments are responsible for almost all of their total number (incl. Internet-bank, telebank, card payments). Estonian Internet banks are supplying a number of services for their clients, the number of Internet bank users had increased to 760 000 by July 2003. From the total number of payments intermediated by commercial banks at the end of 1997 and in the beginning of 1998 over 40% were paper-based credit orders and only about 1-2% Internet bank orders. By the end of 2002, the share of paper-based credit orders had declined to 3% and the share of Internet-bank credit orders had grown to 22% of the total number of transactions. Together with telebank credit orders (these are used by businesses and contribute 23-24% of transactions) and card payments (40-42% of payments) electronically initiated payments are responsible for 95% of their total number. Broad Internet penetration enabled to reduce the number of bank offices and tellers, electronic payments squeezed out the use of cash in circulation and reduced the share of black market.

Estonian large banks launched also an m-payment pilot project with about 1 000 test users. M-payment is an alternative to card payments and enables mobile phone holders to pay for goods and services.

According to the General Population Survey conducted by SIBIS, 34% of the population in Estonia were using online-banking or buying financial products at the beginning of 2003 (Sibis, 2003). Enterprises and institutions are more interested in using Internet banks because of the need to make a large amount of payments per day. Electronic banking facilities speed up the cash circulation and increase their performance, because of an availability of a number of cash management instruments on the banks' Internet sites (e.g. investments in overnight-, short- and long-term deposits, equities, bonds, money market funds).

[107] Calculated on the basis of Bank of Estonia data (http://www.ee/epbe/statistika/itp.html.en)

The role of banks in contributing to the process of creating information society is considerable. Banks invest continuously in information technology as users facilitating development of customer friendly IT solutions. Estonian banks host their own departments with a good competence, which can be viewed upon as major software companies. Banks create demand for a number of services (e.g. cryptography, e-commerce solutions) and have thus a potential to promote innovation (Kerem, 2003). The banks are participating in joint projects with mobile communication operators and other specialised ICT companies. Banks possess authentication systems that have proved suitable for providing public services. The bank link services provide risk-free options for e-commerce providers, because clients pay for their goods prior to receiving goods. Therefore, one of the advantages in the development of e-commerce is the widespread Internet banking, conducing to the growth of positive attitudes towards e-commerce. Banks generate also demand for additional services and payment for services.

Estonian banks have been engaged in co-operation projects for providing electronic services to Tax Board (to submit electronic tax reports), Health Insurance Fund (view personal data, payments), mobile phone operators (viewing, paying and archiving bills), telephone company (ordering and payment bills), energy company (consumption data and bills) and vehicle insurance policy. The Public Internet Access Points network is important for increasing the number of Internet bank users. Public and private sector commitment in Look@world project is another example for the same purpose through providing computer and Internet training for persons who have not used Internet before.

The Estonian Central Depository for Securities (ECSD) was established in 1994 with an electronic registry of securities that enables electronic trading on the secondary market. The goal was to create a well-regulated and efficient environment for electronic clearing and registering of shares. Tallinn Stock Exchange (TSE) started operation in 1996 as an electronic trading environment for securities.

It is prognosticated that the number of Internet users will increase in Estonia, which presumes a growth of e-banking. It is also prognosticated that the growth will be focused rather on mobile phone-based services.

E.2.3. IST in major services sector

Improving online access and providing different services are essential for the enhancement of the development of SMEs, as the use of information and communication technology has a great potential to reduce the administrative burden of enterprises and to simplify respective procedures. E-commerce and m-commerce have developed and increased during recent years, these are also the fields for future development in Estonia.

On the basis of the information of Statistical Office of Estonia, 29% of enterprises had purchased goods/services via Internet in 2002, which is half more than in 2001. 12% of enterprises had received orders by the order form on their website. The Internet sale from business to business or to a third person exceeded the direct sale to a private consumer (Estonian Statistics, 2003). There are a number of Internet shops[108] offering books and publications, tools, household appliances, software and hardware, multimedia, flowers, etc. Computers and computer appliances, home electronics, books and CD-s were most often

[108] No statistics are available

bought from Internet shops. However, one may add to traditional e-commerce also subscriptions for newspapers and journals with payments over the Internet. According to the E-track survey by Emor, purchases/orders via the Internet included 38% books, 23% audiotapes or CDs, 14% theatre, concert or other tickets, 13% newspapers and magazines, 13% computer programs, 11% clothes, 9% computer accessories, 4% foodstuffs, 4% footwear and 21% of other goods and services (E-track survey, 2002). In Estonia, the biggest group of Internet users is persons aged less than 20 years. These people, as the world experience shows, are the least likely to buy goods and services via the Internet.

There are successful B2B (business to business) projects implemented in Estonia as well. One example is the wholesale company of medicines Magnum Medical who started to develop its Internet based ordering system already in 1997. By 2000, the share of electronic commerce of the company had grown to EUR 13 million per year; it accounted for half of the total turnover of the company (WWW indicators …, 2001).

Little use is made of electronic data exchange (EDI) between enterprises both for purchase and sale transactions (only 4% of enterprises).

The proportion of employees who used computers and the Internet was the largest in wholesale enterprises (13 and 15%respectively), retail trade (12.5 and 9%), postal and telecommunication services (11 and 10%) and in other business activities (around 11%) (Statistical, 2002f). Most of the employees in trade and services are engaged in purchase-sale transactions and accounting; computers are used less in conducting the sale process.

Enterprises have ranked by importance the motivations for using Internet sales: enhances the business, helps to find new clients, helps to acquire good reputation for the enterprise, widens the market, reduces business operation expenses and helps to develop new products. On the other hand, the Internet does not provide the possibility to directly see the goods before purchasing in order to check the quality, people also worry about the possible misuse of their personal data (Statistical, 2003c).

There are different data by surveys characterising e-commerce users. According to the Global E-commerce Report, 74% of the Internet users in Estonia are non-shoppers, nearly 3% of Internet users were online shoppers in 2002. E-track survey shows that over 4% of the population used the Internet for buying and ordering goods and services in 2003. On the basis of the results of eEurope+ Households Survey 57% of Internet users were searched for goods and 11% purchased goods (eEurope+ 2003, 2004). SIBIS project shows on average 15% of the population in Estonia purchase products on-line in 2003. This is the highest level among CEE candidate countries, but remains lower than in EU countries (19%), and US (44%). By age groups, the most dynamic group of eCommerce users is the ’25 to 49’ age segment (SIBIS, 2003). The retired people use eCommerce services five times less.

The attitude towards e-commerce depends also on the general attitudes of the population towards this new way of services. The survey indicates that among the age group 15 to 74 years (Sept-Nov 2003), 60% of the respondents are not interested in e-commerce at all, 18% are generally not interested, 4% cannot say, 15% are generally interested and only 3% are very much interested in e-commerce (IT indicators, www.ria.ee). If we compare the results of different surveys, the interest in e-commerce confirms that the SIBIS results may be quite realistic.

According to the E-track survey, reasons for not using e-commerce in Estonia are not so much related with the fear of insufficient Internet security (8%), but rather the fact that it is not possible to check the quality of goods (30%) or that the traditional way of shopping is preferred and customary (41%)(E-track survey, 2002).

One of the advantages of e-commerce in Estonia is widespread Internet banking the introduction of which has been a factor that has increased the use of computers and the Internet and which makes payment for goods easier for people.

Card payments are quite popular in Estonia's retail trade, they are still quite costly (2-3 % of the paid value) for retailers. Additional investments are necessary to set up POS terminals. Therefore, POS terminals are not very widespread in small shops and instead of them, the use of mobile phones in intermediation of payments (m-commerce or m-payments) is picking up.

Mobile technology is the other most important driver of the information society. Estonia has achieved some remarkable results in the field of mobile value-added services, which go beyond the traditional phone-calls (see also Rannu, 2003):

- Estonia was the first country in the world to have mobile positioning in commercial use and one of the first to have 112-emergency calls linked to mobile positioning system to determine the origin of each call.
- Estonian system for using mobile phones to pay for parking has achieved a remarkable penetration rate of 68%. In 2002, Estonia has launched several successful mobile commerce projects. Estonia is used as a test-bed for mobile services by some leading mobile infrastructure providers.
- Mobile commerce services (started in 2002) mean that a client can make payments for goods by mobile phone when he has tied his mobile number to his bank account on the basis of a contract with bank. For banks this decreases cash circulation by providing a cheap alternative to credit card payments. This is suitable for shops where Internet connections or credit card terminals are not possible to use.
- Also, a short-text-message (SMS) has become successful.
- In 2002, 40% of total parking payments were made by mobile phones (m-parking).
- Mobile transport ticketing pilot projects were launched in 2002 in Tartu and Tallinn, which makes it more convenient for users to buy tickets for transport. The project was evaluated as successful and continued as a commercial service.
- Telematic services enable one to control various devices via mobile phone (e.g. gate control, house alarm).

E-commerce and other services are dependent on the quality and speed of telecommunication networks. According to the analyst company Point-Topic, Estonia holds 12th position in the world by ADSL/regular phone line ratio with 2.57 lines per 100 people. Presently Eesti Telefon has over 35 000 DSL lines, more than 5 000 (7%) of which are ADSL broadband Internet self-installation kits. In addition to the physical Internet access points, there are over 170 free wireless Internet (wifi) zones around the country (www.wifi.ee). According to wifi.ee, 6.8% of all wireless Internet areas in Europe were located in Estonia (May 2003). In recent years, the number of fixed phone lines has decreased, as many consumers switched from fixed phones to mobile phones[109]. The biggest driver for the growth TC market is the mobile segment.

[109] http://www.vm.ee/estonia/kat_172/3364.html

Estonia has awarded 3G Universal Mobile Telecommunications Service (UMTS) licences to incumbent mobile operators in 2003.

Some other examples can be found in the private sector to characterise e-services. For example, *Integrated Learning Environment,* a portal *Miksike*[110] is a e-study environment which offers services to virtual assistant teachers, to schools that provide education in Estonian but are located separately (e.g. in Alutaguse, Ruhnu, New York, Washington or Sydney); to parents who wish to teach their children at home. *Miksike* gives away more than 20 000 worksheets in HTML and offers a set of collaborative learning services. In Estonia, *Miksike* servers got 80-100,000 page views per school day.

The private sector is far ahead of the public sector in offering labour market services. For instance, *CV Online Eesti* reported on their webpage that they had 93.6 thousand registered users, 60 thousand CV-s and 1.9 thousand registered clients as of 2 May 2003[111].

E.2.4. IST in public services

IST in health services

Estonia has no unified functioning health information system yet, but it has many of its components, e.g. hospitals', family doctors', emergency aid, pharmacies', Health Insurance Fund's information systems, as well as registers and databases with no exchange of information between them. The national health care and also WHO statistical databases are public and accessible via the Internet[112]. Almost all national registries (e.g. Cancer Registry, Mortality Database etc) were computerised in the 1990s. There are several health portals,[113] independent health-related websites, health care institutions' web-sites providing information and professional comments on health and medicine topics and there is a possibility to consult by e-mail with doctors, pharmacists, dermatologists (E-Europe+ Progress Report, 2002). In order to make communicating easier and more convenient for clients and partners by employing the means of modern information technology, the Estonian Health Insurance Fund has foreseen that in 2004 the partners and customers will have the opportunity to settle the accounts and manage services in the range of 95% in an electronic environment. In 2005, 95% of the Fund's services and benefits settlements should be made in an electronic environment (Development Plan of the Estonian Health Insurance Fund for 2003 to 2005).

Health related services, i.e. interactive advice on the availability of services in different hospitals; appointments for hospitals are available online. Also, specialists, psychologists and pharmaceutical advisers consult citizens and answer their questions anonymously over the web[114].

Telemedical experiments[115] have been performed in Estonia already earlier, but the systematic use of these possibilities started in 2000 when within a year 30 teleconsultations were conducted in Estonia (Linnamägi & Asser, 2002). The new health care development plan for 15 years envisages development of a telemedicine network. For example, there has been a

[110] http://www.miksike.com/
[111] http://www.cv.ee/cvo/stat.php?page=1&keel=inglise
[112] www.stat.ee, www.sm.ee, www.haigekassa.ee
[113] www.kliinik.ee; www.inimene.ee
[114] www.kliinik.ee
[115] health care services at a distance (e.g. teleconsultation and home telemonitoring)

telemedicine network created between five health care institutions in Estonia since 2000 on home telemonitoring of patients by cardiologist using home monitoring equipment *Docobo*. The spread of extensive use of telemedicine has been restricted by the lack of data protection and relevant laws.

Box E.1. A unique health monitoring project of Doc@HOME

Development of the project Doc@HOME was financed by the European Commission in the amount of 16 million kroons. This project has been estimated to be one of the most successful among Estonian innovation projects.

The Estonian capital-based international telemedicine firm Docobo Ltd. started international research in target countries where it intends to introduce a unique health monitoring program doc@HOME® that was elaborated in Estonia. A development project of Doc@HOME has by today reached a stage where first orders are coming in for the introduction of the new health monitoring system and for buying the special equipment Docobo™. An examination of the total of 220 hypertonic patients will be carried out in Germany, United Kingdom, Finland and Estonia. Doc@HOME telemedicine system enables patients to register their health indicators without leaving home and send them to the medical personnel electronically. According to various estimates, it is possible with this system to save up to 50% of the medical treatment expenses.

The Estonian Health Sector Development Project 2015, approved by the Government in May 2000, is aimed at restructuring the health care system, including the United eHealth Information System (Estonian Health Project 2015, 2000). Preparations for the introduction of electronic health cards and health information networks have started already and more intensive activities are envisages for 2004 (Kuivjõgi, 2004)

IST in educational services[116]

Most schools have been provided with computers and Internet connections through the financing schemes of the Ministry of Education and the *Tiger Leap* programs (IT in Public Administration, 2003). The program was launched in 1996 by the Ministry of Education and was carried out in 1997-1999. The *Tiger Leap* program set the goals of introducing ICT knowledge in schools, connecting the schools to the global computer network and training in productive application of the technology. It was also a goal of the program that schoolchildren learn to cope in the information society.

Within the *Tiger Leap* program, about 11 thousand teachers (out of 17 thousand in Estonia) upgraded their knowledge in ICT; schools were supplied with computers and 61 educational software programs (including 39 original programs in Estonian). The program was followed by the Tiger Leap Plus that was created to transform Estonian schools into schools of information society, to support teachers in their conversion into teachers of information society and to equip pupils with a compass for keeping on course.

IT infrastructure in schools has developed under the Tiger Leap programs: in 2001/2002 on average 3.4 computers per 100 pupils on the primary level and 3.7 computers per 100 pupils

[116] Information from: IT in Public Administration of Estonia Yearbook 2002. http://www.eik.ee/english/2002/ is used for this paragraph.

at the secondary level. An example of uneven distribution of computers and leased lines can be noted to some extent across counties, in cities and rural districts (e.g. a small share - 4.9% of the total number of pupils had no leased lines) (IT in Public Administration, 2002). There is a shortage in providing high-speed connection in some schools and some computers have to be updated. The issue of replacing computers with new ones arises in order to ensure studies at the contemporary level. The target – one computer per 20 pupils – has not been achieved yet, as it has been estimated that there are ca 24 high school students per one computer now (for comparison - EU average is 10-15). The government, the private sector and the third sector have initiated projects for stimulating ICT usage among population. This means that with the economic development of society there is room for replacement and improvement of ICT infrastructure.

As the essential IT infrastructure for Estonian schools was built very fast – within 2-3 years – and already 5 years have passed since the beginning of this, the issue of replacing computers with new ones may arise in the near future.

ICT related education is also provided by other institutions besides schools and may be related to life-long learning. For instance, the program *Look@World* is funded by private sector companies (2 major banks and 2 telephone companies) (see in B). Look@World Foundation commissioned and financed the establishment of e-school (see Box E.2.)

Box E.2. School-Home communication interface E-SCHOOL

E-school is a solution that allows parents (and students) to see school information i.e. grades, missed classes, home assignments etc concerning their child over the Internet. It also improves parents' communication with teachers via different forums.

As e-School was commissioned and financed by the Look@World Foundation, the schools that join in do not have to cover the costs for working out the software. The schools only pay the link-up fee and make monthly payments related to application hosting in the central server the size of which depends on the number of schools joining e-School.

e-School is secure since user authentication procedures (ID card; Internet banking codes; or password) guarantee that everyone can only view the information designated to him/her.

Source: http://www.vaatamaailma.ee

E-education has expanded in higher schools in recent years (e.g. University of Tartu, Tallinn Technical University). In 2003, the Estonian e-University[117] was founded.

[117] http://www.e-uni.ee/

Box E.3. Estonian e-University

e-University is a consortium of Estonian universities and professional higher schools. The founder members of e-University are the Estonian Ministry of Education and Research, Estonian Information Technology Foundation, University of Tartu, Tallinn Technical University, Tallinn Pedagogical University, Estonian Agricultural University, Estonian Business School and Estonian Information Technology College.

Its mission is through e-education to improve the quality of higher education in Estonian higher schools, make universities more open to new target groups, enable students and other learners wider, high-quality and more flexible opportunities to study, use more economically the resources of Estonian higher education, both material and human resources, and support regional development in Estonia.

The objective of e-University is to initiate and simplify co-operation between universities in the field of e-education; popularise and develop e-education in Estonia, support co-operation of Estonian higher schools with business environment and higher schools abroad in the development of e-education; create a regional support system for e-education; support the initiative of higher schools and individual teachers in the development of e-education; develop technological infrastructure for e-education.

Source: http://www.e-uni.ee/

For the use of ICT in the work of governments and in democratic practices a centre of e-Governance Academy was established. The centre provides training in e-governance and e-democracy in Estonia, but it serves also as a platform for exchange of experience and conducts related research in other countries (e.g. Russia, CIS countries, etc).

Box E. 4. E-governance academy[118]

(EGA) is a regional learning centre in Estonia, set up in 2002 by the Republic of Estonia, United Nations Development Program (UNDP) and Information Program of Open Society Institute (OSI). The centre aims to promote the use of ICT in the work of governments and in democratic practices. The centre provides training in e-governance and e-democracy, serves as a platform for exchange of experience and conducts related research in the home country as well as in other countries (e.g. Russia, CIS countries, etc).

EGA implements its mission through the provision of training services, organising research, facilitating networking and enabling exchange of experience in broad areas of e-governance. Located in Tallinn, Estonia, the Academy provides a platform for analysing and systematising both international and domestic experience into forms of knowledge that can be transferred to those interested both in Estonia and abroad. The target audience of the Academy's activities are senior policy-makers and governmental Information and Communication Technology (ICT) specialists, as well as researchers working on the issues of e-governance.

The primary geographical focus for training is on the countries of the Commonwealth of Independent States (CIS, particularly the Caucasus and Central Asia), Mongolia and South Eastern Europe. In the longer term, while retaining its mission of knowledge transfer to the East, they want to become a leading European Union (EU) institution in the area of e-governance.

The target audiences of the Academy's activities are top policy-makers and governments' Information and Communication Technology (ICT) specialists as well as researchers working on the issues of e-governance. The academy has a capacity for provision of training in both English and Russian.

Source: http://www.ega.ee

[118] http://www.ega.ee

According to e Europe 2005 objectives the activities in public services have been directed for connecting public administrations, schools, health care to broadband, interactive public services, accessible for all, and offered on multiple platforms; providing online health services.

E.2.5. IST in public administration

(IT in Public Administration, 2003)

Estonian public administration is relatively well equipped with contemporary computers, 93.3% of the computers are connected to Internet.

Nearly 100% of government agencies and many local government agencies have their own homepage or have documents available on respective county websites or through the Internet resources of e-county or e-government portals. According to the Public Information Act adopted in 2001, public institutions have to provide information required by citizens. This has forced all public institutions to develop their Internet homepages to make public information available pursuant to the law.

During 2000-2002, the number of public agencies providing information via their homepages increased. In 2002, 55% of primary and secondary schools, 94% of universities, 63% of hospitals and clinics, 100% of public administration agencies and 68% of local governments had their own homepage. The ten most popular homepages visited daily by more than 20 000 times in Estonia include 3 newspapers, 2 news and entertainment portals, 2 Internet banks, 2 mail service providers and 1 major search engine. Searching for certain information, news and entertainment, sending/reading e-mails, and Internet banking are the most popular activities of Internet users in Estonia.

Based on the information policy main principles and the national development policy strategies of information society, public administration activity in recent years has been targeted to develop ICT environment through elaboration and implementation of state information systems. Elaboration of new solutions for the state information systems has been facilitated by the availability of good specialists, although there is a risk that these specialists go over to conduct international projects (higher wages).

The overview of the major projects and principles of their implementation is brought in Appendix E.1. Introduction of these programs has been conducted through respective web-portals and has enabled to render services to citizens, enterprises and institutions. An example may be the main networks for data communication, which are effectively used, such as backbone networks *PeaTee* and *EEnet*:

The development of the backbone network *PeaTee* (in English EEBone) is directed at providing state and local government agencies as well as other state-financed institutions with data communication services. The Backbone network connects all Estonian ministries, county centres and several modes of Tallinn. It is connected to Internet and is using TP/IP technology and 16Mbps bandwidth. At present there are around 11 000 users – about 95% of state agencies are connected to the network (ICA Country Report, 2003).

The target programs *KülaTee* and Internetisation of Public Libraries, both being a continuation to the *PeaTee* project, were implemented to provide local government agencies, public libraries and municipal schools with data communication services. An infrastructure

was built in rural regions to provide the above-mentioned institutions with data communication and leased line Internet connections. Local government agencies got switches to *PeaTee* network nodes; schools, libraries and other cultural institutions were connected to the EENet or commercial ISPs.

The aim of the *data communication network EENet* is to develop and organise the data communication network of educational, cultural and research institutions and to manage and co-ordinate respective activities in Estonia. EENet network that has been created with joint efforts and means, covers all counties. Every county has at least one communication centre, several counties already have several centres to which schools and other educational and cultural institutions are connected. The EENet network and external connection costs are covered from the state budget and the use of this network is therefore free of charge for institutions. As of 1 January 2003, 475 agencies had leased line connection to the EENet; there were 345 virtual homes, 930 e-mailboxes and 104 thematic mailing lists of agencies and educational, cultural and research projects in the service server www.eenet.ee. In .ee top-level domain controller, 14,965 domain names had been registered by 1 January. According to estimations, the EENet serves over 200 000 researchers, students, teachers, persons engaged in culture, etc. The EENet has acquired experience in most of the advanced technologies: ATM, fiber-optics, radio-links, etc.

E-Government Portal[119] is a common access point for government agencies and institutions through an Internet domain riik.ee (gov.ee), and the Virtual Estonian Web Centre was established to administer it. In addition, the portal acquired the role of an integrator and co-ordinator of national information systems. Several virtual servers and websites of state institutions and projects (e.g. e-Citizen, X-road, see Appendix E.1.) use the domain. The fact that the system has an average of over 100 000 visitors per day on weekdays proves the popularity of the portal. During peak hours there are over 5 visits per second, about 18% of them are made abroad. In addition to Estonian, the working languages of the portal are English and Russian. Since the beginning of 2000, every state agency and local government has been able to opt to use the modules of public services in the e-government server. The following modules are available: guest-book, voting, discussions, and questionnaires. All state and local government agencies can use these modules free of charge. These so-called communication modules can be used for organising discussions and polls on the web.

The aim of the e-government portal's website TOM or "*Täna Otsustan Mina*"[120] (in English 'Today I Make Decisions') is to enhance citizens' participation in the state's decision-making processes. In January 2003, 371 ideas that had been submitted over TOM were in the legislative proceeding in different government agencies.

He information portal eesti.ee (opened in January 2002) is a web with free access to all people to inform them about their rights and duties and is a gateway to the citizens to using e-services (incl. advises citizens on official communication with Estonian state agencies). In the portal, citizens can find relevant information from traffic, population and business register and some other databases. There are document forms, references to laws and links to useful websites, relevant phone numbers and www.services available in the portal. The state and local governments are obliged to keep the information about their respective administrative field-related life and business situations available.

[119] www.riik.ee
[120] http://tom.riik.ee

"*Forms in the Internet*" – the service has made document forms available for citizens to communicate with state agencies. Forms are in PDF format and can be printed out (over 400 forms) or filled in directly (ca 80). At present the citizens can personally submit forms obtained from the Internet or filled in on the screen or send them by mail to a respective state agency, which will then proceed with the forms. Thus, the service saves time for the citizen.

The service was elaborated as an independent project in co-operation with the Open Estonia Foundation, the State Chancellery and Phare public administration development program and was already launched in 1998. After the establishment of the virtual Estonian Web Centre, the service was integrated with the latter and at present it is the most frequently used service in the e-government portal (average of 5 800 visits per day in January 2003).

On 1 June 2002, a new important register was launched in Estonia – electronic *Riigi Teataja* (State Gazette). Pursuant to the Riigi Teataja Act, *Riigi Teataja* is the official publication for the legislation, international agreements, reasoned judgements of the Supreme Court, notices and other documents of the Republic of Estonia.

e-TaxBoard. Since 2000 it is possible to fill online personal income tax declarations. A total of 137 613 declarations (about one-third of total number of declarations) of taxable personal income and paid taxes were submitted to the Estonian Tax Board via the Internet in 2003 (Europemedia, 08/04/2003). Electronic filing of peoples' income tax returns is possible via the portals of five banks – *Hansapank, Ühispank, Sampo pank, Nordea pank* and *Krediidipank*. As of February 2002, ID-card owners can enter e-TaxBoard via the Tax Board's website (www.ma.ee) by using ID-card. If the taxpayer has not concluded an agreement for using e-TaxBoard, it will be concluded electronically at the first entering with the ID-card. In 2003, less than 10 thousand personal income tax declarations were made using ID-cards (by approximately 200 thousand ID-card owners) and authentication over Internet banks prevailed.

Social security contributions (pensions, etc.) can be transferred via Internet banking.

Corporation tax: declaration, notification
In summer 2001, the Taxation Act amendment entered into force, which requires state, rural municipality or city agencies to electronically submit declarations to the Tax Board provided that these agencies have info-technological means for that. The further aim is to make it obligatory also for large companies to communicate with the Tax Board via the Internet. In 2001, the e-Tax-Board system was expanded and supplemented by services as well as additional information for taxpayers; special service packages were elaborated for the Central Criminal Police and Public Procurement Office. Similar applications that pursue the needs of a specific agency are being elaborated for bailiffs, Police Board, Health Insurance Fund and other agencies that have been given the right by the Taxation Act and tax laws to conduct inquiries in the register of taxpayers and withholding agents.

VAT: declaration, notification
Regularly submitted to Tax Board by enterprises. According to the Tax Board Annual Report 2001, 162.3 thousand VAT declarations were made by companies electronically in 2001 or 29% of the total amount of VAT declarations (Tax Board ..., 2002). 183.5 thousand social tax and withheld income tax declarations (22% of total number) were also electronic ones. Thus, tax administration is rapidly growing electronic.

Customs eSystems.[121] In November 2002, the IT Departments of Customs Board and Tax Board were merged in order to consolidate IT services for tax authorities (the Customs Board and the Tax Board). The purpose of the merger was to improve the quality of the IT services rendered to the tax authorities. The synergy resulting from the merger, the loss of duplication of services and the development and implementation of function-based management should facilitate the application of IT processes by the tax authorities and accomplishment of their objectives.

Job search services.[122] There are job offers from employers on the website available. Development of the IT network is under elaboration in state employment offices since the end of 2003.

Citizens can find forms from the Internet *for car registration* and for checking the validity of driving license, pay taxes, get teaching materials and ask questions connected with regulations and get other information from the website of the Estonian Motor Vehicle Registration Centre.

Declaration to the police. This means the presentation of the declaration in the case of theft, where a person can turn to the police and ask help (request) for search by the police or other information. This possibility is not very frequently used by people. The system of inquiries created in the Internet makes it possible for the police to get information about all cars and driving licences during 24 hours per day. Estonia joined the EUCARIS (European Car and Driving Licence Information System) in 2001, making it possible for the police to get information from other countries.

Public libraries (availability of catalogues, search tools). Main libraries have joined the ESTER[123] – Estonian Libraries Catalogue that includes an electronic database of books, journal articles, periodicals and other publications. The Catalogue is operating under the ELNET Consortium, i.e. non-profit union of catalogues, archives and other institutions of information collection, which citizens can use.

The Estonian Public Information Act states that everybody must have free access to public information. By adopting this act the Government assumed a specific obligation to establish Public Internet Access Points (PIAPs) in all public libraries, where people can access via the internet free of charge. As a result of the internetisation program launched by the Ministry of Culture, over 550 public libraries had leased line Internet connection in the first half of 2003. There were 0.76 PIAPs per 1000 inhabitants (eEurope+ 2003). An integrated Internet-based information system of libraries is created, which would serve as a channel for obtaining and using information on the services of libraries. A number of PIAPs has increased in cafes, supermarkets and other public places.

A nation-wide electronic identity program *ID card* was elaborated at the beginning of 2002. By the end of 2003, over 300 000 ID-cards had been issued, which means that over 20% of the population have an ID-card. In 2003, some institutions of public services introduced digital signature in practice (e.g. TaxBoard, Ministry of Justice).

[121] www.customs.ee
[122] www.tta.ee
[123] http://helios.nlib.ee/search

A free secure signing portal has been elaborated for ID-card owners. Provided a person has an ID-card and a computer with a properly adjusted ID-card reader, it is possible to upload a document which will be digitally signed, in this portal. In addition to the person's own signature this document can be opened for signing by other people, provided they have an ID-card. It is also possible to search for persons in the catalogue. The parties can download the signed document from the portal to their computer and retain it. The portal technology is free for use by anyone. (ICA Country Report, 2003).

Currently, additional applications of the ID-card are under discussion. For instance, identification of a person with his/her ID-card in other countries (in customs, police, etc.); access to a person's medical data when abroad; submission of a letter of explanation to the police; submission of applications concerning a person's car to the Estonian Motor Vehicle Registration Centre; submission of applications concerning change of address, marriage, divorce, change of name, change of address, etc to name a few.

Submission of data to statistical offices
Submission of statistical reports via the Internet; the request for information is available from statistical databases.

Public procurement[124]
In 1997 the elaboration of electronic public procurement information system was started. In March 2000, a strategy towards setting up a Public Procurement Information System was adopted. A new Public Procurement Act was enforced in April 2001, which represents progress in harmonising Estonian legislation with the *acquis.* In April 2001 the *State Procurement Register* was established, which became the basis for carrying out public procurement. As a result, all activities related to public procurement are Internet-based. The register was launched on 1 April 2002.

In order to be able to enter one's public procurement notice, tender or any other document in the register the purchaser has to register him/herself. The purchaser registered in the state procurement register enters preliminary notice, notice, tender or tender for design contest through the link on the register's homepage. Entered documents are checked by the employees of the register and if the information is in conformity with the Public Procurement Act, it will be confirmed and the next workday the confirmed document will be available for all Internet users on the register's homepage under "Electronic Bulletin".

Since the document is available for everyone in the Internet, all those interested in public procurement can turn to the purchaser on the basis of this information to apply for participation in the public procurement, receive the tender documents from the purchaser and make their tender. All the information in the register is public and available for everyone interested in public procurement. At present the homepage of the state procurement register is in Estonian. The website in English is under construction.

Besides essential Target Programs and Projects in public sector there are other Internet-based information systems in use for public as well as private sector or citizens such as: *Government of Ministers Session Infosystem (e-cabinet), e-State Treasury, Centre of Registers of the Ministry of Justice, Services of the Court Settlements Register*[125].

[124] http://www.rha.gov.ee/
[125] see www.riik.ee; www.esis.ee.

The following e-government services were used most widely in communication with state and government agencies:

- paying for services or documents through Internet banks – 48%
- searching for information on homepages – 47%
- printing document templates (forms, applications) – 33%
- exchange of information related to oneself or one's family – 30%
- expression of one's opinion or participation in public discussion – 10%.

The user group of the e-government portal (http://www.riik.ee/) is still quite small – 30% of the Internet users. The respondents considered the exchange of information via the Internet:

- very secure 4%
- rather secure 23%
- rather insecure 31%
- very insecure 18%.

To conclude, the preconditions have been created to make basic public services accessible for citizens and businesses via specialised web portals as well as by government departments and agencies. Based of the eEurope 2005 action plans, the national IT architecture is under elaboration, which unites the so far separate systems into a whole to enable individuals and organisations access to a government-wide information system (IT in Public Administration, 2003). This will enable to join the European Union information system and exchange information in a common system. It is also necessary to expand the use of broadband connection for public administration. Work must go on with expansion of e-inclusion of population (e.g. PIAPs, Look@World project).

E.2.6. IT in households

The number of computer and Internet users has quickly increased in Estonia over the last years. On the basis of IBM Monitoring Reports Estonia is at the 5th place (after Cypros, Malta, Sloveenia and Czech Republic) on fixed telephone lines per 100 population (eEurope+ 2003). The ITU statistics indicates 37% of respondents with a PC at home in Estonia and 26% of respondents with a PC at home connected to the Internet. On the basis of ITU calculations there were about 35 Internet users per 100 population. The percentage of regular Internet users has increased in Estonia: 56% used the Internet 3 months ago (eEurope+ 2003). E-track survey by Emor Ltd indicates that people who used Internet during the last 6 months accounted for 49% (March-May 2003). 67% of the children (aged 6 to 14) had used the Internet during the last 6 months according to a spring survey of 2003. The number of people (aged 15 to 74) who have never used a computer and/or Internet was similar –53%. As to the percentage of Internet users in total population, Estonia outstrips several EU countries and is one of the leaders among the candidate countries (SIBIS, 2003). According to the eEurope 2005 actions the broadband network is developing in Estonia (7% of all fixed lines in 2003).

The analysis shows that the cost of a PC was 184% of the monthly household income in Estonia, which is one of factors strongly influencing the decisions to buy a PC (eEurope 2003+). For comparison, in Malta the cost of PC was 47% of monthly income, which is more than 3 times less than in Estonia. Estonians spent 4.9% of their monthly incomes on telecommunication and nearly 3% on purchasing IT equipment in 2001 (IT in Public Administration, 2002).

The following reasons for reaching the present level in computer and Internet usage should be mentioned (the reasons are listed in random order) (IT in Public Administration, 2002):

- educational programs oriented to the use of computers and the Internet; realisation of the Tiger Leap Program to provide schools with computers and Internet connections;
- extensive development of Public Internet Access Points with public funds;
- extensive promotion of Internet banking services provided by banks;
- informing the public about the government's information policy and information society development trends; generating positive attitudes towards information society in the media; enactment of legislation promoting ICT development;
- joint steps and co-operation projects of the government and private companies to create convenient options to use ICT infrastructure (issuing of ID-cards and launching of necessary PKI infrastructure, development of e-government services, implementation of projects such as Look@World , etc.);
- highly developed telephone communication and networks, and the provision of alternative data communication options (wireless Internet);
- the reduction of prices of Internet usage by ISPs and provision of a variety of services for different Internet user groups;
- general fall in prices of PCs with multimedia applications;
- geographical proximity of highly developed ICT countries (Finland, Sweden, etc.) and close and good neighbourly relations; foreign investments in the development of the Estonian ICT infrastructure;
- continuous economic growth, improvement of life quality, etc.

The provision of secure Internet services is encouraging the use of ICT among population and businesses. For example the number of secure Internet servers per million inhabitants is the highest in Estonia (eEurope+ 2003). The vast majority of security problems experienced relate to computer viruses.

Surveys show that Estonians use the Internet prevailingly (Sept-Nov 2003) for sending/reading e-mails (74%), searching for concrete information (72%), using Internet banking (62%), reading Internet publications (61%) and for communication in chat rooms (33%). According to the survey, 4% of all respondents (9% of all respondents who had used the Internet during the last 6 months) used the Internet for ordering/purchasing products/services. At the same time, 21% of those who had used the Internet during the last 6 months visited Internet department stores to obtain information without purchasing anything.

Most of the Estonians use the Internet (Sept-Nov 2003) at their workplace (46%), at school/university (23%), at home (52%) but also at home or workplace of their acquaintances (25%). Since the share of home PCs has grown, the Internet usage in households has increased to 47% of people aged 15 to 74 of those who had used the Internet at least once during the last 6 months. The Internet penetration rate depends on people's possibilities either to buy a computer or use it at work or in public Internet access points, as well as the skills. 15% of the Internet users, mainly younger people, use Public Internet Access Points (PIAPs) (E-track survey, 2003).

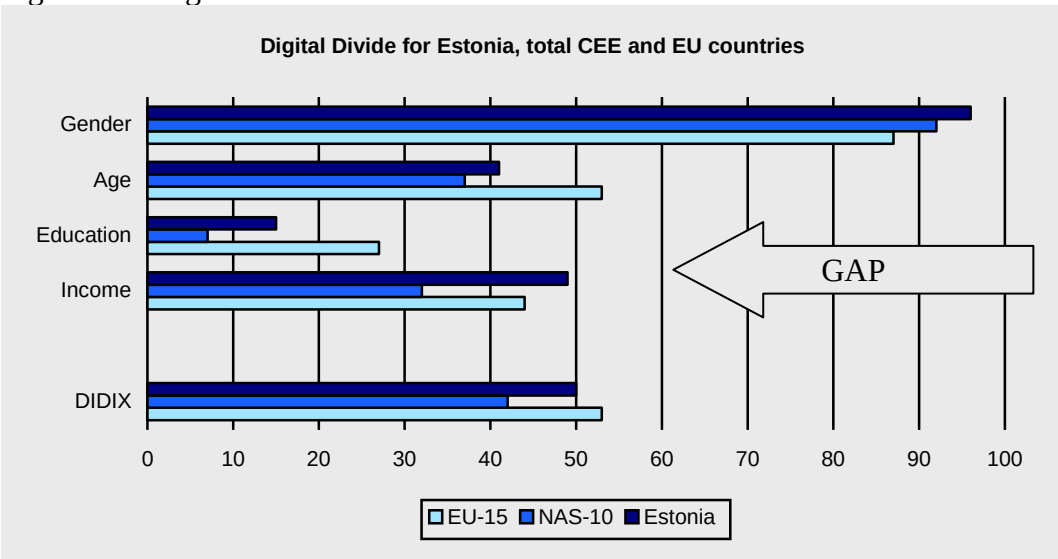
The topic of digital divide has been under discussion in various debates and seminars and a respective survey was also conducted in 2002 (http://www.oef.org.ee/ - Kalkun & Kalvet,

2002; IT in Public Administration, 2003). As 53% of the adults in Estonia have never used a computer and never used the Internet, social factors that have prevented the application of new means of communication among this part of the population are now under scrutiny in order to find channels and opportunities for involving everyone in further development of the information society. The survey distinguishes retired persons and workers as the main groups of Internet non-users, who have not found enough motivation to start using the Internet. Additionally, there are several motivational, skills and access barriers, which prevent the wider use of Internet in Estonia (Kalkun & Kalvet, 2002).

To fight against the digital divide, the government has planned to establish a good infrastructure with open Internet access points, Internet connections, PKI infrastructure etc. Several new projects and initiatives have been launched (incl. ID-cards, basis for digital signature) during recent years with the aim of creating new services fort the citizens and businesses. The joint project of the public and private sector Look@World (http://www.vaatamaailma.ee/ - also in English) aims to expand Internet access to non-users by establishing new PIAPs and providing PIAPs with IT tools (up to 450 computers to PIAPs in 2002). Attention will be paid and measures are foreseen to solve the other aspects (services, R&D, education etc).

The Digital Divide Index (DIDIX, defined under SIBIS project) is a compound index that comprises four indicators: gender, age, education and income. The lower the index value is, the more severe the divide is. The lowest is the gender gap, especially in Estonia (Figure 14). The highest is the education divide, which is rather high also in EU countries. In Estonia, the education gap is two times lower than in CEE candidate countries, but higher than in EU-15. The Digital Divide Index value is not far from the EU-15 average and has in Estonia the best result among CEE countries. The low level of formal education for a small part of the population (e.g. 6.7% of population and 0.8% of labour force with no primary education) appears to be the most significant reason why these people cannot participate in the Information Society. But the generally high level of formal education of the rest of the population (see more in Chapter G), which with the availability of advanced training will enable to obtain computer skills quite rapidly, will guarantee a stable development of information society and therefore it is important to tackle the problem of digital divide more than has been done until now.

Figure E1.: Digital divide for Estonia

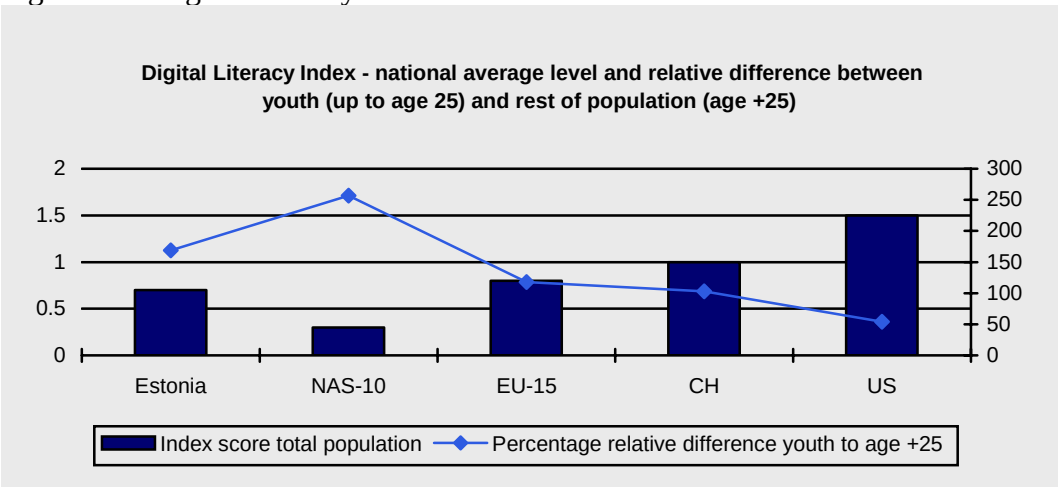


Base: All respondents, weighted column percentages
Sources: SIBIS 2003, GPS-NAS; SIBIS 2002, GPS

In the Information Society, the ability to operate over the Internet is essential for taking part in the societal processes of living, working and learning. On the basis of the SIBIS survey, 44% of the Estonian population regard themselves as very or fairly confident in communicating with others via the Internet (i.e. feel confident in using e-mail). It is almost the same level as in EU countries (46%). In CEE candidate countries, only 20% of the population feel themselves confident in using Internet.

Digital literacy can be seen as an indication of readiness for qualified use of ICT. The digital literacy index (COQS, defined in SIBIS project) is a measure that combines four types of skills in using the Internet: communicating with others (by e-mail and other on-line methods), obtaining (or downloading) and installing software on a computer, questioning the source of information on the Internet and searching for the required information using search engines. The COQS index combines these items (based on self-assessment) with a range from 0 to 3, with '0' representing the lowest digital literacy score. Digital literacy among the youth in Estonia and Slovenia has the highest COQS index value (1,4) among CEE candidate countries. The same countries have also the highest index value for total population (0,7), which is close to EU average (0,8). The relative differences between the COQS index scores among the youth and the rest of the population in Estonia are much smaller than the CEE average.

Figure E2.: Digital Literacy Index



According to SIBIS, usage of e-Learning and participating in work-related training was also higher in Estonia than in other CEE countries. However, security concerns are a significant component of the Internet users' environment in Estonia. The share of population willing to report security or privacy violations shows a certain awareness of the problem in the country. In the diffusion of broadband networks and services, a key objective of the eEurope 2005 plan, Estonia ranks on the second place after Slovenia among CEE countries (SIBIS^{+} – WP 5: Country Topic Report. ESTONIA, 2003).

E.3. A SWOT analysis

Traditional indicators of ICT development reveal that the infrastructure has improved in Estonia in terms of PCs and especially mobile phones in Estonia. Most of the enterprises as well as public sector institutions are provided with computers, which mostly are also connected to the Internet. However, only 22% of the households have a computer. The small number of home computers is made up for by the possibilities to use computer and Internet at work and in public Internet access points. As a result, 49% of people used the Internet (during last 6 months). As to the percentage of Internet users among the population, Estonia outstrips several EU countries and is one of the leaders among candidate countries (SIBIS, 2003). The reasons for reaching the present level in computer and Internet usage is in the opinion of citizens connected mainly with the implementation of information policy priorities, supply of services both by the public and private sector (supply of training; PIAPs, Internet banking, broadband use etc) and the continuously improving quality of the services.

The number of people (aged 15 to 74) who have never used a computer and/or Internet was 53%. The topic of digital divide has been under discussion in the country and government has established a good infrastructure with public Internet access points, Internet connections, PKI infrastructure, several new projects (e.g. ID card) to promote the interest in using ICT.

In 2002, most of the enterprises (83% of activities chosen in the survey) used the Internet, 58% had permanent Internet connection (ADSL, SDSL), 5% of enterprises had wireless connection and 4% broadband cable connection. The diffusion of information society technology is estimated in enterprises which use IT-systems for managing orders to be much lower – 25% of enterprises, incl. 9% who used IST in production management systems, logistics or service operations.

IST use in Estonian banks has grown fast (incl. telephone banking, credit cards, debit cards, ATMs; Internet banking, mobile banking and digital TV banking.). Estonian large banks launched also an m-payment system. Banks invest continuously in information technology as users facilitating development of customer friendly IT solutions. The activities of banks in IST application have been assessed to be one of the advantages in the development of e-commerce (e.g. Internet banking), conducing to the growth of positive attitude towards e-commerce among population and generating demand for additional services and payment possibilities.

The development of e-commerce indicates a growing trend. Although this possibility is today used more by enterprises (B2B - 29% enterprises) rather than individuals (B2C – 4-15% by different estimates), surveys indicate that interests in e-commerce is higher than it is actually used (18% of population). Reasons for not using e-commerce in Estonia are not so much related to the fear of insufficient Internet security (8%), but rather the fact that it is not possible to check the quality of goods (30%) or that the traditional way of shopping is preferred and customary (41%). The growth of internetisation, as well as improvement of the relevant legislation, which is on the agenda of the government, will certainly conduce to the increase of e-commerce.

Card payments are quite popular in retail trade in Estonia and mobile technology is seen as another most important driver of the information society, the penetration rate of which is 58% among individuals. Estonia has achieved some remarkable results in the field of mobile value-added services (mobile parking, m-payments). According to prognoses, the number on Internet users will grow in Estonia, which presumes a growth of e-banking. It is also prognosticated that the emphasis will be laid rather on the growth of mobile phone-based services.

Public sector IST applications have been supported by adherence to the information policy priorities (e.g. schools' internetisation). Most of the schools have been provided with computers and Internet connections through the financing schemes of the government and foreign help. The target – one computer per 20 pupils – has not been achieved yet, as it has been estimated that there are ca 24 high school students per one computer now (for comparison - EU average is 10-15). In 2003, some institutions of public services introduced digital signature in practice (e.g. TaxBoard, Ministry of Justice). Nearly 20% of the population have ID cards for authentication.

In recent years, e-education has increased at higher schools (e.g. University of Tartu; Tallinn Technical University). In 2003, the Estonian e-University was founded, which is a consortium of Estonian universities and professional higher schools. School-home communication interface e-school was established by the aim to improve parents' (and student's) communication with school via Internet.

Estonia has no unified functioning health information system yet, but it has many of its components, e.g. hospitals', family doctors', emergency aid, pharmacies', Health Insurance Fund's information systems, as well as registers and databases between which the exchange of information is in the stage of establishment. Health related services, i.e. interactive advice on the availability of services in different hospitals; appointments for hospitals are available via online already today. The health monitoring program Doc@HOME that has been elaborated in Estonia has been introduced in Estonia and internationally. Electronic health cards and health information networks are to be introduced.

Public administration activities have been aimed at the development of ICT environment through elaboration and implementation of state information systems; many projects have been launched and networks created over the web portals, which have enabled to render services to citizens, enterprises and institutions. An example may be web-portals e-government and e-citizen, as well as services "Forms in the Internet", e-TaxBoard, Customs eSystems, Job search services, Public libraries, PIAPs etc. The main principle of the national information policy to provide everybody equal access to information has served as the basis for the activity of the respective structure of public administration (e.g. ministries, IT departments, councils) whose purpose has been to create a favourable environment for spread and exchange of information (e.g. target programs). Elaboration of new solutions for state information systems has been facilitated by the work of good specialists, but there is a risk that these specialists will leave to take up international projects abroad.

These services have caused changes in the structure and work of public administration. Besides better access to public information it makes activities of the government and municipalities more transparent and supports democracy. E-government cabinet sessions have updated the government work methods. However, a further development demands new activities and measures to guarantee security of ICT and reduce the digital divide.

Considering the EU accession, the national development plans have been focused on the development of eEurope 2005 key areas (e.g. e-government, e-learning, e-health and e-business services; availability of broadband and secure information infrastructure). The basis has been created to make basic public services offered on multiple platforms accessible for everybody via specialised web portals as well as by government departments and agencies. There are a number of e-learning and e-health activities available via the Internet. The broadband network is developing.

Strengths	**Weaknesses**
Developed infrastructure (computers, Internet, broadband) The high use of Internet among citizens Extensive development of ICT in schools, on all levels Supply of e-government services Fast development of different kind of Internet and mobile services attracting people to use them Creation of favourable ICT environment by government creating possibilities for service development (e.g. digital signature, ID cards, x-road) The presence of good specialists for elaboration of new solutions	Certain stagnation has occurred in ICT penetration rates (some decrease in 2000-2001). Decreasing fixed line penetration Existence of digital divide Moderate IST use in production management
Opportunities	**Threats**
Development of new ICT solutions for public and private sector services (the Internet, mobile) Expected growth of e-banking Development of government-wide IT architecture	High cost of equipment, makes it inaccessible to poorer households, thus the digital divide will remain Good specialists go abroad to take up international projects

F. INSTITUTIONAL CAPACITIES AND REGULATORY BACKGROUND

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

One of the important principles of the Estonian IT policy is to support de-monopolisation in order to ensure competitiveness in the market. The government has approved two important acts concerning the telecommunication business – Telecommunications Act and Cable Distribution Act – to ensure fair competition and avoid creation of monopolies in the market.

Since 1991, the Estonian telecommunications sector has gone through a considerable development, driven by high levels of foreign investments. At the beginning of 1992, *Eesti Telefon* was a dominant company on the market and had a specific agreement with the government concerning the development of the national telephone network and telephone services. In return, the company was guaranteed monopolistic rights in the market for local long-distance calls and international calls.

The privatisation of Estonian Telecom took place under the rules of privatisation of the state-owned infrastructure enterprises, which became topical in 1995, where Estonian Telecom was first included into the "State property privatisation program for 1995". The privatisation of so-called strategic infrastructure enterprises was prepared by tenders with preliminary negotiations. Because of the complicated method of privatisation and shortage of experience in the country, the process of preparation (incl. collecting of know-how, support from foreign consultants, development of firm's development programs etc) lasted some years. The list of infrastructure enterprises (incl. Estonian Telecom) was presented to the Parliament in spring 1998. Privatisation took place through the sales of the shares of Estonian Telecom as a holding company (where 49% of shares were already in the possession of strategic foreign investors). The sale process itself took place at the beginning of 1999. Estonia managed to carry through a complex procedure of international public offering (IPO), including the necessary "road show" and publishing of the introductory and sale conditions' materials (Terk, 2000). The sale was timed well considering the dynamics of the international stock markets and there was much interest in the shares of the Estonian Telecom. In 1999, the direct involvement of the state in the telecommunications diminished, as the state sold its direct participation in Estonian Telecom via a public offering to a Swedish-Finnish consortium. Sonera and Telia purchased 49% of Telecom shares, the Republic of Estonia 27.3% and public investors 23.7%. In January 2001, the market was liberalised for opening to free competition. Relations between *Eesti Telefon* and the Estonian government are regulated by the Agreement terminating the concession agreement, which was passed on 29 December 2000.

The telecommunications market as a whole is regulated in Estonia by the Telecommunications Act. This Act, passed on 9 February 2000, facilitates the development of the telecommunications market, exercises pressure on the monopoly of Estonian Telephone and those operators whose market share is above 25%. The Act obligates Estonian Telephone to provide universal services at the same price all over Estonia. The main objective of the Act is consumer protection and fair distribution of restricted resources, i.e. radio frequencies and numeration. The purpose of the Act as it is to create favourable conditions for the development of telecommunications and to guarantee the protection of the users of telecommunications services by promoting free competition. The change has occurred in the

ownership structure of the main telecommunications players. The state does not have a majority in any of these operators.

Liberalisation of telecommunications continues to represent a major driver of ICT investment and produces an expansion in the Internet services market. Close competition between service providers (e.g. *Eesti Telefon*, *Uninet*, *Tele2*) has brought down data communications prices. However, Internet Service Providers (ISPs) are still dependent on networks owned by the incumbent telecommunications operators, although the issue is under discussion in the country and the situation may change with the continuous market liberalisation.

Changes to numbering were brought by the liberalisation of the fixed telephone market in January 2001. Carrier selection was introduced already in 2001, introduction of number portability is not decided and carrier preselection will be introduced in 2004. As of June 2003 there were 14 operators with allocated access codes and all of them were using the code for provision of services using carrier selection. 12% of all the allocated numbers were allocated to alternative operators. Numbering fees are set for fixed numbers, access codes and signalling points annually, no single payment is charged (IBM, 2003).

Estonia is harmonising its legislation with that of EU, for instance transportation of a new telecom package into Estonian legislation is currently under way. When the current Telecommunications Act of 2000 was aimed at liberalising the telecommunications market, then the new Act currently under elaboration will regulate the liberalised telecom market.

According to the Cable Distribution Act, a cable network shall not be an undertaking which accounts for more than 40 per cent of the turnover in the market of telephone services provided in Estonia or an undertaking which has a holding of more than 10 per cent in such company either directly or through partners, shareholders or third persons.

A company can be declared to have a significant market power (which basically means that it has too much of a market to impede competitive processes) based on many conditions, the most important of which is the company's market share. A company can attract the government's attention if it controls 25% of the market. Furthermore, if a company controls more than 40% of the market, then it is governed by the Competition Act (Estonian equivalent to Anti Trust Law).

Consumer Protection Act (came into force in 1994) defines the rights of the consumers in relations with the sellers in purchasing and using the goods, as well as obligations of the sellers, producers and mediators in protecting consumer rights, the liability for violating them and the organisation of consumer protection.

Institutional implementation capacities

The main bodies in charge of telecommunication regulatory issues are as follows: the Ministry of Economic Affairs and Communications, National Communications Board, National Competition Board.

Telecommunication services are supervised by the ***Estonian National Communications Board***[126] (ENCB). ENCB is a government agency in the administrative field of the Ministry of Economic Affairs and Communications subordinated to the Estonian Government.

The main tasks of ENCB include promotion of business competition in the fields of telecommunication and postal services; ensuring the quality of telecommunications and postal services through regulations; planning and ensuring the rational use of limited resources (radio frequencies and numbering); performing surveillance over the companies operating in the field of telecommunications and postal services. The main activities of ENCB arise from various legislative acts: Telecommunications Act, Postal Act, Cable Distribution Act, Digital Signatures Act and Broadcasting Act. The most important tasks are:

- registration of telecommunication service provision and issuing of operating licences and performing of surveillance,
- registration of companies providing postal services and issuing of operating licences for universal postal services and performing of surveillance,
- fulfilment of conformity assessment procedures for telecommunications terminal equipment and performing of surveillance over the supply and use,
- planning, organising and fulfilment of the use of radio frequency spectrum, issuing of licences for radio transmission equipment and performing of surveillance over the use of radio transmission equipment and radio frequency spectrum,
- planning of the use of numbering, issuing of numbering licences and performing of surveillance,
- issuing of cable television network licences and registering of service provision - planning of broadcasting channels and frequencies and surveillance over their use,
- registration of companies providing services related to digital signature (certification and time stamp service),
- representing Estonia in the activities of international telecommunications organisations and relevant standard organisations.

The Estonian National Communications Board has been operating since 1991. Its original technical regulation functions were supplemented with regulation of the market and competition during 1998-2000. The budget of the Board is financed from the state budget. As of 30 June 2003, ENCB had 136 employees out of which 96 were handling directly the regulatory tasks. According to the plan, the number of employees should increase to 146 (EITO, 2003).

ENCB has issued licences for ten years unless the applicant requests a shorter term. The payment for the registration/licence is only one-time and insignificant. A licence is required for operation of a public telecommunications network if the operation is based on the use of allocations of radio frequency bands from the national radio frequency allocation plan. A licence is also required if a telecommunications network is interconnected with a public telecommunications network or located in the territory of a foreign country. As of 30 June there are 23 operators with a licence for provision of telephone network service and 47 service providers (the licence is not needed, registration only) for provision of public voice telephony services (22 nationwide and 31 local). Licences for mobile market have been issued for GSM and DCS. UMTS licences were granted to operators in August 2003.

[126] http://www.sa.ee/atp/eng/

The Competition Board has the right to impose sanctions in order to secure the enforcement of the Competition Act.

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

For the creation of a good environment for e-services a number of projects have been launched and legislation elaborated (see also B and E). One of the most significant breakthroughs for the development of e-commerce in Estonia was the enactment of the Digital Signature Act on 8 March 2000, which became effective on 15 December 2000. This Act provides for the legal validity and enforceability of digital signatures. Additionally, the Act delineates the requirements for a valid certificate, as well as who is able to issue these certificates. The Act also addresses Time-stamping Services and Service Providers, and discusses the supervision of necessary Certification and Time-stamping Service Providers (Cybernetica Ltd.)

Box F1. The implementation of digital signature

In order to make the implementation of digital signature easier, the *DigiDoc* project (http://digidoc.sk.ee) was initiated. This project comprises agreed file formats as well as program libraries and applications for handling them. The program libraries are meant for everyone to use, either as a direct library or as samples of a useful code. This helps to follow the common format in the applications of all parties. For example, a certificate issued by a bank must be suitable for submission and use in the Tax Board and vice versa.

DigiDoc-Client applications allow to sign documents and check signatures in the workplace computer. The documents need not be printed out for signing – it can be done directly in the computer. These documents can be forwarded by e-mail and loaded in records management systems. The *DigiDoc*-portal and the *DigiDoc-Client* are freely applied in whatever relations – whether the party being a state agency, a company or a private person. The party must only have an ID-card and a computer with a card reader (in order to sign). In addition, the message gate of *DigiDoc*-portal has been launched. Through the message gate it is possible to digitally sign also faxes and calls. The gate enables to save fax or voice messages in the *DigiDoc*-portal and afterwards it is possible to sign them with the ID-card.

Source: ICA Country report, 2003

The EU eCommerce directive (Directive 2000/31/EC on certain legal aspects of information society services, particular electronic commerce, in the internal market) is being transposed into a new law (ICA Country Report, 2003).

Authentication can be carried out by using the ID-card. The authentication with an ID-card functions securely and it is convenient to use the card wherever user names, passwords, code cards, etc. have so far been used – whether it be Internet banking services, internal applications of a company, intranets or public portals. ID-card is suitable wherever a person needs to be authenticated or when documents have to be digitally signed. The authentication with ID-card functions securely as the card-owner is responsible for his/her ID-card and the usage of it. ID-card can be used also for signing and encrypting e-mails. Every authentication certificate includes the person's e-mail address surname.XXXX@eesti.ee (XXXX is the random number assigned to the person). The person can register his/her daily e-mail address in the mail server and respective e-mails will be forwarded to that address.

Use of Internet is regulated by Personal Data Protection Act and Databases Act. Legislation protecting privacy of Estonian citizens is summarised in the *Personal Data Protection Act*[127] that was enacted in 1996, but was regularly amended during 1998-2003 and its last version entered into force on 1 October 2003[128]. This Act regulates the usage of personal data of individuals by the third parties. Generally, the Act was designed to fit within the European Union regulatory environment. Under the Act, non-sensitive individual data can be used without a specific permission of a person. At the same time, to use sensitive personal data, such as religion, political opinions, and similar other information, the third party must obtain permission of an individual whose data is to be used. There are various exceptions, of course. Both Estonian citizens and legal permanent residents are protected by the Act. Processed personal data are protected by organisational and technical measures that must be documented. Chief processors must register the processing of sensitive personal data with the data protection supervision authority, which is the Data Protection Department of the Ministry of Internal Affairs. The Legal Committee of Parliament exercises supervision over the Data Protection Supervision Authority.

The *Databases Act*[129] was proclaimed by the Estonian president on 1 April 1997, and the law was enacted on 19 April of the same year. This is an untraditional law in terms of the Estonian legal system, as it is one of the least general laws in the country. The Databases Act is a procedural law for the establishment of national databases. The law sets out the general principles for the maintenance of databases, prescribes requirements and protection measures for data processing, and unifies the terminology to be used in the maintenance of databases. Section 5 of the law specifies that state and local governments establish databases pursuant to the procedure that is described in the act. As the Databases Act is a general law for databases, the act governs the maintenance of databases in any area that is not governed by other legislation or acts. The legality of the maintenance of databases is supervised by a Data Protection Supervision Authority.

Standards help to create information and means for its procession available to everybody, and reduce their cost. Information technology would not have such a big impact and wide range of distribution without standards. Standards have opened technology and through this rendered further innovation possible. Standardisation in Estonia on the whole and the IT standardisation committee (EVS/TK4) has an important role to play here. *The Estonian IT Standardisation Committee* is working on adapting a variety of international software quality standards.

Institutional implementation capacities

Estonian Data Protection Inspectorate. Supervision regarding data protection is regulated by two laws: Personal Data Protection Act and Databases Act. The processing of data and liability are also regulated by Health Protection Act, Archives Act, State Secrets Act, Accountancy Act, Statistics Act, Criminal Code, Code of Administrative Offences, Public Information Act etc. Personal Data Protection Act obliged the Government of the Republic to form a data protection supervision authority by 1 January 1997. From 1 January 1997 till 1 February, 1999, the data protection supervisory authority in Estonia was the Department of Data Protection under the Ministry of Internal Affairs. An independent supervising authority -

[127] http://www.legaltext.ee/text/en/X1032K4.htm (Estonian Legal Translation Centre)
[128] RT (State Gazette) I 2003, 26, 158
[129] http://www.legaltext.ee/text/en/X1060K4.htm (Estonian Legal Translation Centre)

Data Protection Inspectorate - started operation in February 1999. According to Article 17 of the Databases Act, the Legislation Committee of the *Riigikogu* controls the activities of the inspectorate. According to Article 28 of the Personal Data Protection Act, the head of the data protection supervision authority is, in the performance of his or her functions, independent and shall act pursuant to Personal Data Protection Act, other Acts and legislation established on the basis thereof. The main task of the Data Protection Inspectorate is to implement independently the supervision over the legality of processing personal data and keeping databases, as well as organise data protection activities. The issue of precepts to the responsible and authorised personnel dealing with databases, and the administrative penalisation for violating the order of keeping and processing of personal data will also fall within the competence of the Data Protection Inspectorate.

In addition to the rights provided for in the Personal Data Protection Act and the Databases Act, the data protection supervision authority has the right to inspect at all times the compliance of the maintenance of state and local government databases with Acts and other legislation; to issue, in the cases provided by law, licences provided by law for the processing and interpose cross-usage of data and for the combination, expansion and liquidation of databases; to resolve disputes arising from data processing and, pursuant to the procedure provided by law, to impose punishments for unlawful data processing or violation of the procedure for maintenance of databases. However, too severe data protection regulation may limit the use of databases.

The important functions of the Inspectorate are the improvement of legislation, the consultation and education of officials and more efficient supervision. The Inspectorate participates in the work of different work groups preparing legislative acts as well as arranges know-how of the officials and exercises on-the-spot control. In the practical work of legislative proceeding, registering, and supervision, medicine has been in the main focus - at first to get the overview of databases kept in Estonian medical institutions and now to organise the supervision of requirements of medical institutions as to processing sensitive personal data. Besides this, problems of correspondence of many national and private sector databases to legislation have been dealt with systematically. The security of state databases has also been dealt with as much as possible.

By now, the supervision activities of the Data Protection Inspectorate have more or less started, but Estonia needs a separate data security agency, which is common in many other countries. The future plans of the Data Protection Inspectorate are closely connected with the aspiration to develop from the status of a national supervision authority to a supporting agency of information security co-ordination.

In December 2000, Estonia ratified the Convention for the Protection of Individuals with regard to Automatic Processing of Personal Data (Strasbourg, 1981). The Convention was signed in Strasbourg in January 2000.

The inspectorate must turn into an institution that is able to systematically supervise and develop data security activities. Besides supervision and development, one of its priorities should be to function as a consultation body. For that, constant and updated overview of training possibilities and needs is necessary, as well as their planning and establishing in case of need. By now it is clear that there is an urgent need for support activities in the field of security during the whole life cycle of state information systems.

Specific attention will be paid to processing of sensitive personal data (concerning persons' private life, medical information and legal aid). Taking into account the present processes in the world, it is definitely IT (including information security) that should be one of the main priorities of most countries - the successful or unsuccessful development of it will be probably determined in the next ten or twenty years in the new top list of countries and their division into developed and developing countries. It would be necessary that data security activities - especially the support activities - in Estonia would achieve enough attention at the highest level of the Estonian state apparatus, as well as necessary systemic position, level and respective funds in the state budget.

The Estonian legal system adequately protects the property rights, including intellectual copyrights, trademarks, trade secrets and industrial design. Estonia adheres to the Bern Convention, WIPO and TRIPS, the Rome Convention and the Geneva Convention on the Protection of the Rights of Producers. Estonian legislation fully complies with EU directives granting protection to authors, performing artists, record producers, and broadcasting organisations. In 2002, Estonia withdrew its reservation on Article 12 of the Rome Convention, thus extending equal treatment to domestic and foreign phonogram producers. (Note: However, because the U.S. is not a member of the Rome convention, equal treatment is not extended to U.S. phonogram producers under this agreement). Estonia signed a bilateral agreement with the United States in 1994.

As for new start-up IT companies, especially those developing software, a major problem to deal with in Estonia would be software piracy. Even though the government is taking measures against counterfeit software manufacturers and its exporters/importers, and Estonian software companies have been doing much better lately as a result of that, the problem still remains. This requires more attention to the regulation of Intellectual Property Protection (IPR).

The *Permanent Copyright Committee* was established at the Ministry of Culture in June 1999. According to the Copyright Act, one of the tasks of the Committee is to improve the copyright situation in Estonia and make relevant suggestions to the Government. For raising the administrative capacity, the Media and Copyright Department at the Ministry of Culture was created in 2000. A special unit was formed at the Tallinn Police Department in order to fight piracy in the market more efficiently. The Estonian Organisation for Copyright Protection was also formed. Training courses are continuously arranged for the police, customs authorities and judges.

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

Public Information Act[130] - guarantees the citizens' constitutional right for information; regulates what information on the administrative apparatus and its activities is offered to the public; asserts that all information is accessible also through the Internet (entered into force on 1 January 2001).

A digital archive is being launched for the introduction of digital document management in the public sector, which attempts to organise electronic communication and exchange of information between the state and local governments. It is regulated by the *Archives Act*.

[130] http://www.legaltext.ee/text/en/X40095K1.htm (Estonian Legal Translation Centre)

Also, databases and information systems are further developed to guarantee the quality, availability and access to information.

Box E.2. The modernisation program of national databases

Estonia has started to develop systems that guarantee the maintenance of public administration databases, which is a complex activity and demands changes in both legislation and in the activity of institutions. Special systems harmonise the maintenance of databases and enable more effective exchange of information between databases and information systems[131]. The requirement of establishing the systems guaranteeing the maintenance of databases was stipulated in the Databases Act Amendment Act adopted on 31 January 2003. According to this Act, all databases of the state and local governments are obliged to use these systems for maintaining the databases by law. The current Databases Act focuses on the establishment of databases and stipulates the rules for that, but leaves out extremely important components of information systems: the use and services of databases, or *front-office* regulation. The current Databases Act established the state register of databases, but for various reasons, it has not worked (undefined target group of users of the databases, narrow administration-oriented approach, diffused, low efficiency).

Hence, to implement new solutions for the maintenance of databases, the Databases Act needs amendments in several important points to bring the Act into line with the contemporary possibilities and needs. The purpose is to make the present bureaucracy-oriented law to be citizen-oriented. A new law must take direction to dealing with the state information system as a whole. The databases register planning must take into account how to make the data available for other state agencies, private firms and individuals. The main purpose is to create an integrated system of registers. Information important for public administration should be available either from one place or an integrated cross-use system. Hence, the primary purpose is to have all databases service-oriented, where the creation of services is based on the need of civil servants and the citizens. In parallel, they have started to work out a new concept of databases state register. Notification of the available services is also important, e.g. for citizens there is the e-citizen portal where the citizens should find information on all public sector services that they are entitled to.

The systems providing for the maintenance of databases are: the information systems data exchange layer X-tee, address information system, system of classificators, information systems' security measures system and geodetic system.

There is no common security measures system for the state information systems now. Thus, the specification of the security needs and requirements of information systems is based on different principles, neither are there any common rules for establishing security standards and measures. Therefore, different security measures are used, some information systems should have, considering their content, a higher security standard, e.g. personal data or delicate personal data, while some systems that do not contain so important data in terms of security are so-called over-secured. A catalogue of standard security measures will be worked out and the choice must be made from these, based on the nature of concrete information system. The purpose is to guarantee on equal basis the security of information systems according to the confidentiality level of data processed in the information system.

Source: IT in Public Administration, 2003

The co-ordination of the IT development in both public and private sector is centralised under the Ministry of Economic Affairs and Communications. The Department of State Information Systems of the Ministry of Economic Affairs and Communications is responsible for co-

[131] Source of the description of the development of databases system: IT in Public Administration, 2003

ordination of state IT-policy actions and development plans in the field of state administrative information systems. The Estonian Informatics Centre is responsible for the co-ordination and implementation of the development of state registers, computer networks and data communication, standardisation, IT public procurement, monitoring of the Estonian IT situation.

For further amendment of the legislative framework to conduce to the development of information society, the following tasks have been underlined in the new information policy principles (Principles…, 2004-2006):

- Protection of the citizens against information society hazards. An information rights charter shall be established to regulate the relationships of individuals with various information. The legislative bodies will keep watching that all principal human rights are continuously granted with the transition to e-environment.
- Legislative provision of new applied solutions of public sector activity.
- An e-country regulative environment will be established and the system of public sector registers and databases will be organised.
- Provision for the security of information systems. Creation of a regulative environment for a systemic implementation of information systems' security measures.
- Continuing harmonisation of EU information society and ICT *acquis*; for harmonisation of information society legislation and for sharing the best experience with other countries, joining with the European Council convention No 180.

F.4. A SWOT analysis

In the process of regulating the markets, the telecommunications market has been liberalised since 1 January 2001 in order to open it to free competition. The liberalisation of telecommunications represents a major driver of ICT investment and produces an expansion in the Internet services market. However, Internet Service Providers (ISPs) are still dependent on networks owned by the incumbent telecommunications operators, although the issue is under discussion in the country and the situation may change together with a continuous market liberalisation.

The telecommunications market as a whole is regulated in Estonia by the Telecommunications Act. This Act was passed on 9 February 2000. Estonia is harmonising its legislation with that of EU, for instance transportation of a new telecom package into Estonian legislation is currently under way. While the current Telecommunications Act of 2000 was aimed at liberalising the telecommunications market, the new Act currently under elaboration will regulate the liberalised telecom market.

According to the *Cable Distribution Act*, a cable network shall not be an undertaking that accounts for more than 40 per cent of the turnover in the market of telephone services provided in Estonia or an undertaking which has a holding of more than 10 per cent in such company either directly or through partners, shareholders or third persons.

A company's market power (e.g. company's market share) is governed by the *Competition Act* (Estonian equivalent to Anti Trust Law) and the Estonian Competition Board.

The *Consumer Protection Act* (came into force in 1994) defines the rights of the consumers in relations with the sellers in purchasing and using the goods, as well as obligations of the

sellers, producers and mediators in protecting consumer rights, the liability for violating them and the organisation of consumer protection.

The main bodies in charge of telecommunication regulatory issues are as follows: the Ministry of Economic Affairs and Communications, National Communications Board, National Competition Board. The institutional capacity has been estimated to be sufficient, which is expected to increase in the future in connection with new information technology applications.

In the main services sector, one of the most significant breakthroughs for the development of e-commerce was the enactment of the Digital Signature Act (became effective on 15 December 2000). This Act provides for the legal validity and enforceability of digital signatures. Additionally, the Act delineates the requirements for a valid certificate, as well as who is able to issue these certificates. The Act also addresses Time-stamping Services and Service Providers, and discusses the supervision of necessary Certification and Time-stamping Service Providers.

The EU eCommerce directive (Directive 2000/31/EC on certain legal aspects of information society services, particular electronic commerce, in the internal market) is being transposed into a new law (ICA Country Report, 2003).

The use of Internet is regulated by Personal Data Protection Act and Databases Act. Legislation protecting privacy of Estonian citizens is summarised in the *Personal Data Protection Act* that was enacted in 1996, but was regularly amended during 1998-2003 and its last version entered into force in 1 October 2003. The *Databases Act* (enacted on 19 April 1997) sets out the general principles for the maintenance of databases, prescribes requirements and protection measures for data processing, and unifies the terminology to be used in the maintenance of databases.

The Estonian Data Protection Inspectorate - its main task is the implementation of independent supervision over the legality of processing personal data and keeping databases, as well as organising data protection activities. By now, the supervision activities of the Data Protection Inspectorate have more or less started but Estonia needs a separate data security supporting agency, which is common in many other countries. The future plans of the Data Protection Inspectorate are closely connected with the aspiration to develop from the status of a national supervision authority to a supporting agency of information security co-ordination.

The Estonian legal system adequately protects property rights, including intellectual copyrights, trademarks, trade secrets and industrial design. Estonia adheres to the Bern Convention, WIPO and TRIPS, the Rome Convention and the Geneva Convention on the Protection of the Rights of Producers. Estonian legislation fully complies with the EU directives granting protection to authors, performing artists, record producers, and broadcasting organisations. Estonia signed a bilateral agreement with the United States in 1994.

The Permanent Copyright Committee was created at the Ministry of Culture in June 1999. A special unit was formed at Tallinn Police Department in order to fight piracy in the market more efficiently. The Estonian Organisation for Copyright Protection was also formed. Training courses are continuously arranged for the police, customs authorities and judges.

The IST based public administration and services sector is regulated by the Public Information Act, which guarantees the citizens the constitutional right for information; regulates what information on the administrative apparatus and its activities is offered to the public; asserts that all information is accessible also through the Internet (entered into force on 1 January 2001).

The requirement to establish systems for guaranteeing the maintenance of databases was stipulated in the Databases Act Amendment Act that was adopted on 31 January 2003. There is a new database law under elaboration, which will be focused not only on *back-office*, but primarily on *front-office*. The objective is to make all databases service-oriented.

Strengths	**Weaknesses**
Creation of competition among suppliers in telecommunications market Regulations and institutional capacities have made available the progress in ICT development Development of government-wide information systems (e.g. databases system) Estonian legal system adequately protects property rights and security matters Development of secure authentication systems	Improvement of legislation is needful for the introduction of e-commerce and other new solutions in practice Internet Service Providers (ISPs) are still dependent on networks owned by the incumbent telecommunications operator Institutional capacities need to be improved in connection with new information technology applications
Opportunities	**Threats**
Implementation of new information policy based on new development needs of information society Improvement of institutional capacities E-citizen system development using personal authentication systems Modernisation program of national databases and development of other new solutions	Deceleration of the adoption and enforcement of laws Too severe data protection regulations may limit the use of databases and hence the development of national information system

G. EDUCATIONAL SECTOR AND LABOUR FORCE SUPPLY

G.1. Main characteristics of educational system

Changes in the educational system in Estonia began immediately after the re-establishment of the national independence in 1991 and were fundamental in character, as they had to conform to the task of an independent state for the preservation and development of the Estonian nation and culture. The Law on Education (March 1992) defines the procedure and scope of future legislation for further development of the educational system. Within the framework of the Law on Education, other laws and concepts (for different types of educational institutions, see Table G1 in Annex) have been adopted by the *Riigikogu* (Parliament) and the Government of the Republic in recent years.

The legal framework was built up concurrently with the changes in the contents of instruction (a new structure and content of curricula), the system of education, institutions (new types and especially fast development of private, educational institutions, a redesigned schooling network) and education provision including new principles of management and financing of the educational system. As of the end of the 1990s, the Estonian educational system was characterised by the efforts of various education authorities and experts to improve curricula, make management of educational institutions more professional and effective and use means allocated for the educational system more efficiently. The current priorities in the field of development of the educational system are related to ensuring the quality and availability of education at all levels. Introduction of the principles of lifelong learning to all people of Estonia becomes increasingly important in order to preserve self-respect, citizen awareness and competitiveness on the labour market. There is a social consensus according to which education is the main prerequisite for the development of Estonia - open, international co-operation based on new knowledge promotes Estonian culture and science and increases public wealth.

The OECD examiners, however, concluded that despite the progress, the reforms have not resulted from a comprehensive and publicly supported view on the architecture of the Estonian education system and its functioning (OECD, 2001).

The developments in the first decade following the restoration of independence have received considerable support from international co-operation: Estonia has joined the Bologna and Sorbonne conventions establishing a European Higher Education Area, joined the Lisbon Convention on the Recognition of Qualifications Concerning Higher Education in the European Region and adopted the Recognition of Foreign Professional Qualifications Act, which ensure equal participation opportunities in studies and employment in Europe. In March 2000, the Act of Recognition of Foreign Professional Qualifications was adopted, which establishes the bases and procedure for recognising foreign professional qualifications for persons in order to work in regulated professions (Ministry of Education and Research, http://www.hm.ee).

The substantial changes in the system of formal education created basis for correspondence of the Estonian educational level categories to those of International Standard Classification of Education (ISCED) and with this for international comparisons of education system developments (see Table G2 in Annex). Pre-primary education (brief characterisation of Estonian educational system in Table G3 in Annex) is a set of knowledge, skills and rules of behaviour that creates prerequisites for successful progress in daily life and school. Basic

education is the minimum general education that is obligatory for everybody. Children who attain the age of 7 have obligation to attend school. Students are subject to the obligation to attend school until they acquire basic education or attain the age of 17.

Secondary education is based on basic education and is divided into general secondary education and secondary vocational education. General secondary education is acquired in an upper secondary school, the upper secondary level is classes 10 to 12. Organisation of vocational education is based on the precondition that the state has to define only general purposes and principles of vocational education, economic and legal levers that guarantee its development, and scheme of education. In the first years of the current reform of vocational education in Estonia, in 1996–2000, a consensus was reached in the ways of reorganisation of vocational education, a constructive dialogue started between educators and social partners, a legislative basis and conditions were created for addressing the development of the system according to the changes in Estonia, for more effective usage of the existing resources, for elaborating new curricula and development of personnel for vocational schools. Acquisition of general secondary education gives the right to continue studies for acquisition of a higher education.

The Estonian higher education system is binary and consists of universities and applied higher education institutions. Some vocational schools also have the right to offer professional higher education programmes. Based on the form of ownership, institutions of higher education can be divided into state, public and private institutions. Since the academic year of 2002/2003, the general structure of the higher education system has been based on two main cycles, following the undergraduate-graduate model. The first cycle is the Bachelor's level; the second cycle is the Master's level. For some specialities, the study programs have been integrated into a single long cycle, leading to a Master's level qualification. The highest stage at universities is Doctor's studies. Applied higher education programs constitute the first stage of higher education and correspond to the Bachelor's level programs.

Perceiving the increasing need for adult education and life-long learning opportunities in Estonia, the Ministry of Education and Research established in 2001 an expert work group to elaborate a life-long learning strategy for Estonia. In 2002, the document was sent for public discussions and opinions to more than 40 organisations. On the basis of the comments and opinions received from them, the work group started amendment and improvement of the strategy. General co-ordination of adult training is the task of the Ministry of Education and Research.

The network of general educational institutions that has developed over decades will change in connection with the decreasing number of pupils in this decade already (the reasons for what will be explained below). In the academic year 2002/2003, the number of general education schools of the daytime study form was 636, of which 10% were nurseries-primary schools, 8% primary schools, 44% basic schools and 38% secondary and upper secondary schools (Ministry of Education and Research[132])[133].

[132] http://www.hm.ee

[133] 83% of general education schools were Estonian-speaking, 14% Russian-speaking, 3% both Estonian- and Russian-speaking and 1 Estonian- and Finnish-speaking. 90% of the schools were municipal, 5% state and 5% private, and 59% were located in rural areas. The number of schools for children with special needs was 45. 15 schools provided the evening/distance learning form of study, of which 8 were Estonian-speaking, 6 Estonian/Russian-speaking and 1 Russian-speaking. In addition, there were 20 evening/distance learning

The number of vocational, vocational secondary or professional secondary educational institutions has also not changed much during the last years and has been around 80. The situation with the infrastructure of vocational education institutions differs very much, most of the training and production facilities were built in 1970-1990 and about 5% of the buildings have been reconstructed or renovated (Estonian, 2004[134]). The number of educational institutions providing higher and higher professional education increased from 27 in 1995 to 51 in 2001, especially private universities (from 1 to 10) and vocational education institutions (from 1 to 18) (Statistical, 2002a).

G.2. Key educational trends

A factor that has been influencing and continues to influence the development of the educational system is the declining birth rate in the 1990s. As the effects of the falling birth rate have reached only the basic education by now, the decreasing number of population will have a considerable impact on the Estonian education as a whole in the years ahead. The total number of students in full-time general education has already decreased by 3.2% (was 207,612 pupils in 2001), but in full-time general secondary education still increased by 8.5% in the period 1995-2001 (Table G1). The decreasing number of students at different levels of education will have a direct impact on the educational institutions network and the government order for teacher training towards decrease.

The number of students indicated the growing trends in the period 1995-2001 (Table G1, Table G4 in Annex), most significantly for higher education, which is the most relevant tendency of the last years. Mainly as a result of the development of private universities and higher educational institutions the number of higher school students is continuously increasing. In addition, also the enrolment in public universities increased over recent years mainly due to the growth of paid education (besides free of charge education on the basis of the government training order, it is possible to obtain higher education also by paying for the studies), including open university. But a worryingly large number of young people leave school before completing even basic education (Statistical, 2002a). This is a clear sign of broadening educational stratification - while more and more young people continue in higher education, there has also been an increase in the drop-out rates (a significant group of drop-outs are boys from the schools in Tallinn, and also students with special needs) at the upper level of basic education. Educational stratification, where on the one hand, the share of people with high educational level is increasing and on the other hand, the share of those with only basic education is also increasing, is one of the causes for emerging digital divide and of the increasing inequality in the society based on income and other economic and social differences depending on the educational level. The problem is especially serious for men, because many boys (2/3 of all the drop-outs) drop out of education without obtaining even basic education. There are many reasons for dropping out – teachers have grown being used to working with homogeneous groups, deteriorating economic situation of families and lack of school advisory system aimed at students and their parents. To some extent as a result of drop-outs of boys already in basic education and due to some other reasons women are generally more educated than men in Estonia. This tendency is likely to grow: in 1999 there were 77 men to 100 women in higher education and 16 men to 100 women in higher professional education (Heinlo, 2001).

departments in schools of general education of the daytime study form (9 were Estonian-speaking, 5 Russian-speaking, 6 Estonian/Russian-speaking).

[134] http://www.fin.ee/index.php?id=5119

Table G1.: Distribution of students in secondary and tertiary education, %

	1995	1996	1997	1998	1999	2000	2001	Change,% 2001/1995
SECONDARY EDUCATION	70.9	67.9	66.8	62.7	58.1	55.0	53.4	4.5
General secondary	55.6	54.6	55.0	54.3	54.6	55.2	56.9	7.0
full-time (grades 10-12(13))	*86.4*	*85.6*	*86.2*	*86.7*	*86.3*	*86.7*	*87.6*	*8.5*
part-time (grades 10-12(13))	*13.6*	*14.4*	*13.8*	*13.3*	*13.7*	*13.3*	*12.4*	*-2.5*
Vocational secondary	44.4	45.4	45.0	45.7	45.4	44.8	43.1	1.3
HIGHER EDUCATION	29.1	30.3	33.2	37.3	41.9	45.0	46.6	121.8
Higher professional	..	..	..	..	6.4	10.0	12.6	..
Diploma courses	22.3	25.8	30.3	36.9	33.3	30.4	28.9	87.6
Bachelor courses	65.9	62.5	59.3	53.6	50.9	49.3	47.5	59.8
Master courses	9.5	9.3	7.7	6.9	6.9	7.7	8.5	98.6
Doctor courses	2.3	2.4	2.6	2.6	2.5	2.6	2.5	41.7
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	

Source: Statistical Office of Estonia, 2002

The overwhelming tendency in Estonia's educational sector in the recent decade has been that an increasingly higher share of graduates from basic education continue education in general secondary education and fewer graduates go to vocational education. The proportion of graduates from basic education continuing in general secondary education changed in 1992-2000 from 63% to 74% (Statistical, 2002a). It is due to the traditionally very low reputation of vocational education in the society. A reason for that until recent years have been the difficulties in reorganising the curricula, the technical base and teacher training of the vocational education institutions to satisfy the changed structure of industry and demands of labour market. Due to the low attractiveness of occupations taught in the vocational education and training schools young people prefer general education to vocational education and at training. At the same time, the labour market situation indicates the necessity to obtain vocational education because of the relatively high unemployment among graduates from general secondary schools (*Gümnaasium*) (Statistical, 2003d). Vocational education and training schools have introduced changes to the programs offered, but these changes are not sufficient to comprehensively respond to changes in the labour market and enhance employability of graduates.

The share of students choosing vocational education in Estonia is considerably lower than in most European countries, where a higher share of students graduating from basic school decide to learn a profession (Berde, *et al*). As a result, Estonia suffers simultaneously from unemployment and shortage of qualified labour force. Several studies have also highlighted the low popularity of natural and technical specialities at the universities in Estonia, which is unfavourable for the technical and industrial development. At the same time, those who have obtained secondary education are still highly interested in studying business administration and law, because due to the needs of a newly independent country, graduates from these specialities are offered a relatively good position in the labour market situation. The Ministry of Education and Research is trying to preserve the previously established budgetary proportions between vocational education and training and other educational sub-sectors with respect to financing of educational institutions (Ministry of Education and Research[135]).

[135] http://www.sekr.ee

However, the current proportions are not sufficient to allow vocational education and training schools to develop.

As a result of the vocational and training reform, in order to resolve the problems with vocational education, a social agreement was reached on the reorganisation of vocational education and training: a constructive dialogue between the trainers and the social partners started, the legislation was developed, the conditions were created for directing the development according to the changes in the society and labour market, for using the available resources more effectively, and for developing study programs and vocational education and training schools' personnel.

In July 2000, the government of Estonia established an Expert Committee to develop national priorities for vocational education and training and a reorganisation plan for vocational education and training system until the year 2004. The principles of modular study have been applied since 1996 in 13 pilot schools within the framework of the Phare VET reform project. Since 1998, there have been 12 vocational councils working at the Estonian Chamber of Trade and Commerce and in August 2001, the Estonian Qualification Authority was established to carry on the work with vocational reform. By the end of 2001, 215 vocational qualifications had been established. By September 2003, all teachers had to have the requisite speciality or pedagogical higher education. At the end of 2001, the government adopted the education strategy "Learning-Estonia" with the objective to visualise development trends of the Estonian educational system.

The establishment of a new type (regional poly-functional) of vocational education centres with modern technical equipment has a central role in reforming vocational education. Such centres have already been opened in Tallinn, Võru county and Narva, additionally, in Kohtla-Järve and Jõgeva county these are almost ready for opening. The main difference between poly-functional centres and other vocational educational institutions is the extensive range of activities provided by poly-functional centres. In Northeastern region of Estonia, much hope has been set on these vocational education institutions to reduce youth unemployment.

A precondition of economic development is that young people are adequately prepared for both entering the labour market and taking an active part in social life. Therefore, it is considered important that young people remain in education and training system until they reach maturity. Therefore, the Ministry of Education has established the following proportions through training orders: the vocational education and training system must ensure learning places for up to 50% of the basic school graduates cohort and for up to 50% of the graduates from *Gümnaasium*. In order to support technical and industrial development a new category of students with vocational higher education has emerged (students in applied higher education courses constituted 9.7% of higher education students in 2002 (Statistical, 2002a)), following the introduction of a respective program according to the 1998 Act on Applied Higher Education Institutions.

Although vocational education and training system has much changed during the reform the capacity to train the workforce necessary to compete in the global economy is not yet sufficient. Unfortunately, the vocational education and training system has not so far managed to provide the developing industry with highly qualified skilled workers.

The distribution of admitted students by fields of study has changed significantly compared with 1995 (see detailed information in Table G5 in Annex). The admittance to commercial

and business administration programs and to law and jurisprudence programs has more than doubled on account of technical and agricultural ones. As a result of the vocational education reform, in the academic year 1999/2000, admittance to higher professional and vocational secondary courses began on the basis of both – basic and secondary education (there were no new entrants to vocational and secondary professional courses, but some of those admitted earlier continued studies on the basis of old programs even in 2001/2002).

Under the above-mentioned changes of the vocational education reform, the structure of graduated people also changed considerably – some specialities belonging earlier to the secondary professional level category were transferred to higher professional, others to vocational secondary level category (information by fields of study see in Table G6). Significant changes occurred also in the distribution of graduates by fields of study in the period 1995-2001 – on the secondary vocational level of education, the number of graduates in computer sciences, and social and personal services mostly increased. In accordance with the decrease in admittance, a notable decrease occurred in the number of graduates in agricultural programs. The development of secondary and higher private educational institutions had a significant effect on the structure of graduation, especially in higher education. As a result, the number of graduates in business and administration, law and computer sciences increased on all levels of higher education. The situation in enrolment and admittance has been different in the case of Master's and Doctoral courses. Master's courses have been most popular for business and administration; medicine and public health perform a major role in doctoral studies.

People who have graduated from vocational educational institutions during the last 10 years make up approximately 12% of the labour force. Professional initial training is as important as complementary education and re-training for people who completed their education earlier. In Estonia, the adults have been provided with opportunities for obtaining general and vocational secondary education through part-time studies. The real implementation of life-long learning in Estonia calls for prior establishment of the relevant system (see some indicators for characterising this in Table G7 in Annex). Though the introduction of the modular system of curricula in the educational system has provided people with different educational level an opportunity to continue studies at any age, there is no stable, uniform principles subordinated state training and retraining system. Considering the rather high level of formal education of Estonian population, the creation of a training and retraining system should quite effectively raise the level of their knowledge and skills and increase competitiveness on the labour market. Despite the vocational education reform measures, rearrangements of vocational education have not yielded results that satisfy labour market demand.

The increasing structural unemployment, especially among the young, indicates that the educational system has not conformed to the labour market demands (Tiits *et al*, 2003; Sectoral, 2002). There is a mismatch between the knowledge and skills developed in vocational education system and demands of the labour market. This happened under the conditions where resource-intensive and low-skilled workforce-oriented investments have been dominating in industry and due to the changed structure of industry the skilled workers' specialities, which were responding to the Soviet-period industrial structure were not needed any more. At the same time, 19.7% of the population (Population Census[136], 2000) and 30.5% of the working age population (Statistical, 2003d) has upper secondary and tertiary vocational

[136] Population – persons aged 10 and older and persons whose age is unknown

education). In connection with the expected rise in the quality of foreign investments and technology transfer, improvement of the quality of knowledge and skills of those who have already obtained higher or vocational education, and especially flexibility to changes is becoming increasingly important. Thus, we still have on the agenda increasing of the adaptability of vocational education to labour market demands and offering of different forms of advanced training, making it more accessible to ensure a rise of productivity in the economy and to avoid increasing of the structural unemployment.

G.3. IST-related education

The society's demand for the ICT-related competence has been growing. In the Information Society, the ability to operate on the Internet is essential for taking part in the societal processes of living, working and learning. Digital literacy can be seen as an indication of readiness for qualified use of ICT. The importance of the latter is best expressed in Estonia's R&D strategic paper "Knowledge-based Estonia" that identifies ICT as a key area for success. Therefore, education has an especially important role to play in the information society.

In the phase of constant changes, the development of ICT requires flexibility from the educational system. In 1995, the schools were rarely equipped with modern ICT equipment, such as personal computers, printers and scanners or the Internet connection. The national Tiger Leap Program for computerisation of Estonian schools, launched in 1996 by President Meri, started the ICT revolution in education if not in the whole society (Krull, 2003). To accomplish educational objectives of e-Estonia, the Tiger Leap Foundation (Tiger Leap Foundation[137]) was established in 1997. The main goals (the ratio of one PC per 10-20 students, Internet connection to each school, and the basic computer training for all teachers) of the National Tiger Leap Program for computerisation of Estonian schools (1996-2000) have mostly been achieved by now (see also Section E). Besides upgrading teachers' knowledge in ICT, the supply of schools with computers, Internet connections and educational software programs can be seen as the main result of the Tiger Leap and other initiatives in ICT promotion at schools. In 1997-2000, besides the state financing (10,5 MEUR), the program was supported by local governments and the private sector. All this helped to bring computers into education and made IT popular among children, creating a positive spill-over effect also to their homes.

Success of the Tiger Leap Program was a precondition for continuing the program. The program for changing Estonian schools into 'information society schools' was continued under the name of Tiger Leap Plus Program (Tiger Leap Foundation[138]). The goals of this program (ICT in Estonian schools in 2001-2005) are in accordance with the educational objectives of eEurope and are focused on four priorities:

- ICT competence – development of the competence of graduates of each school level, of teachers and officials in the field of education by means of up-to-date curricula, advanced training courses and study aids;
- virtual learning – production of electronic study aids and educational software in Estonian, support to virtual collaboration of teachers, advanced training and exchange of experience, creation of virtual upper secondary school, legalisation of virtual learning;

[137] http:// www.tiigrihype.ee
[138] http://www.tiigrihype.ee

- sustainable development of infrastructure – constant upgrading of ICT hardware and software in schools, securing high-quality Internet connections and technical support to schools in co-operation with school owners;
- collaboration of all parties involved: the state, local governments, schools, parents and organisations; elaboration and implementation of principles and different co-operation forms.

3.35 MEUR were invested in the maintenance and improvement of the ICT infrastructure in general and vocational education schools in 2002 (Tiger Leap Foundation 39.1%, local governments 58.7% and vocational schools 2.2%) (Tiger, 2002). Schools' needs for infrastructure improvement were extremely different – some schools replaced whole computer classes, some bought computers for teachers, computer projectors and printers, some supplemented the existing computers with memory, software, peripheral devices etc, replaced monitors, built networks. The Tiger Leap Foundation invested 0.26 MEUR in ICT-related refresher courses and upgrading of subject and computer teachers and schoolmasters in general and vocational education schools in 2002.

In addition to the Tiger Leap Program some other initiatives have promoted IT development in schools:

- A Phare project with a budget of two million EUR – Information Systems in Education (ISE), has created a network of 20 pilot schools with the main task of introducing into local schools the school management software Extens acquired within the framework of the project[139]. Phare ISE has supported the training of more than 1800 teachers in the use of computers in the classroom and organised the Telematics conferences. Phare ISE initiated the introduction of the European Computer Driver's Licence in Estonia.
- Co-operation projects of the Nordic countries and the Baltic countries: "BaltNet" (1,416, 000 NOK and 44,646 USD), "Distance Training for Teachers" (102 thousand EUR), and "School Development in the Information Era" (10 thousand EUR)[140].
- Miksike Llc.[141] which has a virtual learning environment with a wide range of users and virtual assistant teachers, as well as popular virtual educational services, including electronic worksheets, a pupils' factory, story-telling and drawing competitions and academic competitions, was funded with 96 thousand EUR by Tiger Leap. The web site 'Miksike' is very popular among schoolchildren and teachers in Estonia and gives away more than 20,000 worksheets in HTML eWorksheets, which are aligned according to state educational standards, and offers a set of collaborative learning services to facilitate learners in constructing their knowledge. Approximately 50% of Estonian schools are using 'Miksike' at least 2 times a week[142].
- Almost 100 Estonian schools are actively organising and participating in learning projects such as the European School Project, I'EARN and Globe, mediated by international organisations. Upon the initiative of the Active Learning Centre at the University of Tartu, simulation games have been organised via Internet since 1993, and have been attended by almost 250 schools and 4000 pupils over the years.

[139] http://www.ise.ee/docs/strategy/executiv.htm
[140] http://www.tiigrihype.ee
[141] http://www.miksike.ee/1lehekesoleme.html
[142] http://elutuba.ee/introduction.htm

- The Open Estonia Foundation has funded several extensive educational projects promoting ICT infrastructure in schools and universities and teacher training with a budget of almost 319 thousand EUR.
- Within the framework of the Village Road Program (Külatee), the installation of Internet connections in many county schools has been financed.
- Pathfinder[143] is an English version of the Estonian career planning database *Rajaleidja.* This information system operating from 1997 (since 2000 under the name *Rajaleidja)* is dedicated to the field of career planning. It introduces organised data about professions, studies and employment possibilities in order to reveal the wealth and diversity of career opportunities, and is supporting people of different age and background in finding and consciously constructing their own path in life.
- In recent years, on-line-learning firm Trainator Ltd[144] is operating on the Estonian education and training market. The Trainator Ltd is enlarging the knowledge base of people who are oriented to lifelong learning using innovative learning methods. Trainator Ltd is offering several e-courses (composition of on-line-learning materials; career e-planning, e-course demo; introduction into banking etc).

The importance of e-education issues in Estonia is reflected by the fact that according to the Government decision of 14 May 2002 two out of six priorities of the information policy for 2002/2003 are connected with e-education:

- better provision of schools with computers to achieve the ultimate goal – one computer per 20 students;
- launching of Tiger University program to support the development of information and communication technology (ICT) infrastructure and academic ICT staff, and the infrastructure for post-graduate training.

In Estonia the Ministry of Education, Tiger Leap Foundation, local governments and school owners are responsible for the purchase and maintenance of hardware according to the co-financing principle. The responsibilities of various institutions are as follows:

- The Ministry of Education guides the implementation of the development, creates the legal environment;
- The Tiger Leap Foundation supports the ICT development activity in general education schools and refinement of learning environments, finances in-service training projects for teachers, educational software and other projects, organises the public competitions to support the most appropriate ICT solutions for schools and acquisitions of hardware;
- The school administrator supports procurement of ICT means for schools following the principle of co-financing, is responsible for maintenance of hardware, insurance, security and IT support, arranges and finances school Internet connections in accordance with local possibilities and on the basis of relevant national decisions.
- Sources for the development of ICT infrastructure at higher educational establishments are State budget donations.

For the purpose of guaranteeing the sustainable development of ICT sector in Estonia, a National ICT Program for Higher Education (The Tiger University Program[145]) was approved

[143] http://www.rajaleidja.ee/pathfinder/about_pathfinder/index.htm
[144] http://www.edukas.ee/index.php?go =1&I=13&lang=eng
[145] http://www.itcollege.ee/inenglish/tigeruniv_program.php

by the Estonian Government in January 2002. The Tiger University Program goals in 2002-2004 are:

- support for the development of the ICT infrastructure at higher educational establishments;
- support for the development of ICT academic staff and degree courses' infrastructure.

The Tiger University Program is administered by the Estonian Information Technology Foundation (EITF[146]) (see Section B). EITF set up a private IT College[147] to support the ICT education at other higher educational establishments. The IT college gives a three-year applied higher education, which combines both IT and telecommunications. The Ministry of Education supports the IT College and in the first years the state covers a large part of the costs.

The Tiger University Program priorities in 2003 are:

- development of ICT infrastructure (upgrading the academic backbones and networks, PC procurements, equipping the labs, providing software). The goal is to achieve a ratio of 1:10 of computers to students, currently that ratio at the public universities is 1:20 or higher;
- development of ICT-related curricula (new curricula, creation of study materials, e-University, e-learning, literature and electronic resources),
- motivating the academic staff (mentoring PhD students, academic sabbaticals, lecturers' and PhD students' mobility scheme, internships, visiting lecturers).

As it has been explained in Chapter E pupils in Estonia acquire very basic computer knowledge already at primary and secondary school. These skills are developed further in higher education. Some ICT knowledge is taught in all specialities at all higher schools. In Estonia, this field of study (ISCED code 48) is provided in vocational secondary education, higher professional, diploma, Bachelor, Master and Doctoral courses. ICT can lead to a qualification of a Bachelor of Science in Engineering, Electronics, Informatics, Business Information Technology, Computer and Systems Engineering; Telecommunication; Master of Science in Engineering in Electronics, Informatics, Business Information Technology, Computer and Systems Engineering; Informatics for Non-informatics; Master of Engineering In telecommunication; Doctor of Philosophy in Engineering, in Information and Communication Technology; Doctor of Philosophy in Natural Sciences, in Information and Communication Technology; Diploma in Fundamentals of Information Technology etc. (Sectoral, 2002).

The number of ICT students by level of education is divided as follows:

1) In upper secondary qualification (vocational secondary and professional secondary education):

   Diploma in Computing (professional secondary education curricula 4-1 and 4-2), in Fundamentals of Information Technology (vocational secondary education).

2) In tertiary qualification:

   Bachelor of Computer and System Engineering, Master of Informatics, Doctor of Philosophy in Engineering etc.

[146] http://www.itcollege.ee/inenglish/eitf.php
[147] http://www.itcollege.ee/inenglish/index.php

At the beginning of the academic year 2001/2002, ICT students constituted 8.6% of all admitted students (females 5.7% and males 12.2%) in secondary and tertiary level (Statistical, 2002a). Of all admitted students ICT students constituted 11.6% in vocational secondary education, 6.2% in higher and higher professional education (7.3% in higher professional courses, 6.5% in diploma courses, 6.7% in Bachelor, 4.7% in Master and 2.5% in Doctoral courses).

Data about enrolment in ICT related education indicate that the number of students in these specialities was growing fast during the period 1995-2001 (Table G.2). Over the last years, the proportion of ICT students in secondary vocational education has decreased (from 47.3% in 1999 to 42.8% in 2001) and in tertiary education has increased, which is during last years in accordance with the demand for ICT graduates in the labour market.

Table G.2.: ICT - related education, enrolled students, at the beginning of academic year

	1995	1996	1997	1998	1999	2000	2001	2001/95 %
TOTAL SECONDARY AND HIGHER EDUCATION	1124	1205	1869	2134	3115	4555	5291	370.7
SECONDARY EDUCATION	483	573	690	857	1472	2099	2265	368.9
Total vocational and vocational secondary professional secondary education	483	573	690	857	1472	2099	2265	368.9
HIGHER EDUCATION	641	632	1179	1277	1643	2456	3026	372.1
Higher professional courses	..	..	..	..	-	192	414	..
Diploma courses	-	-	108	175	387	677	828	..
Bachelor courses	472	465	904	946	1084	1401	1539	226.1
Master courses	138	127	121	104	119	142	195	41.3
Doctoral courses	31	40	46	52	53	44	50	38.0

Source: Statistical Office of Estonia, 2002.

But the share of Diploma, Bachelor and Master students enrolled in computer sciences was much smaller than in business and administration (Table G3).

Table G3.: The share of computer science and business and administration students by enrolment of Diploma, Bachelor and Master students, %

	1995	1996	1997	1998	1999	2000	2001
Business and administration							
Diploma courses	11.3	11.7	19.5	29.4	36.6	31.3	29.1
Bachelor courses	17.6	19.6	21.0	21.4	19.4	20.7	20.2
Master course	16.4	14.2	16.5	22.3	28.4	29.1	27.8
Computer sciences							
Diploma courses	-	-	1.0	1.2	2.3	4.0	4.7
Bachelor courses	2.6	2.5	4.4	4.4	4.3	5.0	5.4
Master course	5.3	4.5	4.5	3.7	3.5	3.3	3.8

Source: Statistical Office of Estonia, 2002

As the admittance to ICT diploma, bachelor and master courses in computer sciences has risen significantly during 1995-2001, the number of graduates is expected to increase in the next years (Table G4). In the academic year 2000/2001, ICT graduates constituted 6.9% of all graduates in Estonia: 10.1% in vocational secondary education and 2.6% in higher and higher professional education (0.9% in diploma courses, 3.8% in bachelor, 3.0% in master and 0.7%

in doctor courses) (Statistical, 2002a). In 2001, ICT graduates with higher education constituted 16.4% of all ICT graduates. The Sectoral study (2002) indicated that companies' demand for ICT specialists with tertiary education has increased and secondary vocational education graduates has decreased. Table G4 expresses the challenges of ICT speciality students during the studies. They already have then good opportunities to find employment and earn money, and therefore graduation is not of primary importance for them. Such a situation diminishes the efficiency of the educational system and is also limiting the development potentials of the ICT sector, which needs qualified and constantly upgrading highly educated specialists. So the large number of ICT graduates from vocational training and the relatively low number of ICT specialists, programmers and engineers creates a danger of falling into a circle with low-skilled IT labour hired by companies producing low value added products and services with practically no innovation or R&D at all (the need for ICT specialists is described in Section C).

Table G4.: ICT admittance, enrolment and graduates in higher education, persons

	1995	1996	1997	1998	1999	2000	2001
Diploma courses							
admitted	-	-	108	82	221	374	265
students	-	-	108	175	387	677	828
graduates	-	-	-	-	-	3	21
Bachelor courses							
admitted	-	-	160	165	266	357	434
students	472	465	904	946	1084	1401	1539
graduates	51	25	41	90	98	123	129
Master courses							
admitted	31	20	34	29	40	78	101
students	138	127	121	104	119	142	195
graduates	9	8	9	24	15	18	25
Doctor courses							
admitted	11	4	9	10	12	6	7
students	31	40	46	52	53	44	50
graduates	-	-	-	-	5	5	1

Source: Statistical Office of Estonia, 2002.

Therefore, despite the increasing number of students with ICT degrees, Estonia still lacks a skilled ICT workforce. Moreover, because of non-competitive salaries, highly qualified ICT specialists tend increasingly to work abroad more (Ranking in IT Brain Drain: 29) (Braliev and Kalvet, 2002). Specific statistical information about domestic and international mobility of scientific and technical personnel is not available in Estonia. We can provide as examples of brain drain the opinion of Niilo Saard, IT College Council member and executive director of AS Cell Network (Eesti Päevaleht, 2003): Estonians are known in many countries just through ICT sector as hard-working specialists who have good qualifications and wonderful ideas, who are capable of learning and whose number outside Estonia runs into hundreds (in Microsoft, Ericsson). Unfortunately, most of them are self-taught persons who miss more comprehensive basic preparation to be able to go along with extremely fast information technological changes, in addition to the above-mentioned weakness.

In addition, a specific relevant feature of ICT speciality students is that relatively talented students with high self-esteem have good opportunities to find employment on the labour market already during the studies and they also overemphasise independent studying. Therefore, the duration of studies is growing longer, which is often followed by discontinuing

of studies. Also in general, but especially in ICT-related training there is a shortage of steady advanced training. Therefore, the establishment of a training and retraining system is of special significance in Estonia because with a relatively high level of formal education it is possible to achieve rapidly good results with retraining. This may explain the situation where on the one hand, there are good ICT specialists but, on the other hand, there is shortage of skilled labour in the ICT sector. Thus, we must invest increasingly more in basic education, advanced training, science and technology (Estonian[148]).

European Commission DG Enterprise innovation policy study concludes that, although the candidate countries' governments have retained relatively high levels of expenditure on education and the population generally has a high level of education, the analyses of available data point to a mismatch between the skills developed and the need of industry and commerce (Innovation, 2001). This study emphasises that there are substantial deficiencies at the level of managerial and skilled employment, i.e. the types of jobs occupied by university graduates. This also explains the situation in Estonia, but the increase of higher education students in business and administration shows a great promise in the future. By now, higher education and industry have started to develop courses together on the technical and organisational aspects of engineering in Estonia. The initiation of the IT college kind of joint efforts for upgrading qualification of the ICT enterprise personnel is a good example, as well as eLearning providing opportunities for continued life-long learning.

G.4. Educational characteristics of labour force

On the basis of the Labour Force survey (Statistical, 2003d), the most important factor influencing employment is education attained. The following rule is valid for education: the higher the education is, the greater is the probability to keep the job or find a new one. People aged 15-24 expect this principle to be effective because since 1999 the rate of participation in education has increased in all age groups. The total rate of participation in education in the age group 15-24 has increased from 55.2% to 67.7% during the four years. The Labour Force Survey indicated that the rate of participation in education among persons aged 15 was 95.7% in 1999, but by the year 2002 it had increased to 99.1%. The biggest rise was among persons aged 21 – from 29.2% in 1999 to 57.9% in 2002.

In 2002, 44.1% of the students aged 15-74 was acquiring general, 12.4% vocational, 3.7% professional secondary and 39.8% higher education or Master's or Doctoral degree. The proportion of educational level of the population aged 15-74 has remained in general stable during some time: about one-quarter have below upper secondary, half have upper-secondary and the remaining quarter has tertiary education. In the same way, as persons with upper secondary education dominate among the population aged 15-74, the majority (58.1%) of the economically active population have attained upper secondary education. 10.4% of the labour force has lower than upper secondary education and 31.5% have tertiary education (Statistical, 2003d). Thus, it may be stated that the formal educational level of the labour force is relatively high.

Since 1997, the employment rate has decreased at all levels of education. Usually the employment rate fluctuates year by year, but in two groups – among persons with primary and with basic education, the employment rate shows a falling trend (Statistical, 2003d). The employment rate of persons with different type of vocational education:

[148] http://www.fin.ee/index.php?id=5119

- vocational education attained together with general secondary education) decreased from 75.1% in 1997 until 2001 almost 10 percentage points, but in 2002 increased again to 68.5%,
- the most stable (about 70%) is the situation for persons with postsecondary technical education (after secondary education)
- The employment rate of persons with vocational education after basic education is a little over 50%.

Persons with general secondary education are in a worse situation. In this group, the employment rate ranged from 63.3% in 1997 to 58.2% in 2002. Hence, general secondary education does not provide graduates with a good position in the labour market, at the secondary education level, the vocational education after secondary education is the most effective at the labour market.

In 2000 when the unemployment rate rose to the highest level since the re-establishment of independence in Estonia, the unemployment rate rose to the highest for all levels of education during the last six years under study. Only for tertiary education it was not higher than 10%. Less qualified people lost their jobs more often than skilled labour (Eamets *et al*, 2003). During the next two years, the situation improved and the unemployment rate fell to the level of 1997-1998.

It seems that higher education can guarantee employment but employed people with higher education often work in occupations where lower education is sufficient to cope with. In 2002, 45.6% of employed persons with higher education were employed as professionals, 23.4% as legislators, senior officials and managers, 14.4% as technicians and associate professionals, but 3.5% of employed persons with higher education worked as clerks or were engaged in elementary occupations, 3.4% worked as service workers and shop and market sales workers and 3.3% as craft and related trade workers. Employed persons with higher education worked also as skilled agricultural and fishery workers and plant and machine operators and assemblers.

The labour force survey indicates that though higher education can ensure employment, people with higher education often are employed in professions where they could manage with much lower level of education - persons with higher education have concentrated in technicians' and associate professionals' occupations. While in 1997, only 20.3% of the employed persons in this occupation had higher education, then in 2002, the respective indicator was 24.6%.

In 2002, the employed persons with tertiary education in tertiary sector accounted for 41.1%, in primary sector 17.1%, in 1997 40.3% and 15% respectively (Statistical, 2003d). There are regional differences also in the educational level of the labour force. The share of employed persons with tertiary education was more than one-fifth in Tallinn, Tartu and in two counties (Harju and Saare counties) in 2002. In two counties (Lääne and Viljandi), employed persons with less than upper secondary education accounted for more than one-fifth.

As regards the correspondence of employed people's level of education to their job, the situation has slightly improved over the last three years. In 2000, 83% of employed persons had a job corresponding to their educational level; in 2002, this percentage had increased to 85. In 2002, 2.6% (4% in 2000) of employed persons had a job requiring higher educational level that they actually had. However, 12% of employed persons in the Estonian labour

market have a higher educational level than their job requires (13% in 2000). In this respect, the situation is slightly better for males: 87% of males have a job corresponding to their educational level, the respective indicator for females is 83%.

Females generally have higher level of education compared with males. 14% of men and 17% of women aged 15-74 has higher education or Doctor's or Master's degree. More than one-quarter (29%) of working-age women have attained tertiary education, against 19% of men only. 18% of women and 20% of men have basic education.

The unemployment rate among men has continuously been higher than that of women. The difference is noticeable if to compare all three levels of education by gender. The difference is the biggest among persons with upper-secondary education: 18.5% for women and 21.9% for men. For persons with secondary education the corresponding indicators are 11.7% for women and 10.2% for men and for persons with tertiary education - 5.2% and 6.5%.

The educational level of non-Estonians is somewhat higher than that of Estonians (among non-Estonian, the share of first level education is slightly lower, but the share of third level education higher). Consequently, it may be expected that the employment rate is lower among persons with higher education level. As a matter of fact, it is the opposite. Among non-Estonians, the unemployment rate in all three educational levels is by about half higher than among Estonians. It is caused mainly by the differences in the fields of activity and places of residence of Estonians and non-Estonians. Knowledge of the Estonian language is less important if we look at odds ratios in 2000 compared with 1998 (Eamets *et al*, 2003). In the environment of high unemployment, both language groups are under pressure and language does not matter in the labour market as much as in the early years of transition.

If to compare changing of the unemployment rates by level of education among urban and rural population starting from 1997, it can be noted that urban population started from a little lower, but now the unemployment rate of urban population is higher than that of rural population.

Nowadays, studying should not be finished with completed formal education. Although completed education should guarantee prime and possible successful managing on the labour market, further education or re-qualification is very important. Lifelong learning puts great demands on learning systems and learning environments. Due to the lack of official system in lifelong learning it is possible to characterise its level only on the basis of a few statistical indicators. E.g. Labour Force survey (Statistical, 2003d) gives the rate of participation in training courses during the last four weeks, Adult Education survey (Statistical Office, http://www.stat.ee) shows the share of participants in continuing vocational training (CVT) of total number of employees in enterprises providing CVT (27.6% in 1999) (Table G7 in Annex).

On the basis of Labour Force survey, the rate of participation in training courses has decreased over the last three years. In 2000, 3.5% of people aged 15-74 participated in training courses, in 2001 – 2.7% and in 2002 - only 1.9%. 81% of the participants in training courses were employed. The main types of courses were on-the-job courses and conferences and seminars at work. Training courses for unemployed persons accounted only for a small share of courses. During the last three years, the share of prolonged courses has also decreased. In 1999 and 2000, the share of courses with duration of less than one week was

37%, in 2002 it was 46%. The average duration of a course was 13 hours per week. Employers paid for 63% of all courses, but 48% of on-the-job training courses.

For the society the non-correspondence between the structure of labour force and available jobs means wasting of resources. When the development of educational system and labour market is not in accordance, when the number of professionals with higher education exceeds the number of available jobs, it is the main cause of brain drain, which means a serious waste of resources (Statistical, 2003d). The increasing level of education in the labour force has triggered a downward substitution process, which has led to a lower occupational position among those beginning their career. This pertains to graduates from all educational levels.

The authors think that the mismatch between the supply of education and labour market demand has been until recently caused by the fact that the essentially inflexible educational system has not adjusted to the rapidly changing labour market demand. Despite the vocational education reform measures, the rearrangement of professional education has not yielded desired results to a sufficient extent. The generally high level of formal education has not provided everybody with employment, because the developing industry with a changed structure needs highly qualified professional skilled workers rather than workers with a good general education. By creating a retraining system on the basis of a rather high formal education it would be possible to effectively upgrade the level of knowledge and skills of the labour force.

Conclusions

During the years of independence, there have been substantial changes in the system of education. Both the content of training and the system of educational institutions as well as the organisation of education have changed. The development of the educational system is continuously influenced by the declining birth rate in the 1990s, which has a direct impact on school network and teacher training. During the last eight years, the number of students has been growing at all levels of education but most significantly in higher education.

An important tendency in Estonia's educational sector over the last decade has been that an increasingly higher share of graduates from basic education continues education in general secondary education and fewer graduates go to vocational education. This is due to the traditionally very low reputation of vocational education in the society. Young people prefer general education to vocational education and training because the occupations taught in the vocational education and at training schools are not attractive. This is one of the reasons why Estonia suffers simultaneously from unemployment and shortage of qualified labour. The educational system does not provide people with training essential for working life.

The main goals to realise educational objectives of e-Estonia have been mostly achieved by today in the framework of the National Tiger Leap Program for computerisation of Estonian schools. The number of ICT students in secondary and tertiary education has grown fast since 1995 in Estonia (4.4 times to 2001). The growth of the number of graduates can be expected in the years coming as admittance to ICT diploma, Bachelor and Master courses in computer sciences rose significantly during 1995-2001. The share of ICT graduates from higher education has been unproportionately low so far compared with the students, although demand for ICT specialists with tertiary education has been increasing and secondary vocational education graduates has been falling. A reason for that is that there are good opportunities for ICT students to work already during studies and prolongation of studies,

often discontinuing of studies. Such a situation diminishes the efficiency of the educational system and at the same time, limits the development outlooks of the ICT sector that needs highly educated specialists who upgrade themselves constantly. The large number of ICT graduates with secondary vocational education and the low number of ICT specialists, programmers and engineers is a danger for further development of ICT sector and for the whole economy.

The labour force is characterised by a relatively high level of formal education. The rapidly developing industry with a changed structure needs highly qualified professional skilled workers rather than workers with a good general education. The rearrangement of their preparation to satisfy the rapidly changing needs of the labour market has not been resultative enough despite the vocational education reform measures and there is mismatch between the knowledge and skills developed in the educational system and the labour market needs, also in ICT sector.

G.5. A SWOT analysis

Strengths	**Weaknesses**
High formal educational level of population Providing all schools with computers and Internet Training of students and teachers in computer skills	Weak vocational education system Young people prefer general education to vocational education Simultaneous unemployment and shortage of qualified labour More ICT graduates with vocational secondary than higher education Mismatch between knowledge and skills and labour market demand
Opportunities	**Threats**
International recognition of professions and qualifications Increase in the number of ICT students and graduates eLearning opportunity to continue education Increasing share in education in the age group 15-24	More people with higher education simultaneously with an increase in the number of those who did not complete even basic education Brain drain

The factors considered by the authors as most relevant to the IS development of the country are underlined in the above SWOT.

The high formal educational level but low popularity of vocational education and technical specialities at the educational institutions in Estonia is unfavourable for technical and industrial development. As a result, there is a shortage of highly qualified skilled workers. This is one of the main reasons why Estonia suffers simultaneously from unemployment and shortage of qualified labour.

There has been more ICT graduates with vocational secondary than with higher education despite the increase in enrolment in tertiary education in the last decade. The shortage of highly qualified ICT specialists and mainly the availability of secondary level ICT specialists are the limits to further development of the ICT sector. The Estonian National Development Plan for 2003-2006 envisages to invest increasingly more in education, advanced training, science and technology.

H. DEMOGRAPHIC DATA

H.1. General characteristics and trends

The fastest population change characterised Estonia in the period 1970 – 1990 when the cumulative growth of the population was 17%. The urban population increased even faster – 30%. This was primarily due to forcible immigration into Estonia accompanied by both direct and indirect influence on the population growth.

In 1990, Estonia's mean annual population was 1,569,174. The re-establishment of independence caused a turn in the main trends of migration flows, and since then, the external migration balance has been negative. The annual average population of Estonia decreased by 210 530 inhabitants in 1990–2002 (or by 13.4%) (Table H1). The population decrease resulted from two factors: 1) negative balance of external migration; 2) negative natural increase of the population.

Table H1.: Mean annual population (persons) and age distribution (% of total population by age group)

	1990	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**
Mean annual population	1569174	1462514	1436634	1415594	1399535	1386156	1375654	1369515	1364101	1358644
Age distribution										
Until 14	22.25	21.06	20.69	20.25	19.75	19.19	18.58	18.00	17.46	16.89
15-24	13.73	13.78	13.79	13.83	13.90	14.08	14.31	14.53	14.74	14.98
25-59	46.82	46.41	46.44	46.46	46.44	46.40	46.36	46.36	46.36	46.45
60+	17.20	18.75	19.08	19.46	19.91	20.34	20.75	21.11	21.44	21.68
Population dynamics	-2.61	-2.16	-1.80	-1.49	-1.15	-0.97	-0.76	-0.45	-0.40	-0.40

Source: Statistical Office of Estonia

The population of Estonia is ageing. The median age increased from 34.1 in 1989 to 37.9 in 2000, while the share of those aged 60 or more increased from 16.9 to 20.3 over the same period.

Population projections indicate that if the current demographic trends continue (Table H2), the total population will be declining and ageing quite rapidly - the share of 60+ age group from the current 20% up to 25% by 2020.

Fertility in Estonia declined rapidly over the first period of transition, when the annual decrease of live births was 7-16%. The number of births declined steadily from the all time highest of 25 056 in 1987 to 12 228 in 1998. However, in the second half of the 1990s, the decline in fertility slow slightly again to 12 629 children.

Table H2: Demographic profile, medium variant, 2000-2020

Indicator	2000	2005	2010	2015	2020
Population (thousands)	1 367	1 294	1 226	1 159	1 089
Male population (thousands)	630	594	561	530	498
Female population (thousands)	737	700	664	629	592
Population sex ratio (males per 100 females)	85.5	84.9	84.5	84.3	84.1
Percentage aged 0-4 (%)	4.4	4.4	4.7	4.8	4.6
Percentage aged 5-14 (%)	13.6	10.4	9.1	9.4	9.9
Percentage aged 15-24 (%)	14.5	15.8	14.2	10.6	9.2
Percentage aged 60 or over (%)	21.2	21.9	23	24.7	26.5
Percentage aged 65 or over (%)	15.1	16.7	17.2	18.2	19.7
Percentage aged 80 or over (%)	2.6	3.2	4.2	4.7	5.4
Percentage of women aged 15-49 (%)	46.4	47.3	46.1	44	42.6
Median age (years)	37.9	39.1	40	41.1	42.4
Population density (per sq. km)	30	29	27	26	24

Source: United Nations Population Division, The 2002 Revision Population Database[149],

The crude birth rate per 1000 inhabitants, which was about 16 in 1988, had decreased to 8.9 by 1998. In the next 3 years this parameter increased and was 9.3 in 2001.

In spite of some positive signs in recent years, the total fertility rate remains considerably below the replacement level. Since the number of deaths has exceeded the number of births, the natural increase has been negative. However, the situation has improved over the last 5 years (net population increase per 1000 inhabitants –4.3 in 2001).

The average life expectancy at birth declined in the first half of the 1990s, reaching the lowest level in 1994, when it was 61.1 years for men and 73.1 for women. Since then, the average life expectancy has been increasing, reaching 64.7 years for men and 76.2 years for women in 2001. EU average life expectancy is much higher - 74.5 and 80.8, respectively (Eurostat, 2002).

The net external migration has been negative since 1990 when emigration has considerably exceeded immigration. A large proportion of non-Estonian population moved mostly to Russia and other parts of the former Soviet Union immediately after Estonia regained independence. The net migration in 1990 – 1999 was 85 389 people (by 6.3%). The biggest net migration was 33 827 people in 1992.

Critical among demographic problems are those involving the need to reorganise the so far effective arrangements of the society. Ageing of the population continues and requires changes in social policy (Table H2). Both demand for social services and the structure of services are changing.

Decrease of labour force and demographic ageing poses standard problems for the Estonian social protection system and the impact can already be seen.

The declining birth rates have reduced the financial burden on the scheme of family benefits. However, in spite of the decline in the birth rate, the number of women on parental leave has remained rather stable, indicating that many women either preferred to stay at home with a

[149] http://esa.un.org/unpp/p2k0data.asp

child as long as possible or are forced to do so because of difficulties to return to the labour market.

Demographic factors, like increasing life expectancy, combined with labour market developments have posed challenges for the pension and health insurance systems. Over the last decade, the labour market factors have been more important, causing a rapid decline in the number of contributors.

To comply with the continuing squeeze in labour supply, changes and policies of more efficient use of scarce resources are badly needed. ICT development may offer some prospects for the future, notwithstanding the fact that actual changes in employment have been rather small up till now.

Conclusions

The Estonian population decrease is resulted from two factors: 1) negative balance of external migration; 2) negative natural increase of the population.

The population of Estonia is ageing and population projections indicate that if the current demographic trends continue, the total population will be declining and ageing quite rapidly.

Demographic factors, like increasing life expectancy combined with labour market developments have posed challenges for the pension and health insurance systems. Over the last decade, the labour market factors have been more important, causing a rapid decline in the number of contributors.

H.2. A SWOT analysis

Strengths Birth rate decline has stopped	**Weaknesses** Decrease of the population Ageing on the population Decrease of those employed in the labour market Pressure on social insurance system
Opportunities Free movement of labour	**Threats** Inability of social insurance systems to fulfil its tasks

The factors considered by the authors as most relevant to the IS development of the country are underlined in the above SWOT.

ICT development may offer some prospects for the future, notwithstanding the fact that actual changes in employment have been rather small up till now.

I. SOCIOLOGICAL DATA, INCLUDING EMPLOYMENT AND CONSUMPTION PATTERNS

I.1. Changes in employment structures

Along with the population decline the number of employed declined continuously during 1990-2000. For the first time since Estonia regained its independence the employment increased (by 5 000 persons) in 2001 and growth continued also in 2002. There are significant differences in the employment rate of the population aged 15-74 by sex, place of residence, ethnic nationality, age group and sector of economy in Estonia. The proportion of the primary sector in total employment decreased during last ten years and 7% of employed persons worked in this sector in 2002 (18% in 1992) (Labour, 2003). The share of the secondary sector has been about one-third since 1993 and the share of the tertiary sector increased to 62% in 2002.

As a result of changes in the economic environment the employment structure by economic activities in 2002 differed considerably of that in 1993. The share of total employment increased most in wholesale and retail trade (by 3.8 percentage points), real estate, renting and business activities (by 3.5 percentage points), and decreased in agriculture, hunting and forestry (by 4.2 percentage points) in the period 1993-2002 (Table I1). Mainly due to the big differences in employment rates by socio-demographic and economic characteristics the economic situation of different population groups varies broadly.

Table I1.: Structure of employment, % (employed persons[150] by economic activity, annual average)

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Economic activities total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Agriculture, hunting and forestry	10.8	9.1	7.0	6.5	5.9	5.9	5.7	5.0	4.4	6.6
Fishing	2.3	2.0	0.9	0.7	1.1	0.7	0.4	0.4	0.3	0.3
Mining and quarrying	1.8	1.8	1.6	1.5	1.3	1.4	1.5	1.4	1.1	1.0
Manufacturing	23.1	22.3	25.9	24.9	23.2	22.9	22.5	24.1	24.8	21.9
Electricity, gas and water supply	2.8	3.1	2.6	2.7	2.9	3.1	3.1	2.8	2.2	1.8
Construction	7.7	7.4	5.5	5.7	7.5	7.3	6.7	6.9	6.6	6.6
Wholesale and retail trade	10.9	12.1	12.1	12.8	13.1	13.3	13.4	12.7	13.8	14.7
Hotels and restaurants	2.5	2.8	2.7	2.7	2.3	2.3	2.2	3.6	3.0	3.1
Transport, storage and communication	8.9	9.0	10.4	10.4	9.6	9.5	10.4	10.1	9.6	9.3
Financial intermediation	1.0	1.3	1.2	1.1	1.2	1.5	1.6	1.5	1.3	1.4
Real estate, renting and business activities	4.1	4.4	4.8	4.9	5.4	5.9	6.0	6.5	6.2	7.6
Public administration and defence;	5.4	5.7	5.8	5.8	5.7	6.3	6.6	6.6	6.5	5.7
Education	7.6	7.6	9.1	9.4	9.8	9.5	9.4	8.5	9.5	9.5
Health and social work	7.3	7.4	5.9	6.0	6.1	5.9	5.7	5.3	5.7	5.4
Other	3.9	4.0	4.7	4.9	5.0	4.6	4.9	4.7	5.0	5.1

Source: Labour Force, 2003

[150] 1989-1996 persons aged 15-69; 1997-2002 persons aged 15-74

The average annual unemployment rate peaked in 2000 (13.6% of persons aged 15-74) and declined to 10.3 % in 2002. Thus, the negative impact of ICT sector developments in recent years (many ICT sector enterprises reduced the number of employees in 2001-2002) was partly compensated by the increase of employment in other activities (especially in retail trade) and the situation on the labour market improved.

Implications of the IST on employment in general and on various forms of employment are still quite moderate. A strategy for teleworking is presently being developed. Teleworking is gaining more popularity in Estonia. Telework[151] was done by 8% of the working population in Estonia in 2002 (Antila, 2003). Preconditions for fruitful telework in Estonia can be characterised from legal, technological and psychological aspects. The preconditions for telework are created by the development of telecommunication infrastructure and services. Wide penetration of Internet banking and mobile phones, the state's activities through legislation and its enforcement encourage implementation of new ways to work in society.

Key legislative measures include *Digital Signatures Act, ID-card program, liberalisation* of Estonian telecommunication market. Technological preconditions include the implementation of *EEBone-program (*www.aso.ee/eebone) for connecting all 15 Estonian county capitals to other Estonian networks and to Internet with the aim of resolving data connection problems and supporting of regional development. *Estonian Educational and Research Network (EENet)* (www.eenet.ee/EENet), *the county data communication target program Village Road* (www.kylatee.ee), *Tiger Leap Program* for computerisation of Estonian schools, *Tiger Leap Plus program for* general education and teachers, *Look at World* initiative are also included to support technological development.

Centre of Strategic Competence **(CSC,** http://sylvia.ce.ut.ee/evaluation/) was established at the University of Tartu in 1997. The task of CSC is to concentrate research and development activities and resources in key technological areas, including telework. CSC tests implementations of Computer Supported Collaborative work and Computer Supported Collaborative Learning environments such as Basic Support of Co-operative Work (BSCW) in last years were based on the work of enthusiasts. It seems that now users' enthusiasm is calming down. Objective difficulties are: insufficient computer skills, habit to use different communication channels, etc. Telework seems to be suitable for motivated academic dispersed groups, also for project work. BSCW user interface is available also in Estonian language.

Virtual Private Networking implementations essentially mean "public lines, private data". Public communication lines and channels, such as the Internet, are used for communication. This greatly reduces communication costs, as compared to using separate physical communication channels. The confidentiality, authenticity and integrity of exchanged private data are ensured using secure cryptography algorithms. Privador Ltd.[152] is a leading company in Virtual Private Networking market in Estonia.

[151] There are a number of examples of e-work, e-learning (e.g. Trainator Ltd – http://edukas.ee/index) and e-services in Estonia. Both private and public sector initiatives are encouraging. For example[151]: in 2002, *Ariko Marketing* carried out a survey "Impact of information and communication technology and telework use on employment" (Ministry of Social Affairs, http://www.sm.ee). According to the survey, 3.5% of the adult population is doing telework in Estonia.

[152] http://www.privador.com/

Some examples:

- Ministry of Foreign Affairs of the Republic of Estonia: reaching from Tallinn to Tokyo and to New York and growing to cover all the embassies and foreign missions of the Republic of Estonia,
- Ministry of Justice of the Republic of Estonia: consisting of over 50 law enforcement agencies, including courts and prisons,
- Tax Board of the Republic of Estonia: nation-wide system with 15 CryptoWalls in Tax Board headquarters and regional offices.

VPN solutions are used also in Estonian Police, Border Guard, Customs, Citizenship and Migration Board.

Home and mobile offices

A lot of home and mobile offices are introduced by several private companies. *Äripäev-Date*l home office experiment is worth mentioning. *Äripäev* is Estonia's largest business newspaper and Datel one of the largest IT companies. Helmes LTd. mobile office, BCS, KPNQwest, Abobase, Privador are examples among others, several architect bureaus have announced telework. Estonian Telephone Company with co-operation of Privador Ltd. is currently offering secure teleworking solutions and environments for companies, enabling new possibilities for establishing home and mobile offices.

Despite the success it is needful to mention that it is not the question of buying technologies but implementing new technologies at organisational level. It is not so easy to switch on telework. Current organisation of work/learning is not suitable for Web-learning/teaching, new technologies demand time and new methodology, leaders and administrations have not realised that yet, and that is why the content is not developed sufficiently. For example, there are a lot of ideas and virtual office products on the market, but all technologies available need much tailoring to meet actual business needs of enterprises. Additional necessary investments should be made. Internet and Web are like ordinary infrastructure systems, they need investments at corporate level, technical maintenance, security measures implementation. Intellectual capital and professional staff is the key factor in further development.

I.2. Income distribution

The main social problem is the relatively high stratification of the population. Gini coefficients measuring the inequality of income distribution are relatively high (income distribution is considered unequal if the Gini coefficient is between 0.5 – 0.7 and relatively equal if it is between 0.2 – 0.35). According to the World Bank data (2002) these differed from the level of most of the European Post-Communist countries in 1993-1998 in the extent within the limits of the statistical error. In Estonia, the Gini coefficient gained its minimal value (0.34) in 1997 (WIID, 2002) and since 2000 has stayed at the level of 0.36 (Statistical Office of Estonia). On basis of expenditure distribution it can also be concluded that stratification of the population has not increased in last years (Table I3).

Table I2.: Changes in income distribution (Gini coefficients by expenditures, by year and equivalence scales)

	1996	1997	1998	1999	2000	2001	2002
Scale 1,0:1,0:1,0	0.34	0.37	0.38	0.38	0.37	0.37	0.37
Estonian scale 1,0:0,8:0,8	0.34	0.36	0.37	0.37	0.36	0.37	0.36
OECD scale 1,0:0,7:0,5	0.33	0.36	0.37	0.37	0.36	0.36	0.36
OECD modified scale 1,0:0,5:0,3[153]	0.33	0.36	0.37	0.37	0.36	0.36	0.36

Source: Statistical Office of Estonia, 2003

The ratio of decile X to decile I was 12.9 in 1996 and decreased to 11.0 in 2001 (Table I3). The ratio of quintile V to I quintile exceeds the EU average of 4.6 (The Social, 2003). The wide discrepancy between the average income of the bottom and top decile or quintile can be explained by differences in the demographic and socio-economic character of households which make up these deciles (Wilder *et al*, 1999).

Table I3.: Changes in income distribution, EUR

Income deciles	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**
I	22	32	38	39	32	39	42
II	46	55	63	66	65	71	76
III	58	66	74	82	84	89	97
IV	67	74	83	94	96	100	110
V	75	81	92	104	106	111	121
VI	85	91	104	116	120	126	136
VII	100	105	123	133	142	148	159
VIII	120	126	149	159	175	183	196
IX	153	162	189	207	228	244	262
X	278	305	348	374	433	429	466
Average	94	104	120	128	140	146	160
Difference between incomes of lowest and highest income quintiles, times	5.5	5.6	5.4	5.5	6.7	6.1	6.0

Source: Statistical Office of Estonia, Social Sector in Figures, 2002, 2003.

The average nominal monetary disposable income per household member was in 1999 6.6 times higher in 1992. However, in real terms the income had increased only 1.2 times (Viies *et al*, 2001). In the period of 1999-2002 income increased in real terms by 7.3% according to the Statistical Office. Throughout the period of 1992-2002, the two main sources of disposable income (160 EUR per household member in a month in 2002) were the income from wage labour (approximately 60%) and transfers – pensions, benefits, etc. (approximately 30%).

A serious social problem that arose after radical political and economic reforms at the beginning of independence (1992-1993) in Estonia is the development of the so-called generation of winners and losers, the latter is caused mainly by unemployment, which also caused poverty. The issue of poverty was raised to the public policy debate in Estonia only in 1995, following the publication of the results of social changes in the Baltic States (Economic, 1995). Until 1995, the problem of poverty was not directly addressed. It was broadly considered that in a society where the level of resources in general is low, it would be

[153] Scale which is used in most EU countries

inappropriate to speak about poverty as a specific problem for some groups since the problem of low incomes affects the majority of the population. In 1999, experts from the University of Tartu, the Ministry of Social Affairs and UN Development Programme jointly formulated the bases for a national strategy for poverty eradication (UNDP, 1999). According to this poverty study, the following types of households were most affected by poverty:

- households with an unemployed member;
- families with 3 or more children;
- single-parent households.

The number of those who live in poverty or on the edge of poverty is still relatively high. In 2002, 17% (more than 230 000 persons) of the Estonian population lived with income below the poverty line, it means with monthly income less than 110 EUR per household member (60% of the national median income as a poverty line criteria) (Statistical, 2003). In the 15 member states of the EU, the average share of population living below the poverty line income was 17% in 1996.

The indicators of men and women living with income below the poverty line were stable in 1996-2001 and behaved similarly to the population average indicator. During the period under study, the share of men living below the poverty line has been one percentage point higher than the share of women - 18% of men and 17% of women were living below the poverty line income in 2001. In the EU, the share of men (16%) living below the poverty line income was lower than the share of women (18%) in 1996.

Children have the highest risk of poverty in Estonia. Every fourth child lives below the poverty line (in EU every fifth child). Poverty of children is more dangerous than the poverty of elderly people. Due to poverty the development of child's potentials is inhibited and child's competitive ability will be lower in the future – he/she will find it harder to get a job and earn a decent living. Therefore, the poverty of children threatens the quality of the whole society not only now but also in the future.

Social stratification may also cause educational stratification and may lead to digital divide. Households in lower income deciles can hardly afford spending on home computers or ADSL connections. Thus, the children in these families are in a less favourable position in the period of entering into information society. The existing differences in social preconditions are to be smoothed by better access to computers and Internet at schools, public libraries, supermarkets and Internet cafes. This is of great help especially to children who have no computer at home.

I.3. Consumption patterns

Compared to the beginning of the transitional period, the growth rate of expenditure (monetary expenditure on food, housing, clothing and footwear) slowed down, first of all due to inflation. In recent years, the consumption structure showed some stabilisation (Table I4). In the early 1990s, the proportion of housing expenditure increased, and the proportion of expenditure on food decreased in the structure of expenditure (Viies *et al*, 2001). Since 1997, food has steadily accounted for slightly more than 30%, housing for 20%, and clothes and footwear for 8% of the monetary expenditure of a household member. A positive development in the consumption structure – a fall in the share of compulsory expenditure (food and housing) from 60% in 1996 to 45% in 2002 can be noticed. So have increased possibilities of people to spend a larger proportion of the expenditure on items of their own

choice. But the average level of consumption expenditure is low (155 EUR per household member in a month in 2002) because it is limited by the relatively low level of income.

Table I4.: Consumption pattern (expenditure per household member in a year), EUR[154]

	1996	1997	1998	1999	2000	2001	2002
Expenditure total	1139.1	1272.7	1430.1	1468.7	1713.7	1779.8	1890.5
Food and non-alcoholic beverages	469.0	470.5	485.2	484.4	549.4	564.1	577.1
..bought food and non-alcoholic beverages	371.5	380.1	395.5	404.3	459.3	474.8	490.5
..self-produced or received free of charge	97.5	90.4	89.7	80.1	90.1	89.3	86.5
food and non-alcoholic beverages							
Alcoholic beverages	21.8	24.4	27.1	28.7	36.7	34.3	39.6
Tobacco	16.3	17.5	19.5	23.4	28.6	27.9	30.3
Clothing and footwear	78.0	90.4	106.1	104.9	115.9	112.7	116.4
Housing	202.6	238.7	259.3	259.6	262.2	265.4	297.7
Household equipment and operation	53.3	67.6	73.0	78.0	91.8	99.4	115.6
Health	15.6	18.3	22.4	29.7	44.5	44.5	50.1
Transport	70.4	78.6	92.5	90.8	140.9	151.1	144.1
Communication services	18.6	26.2	38.8	51.9	75.1	85.8	103.5
Recreation, leisure and entertainment	59.0	75.0	103.9	107.6	108.6	119.3	126.6
..newspapers, magazines and books	11.2	13.5	16.1	15.8	16.6	16.2	16.0
Education	14.4	18.1	16.4	14.6	22.4	28.9	35.0
Hotels, cafés, restaurants	35.0	36.2	49.0	44.2	65.1	61.9	64.4
..eating out	34.7	35.9	48.4	43.3	63.1	60.5	63.8
Miscellaneous goods and services	54.1	65.6	77.9	82.3	104.0	110.2	115.3
Non-monetary consumption	6.3	19.6	33.5	40.6	34.6	44.5	39.4
Consumption expenditure	1114.4	1246.6	1404.7	1440.6	1680.0	1749.9	1854.8
Other expenditure	24.7	26.1	25.4	28.1	33.7	29.9	35.7

Source: Household Income and Expenditure Survey, 2002

Household's consumption behaviour is influenced considerably by the socio-economic and demographic characteristics of the household. According to the Household Income and Expenditure Survey of the Statistical Office, expenditures in households with a male head of household are larger than in households with a female head; in urban households larger than in rural households; in entrepreneurs' households larger than in salaried workers' households, and considerably larger than in farmers' households of retired persons.

Conclusions

The main social problem is the relatively high income-based stratification of the population. Social stratification may also cause educational stratification and may lead to digital divide. Households in lower income deciles can hardly afford spending on home computers or ADSL connections. Thus, the children in these families are in a less favourable position in the period of entering into information society. The existing differences in social preconditions are to be smoothed by better access to computers and Internet in schools, public libraries, supermarkets and Internet cafes.

Implications of the IST on employment in general and on various forms of employment are still quite moderate. A strategy for teleworking is presently being developed. Teleworking is

[154] In calculations, revised population numbers for the years between 1989 and 2000 population censuses have been used

gaining more popularity in Estonia. Preconditions for fruitful telework in Estonia are characterised from legal, technological and psychological aspects. The preconditions for telework are created by development of telecommunication infrastructure and services. Wide penetration of Internet banking and mobile phones, the state's activities through legislation and its enforcement encourage implementation of new ways to work in society.

I.4. A SWOT analysis

Strengths Improved consumption pattern in general People can spend more to IT Interest of population for IT use	**Weaknesses** Large number of children living in households with low income, who have no access to Internet
Opportunities Public access to possibilities to Internet have enlarged More training opportunities for population Reduction of the price of using Internet	**Threats** Increase in digital divide Income-based stratification of population

The factors considered by the authors as most relevant to the IS development of the country are underlined in the above SWOT.

The income-based stratification of the population and risk of poverty can cause increase in digital divide and become an obstacle to development of IS society.

DIAGNOSIS OF FACTORS AND IMPACTS IN THE INFORMATION SOCIETY IN ESTONIA

The stable macro-economic framework and market economy reforms have developed a favourable economic environment in Estonia, providing for a considerable progress made in the process of convergence towards the EU countries.

Since 1994, Estonia has enjoyed rather high economic growth rates that in recent years have exceeded those of EU15 and the Eurozone. Nevertheless, if compared by GDP per capita at PPS, the Estonian level is only 40.3% of the EU average and also below many accession countries.

The liberal and competitive economic environment had a remarkable impact on Estonia's economic growth. Economic freedom indices show that Estonia indeed offered a good business environment to local and foreign investors. As Estonia's domestic saving rate is far too low for funding necessary investments, the inflow of foreign capital has remarkably contributed to investments. Swedish and Finnish capital prevails in the cumulative stock of foreign direct investments in Estonia. Foreign capital flows from highly IST ready Sweden and Finland mainly supported technology transfer, improved management culture and promoted IST penetration in Estonia. Swedish and Finnish capital in the Estonian economy has obviously implications on IST development. Partly or fully Swedish or Finnish owned enterprises are the main IST sector enterprises in Estonia. Domestic enterprises kept in line with foreign owned ones and some even run ahead.

An increasing convergence of the structure of Estonian economy towards the industrial countries could be noticed in the 1990s. The most common characteristic of the structural changes has been the decreasing importance of agriculture and post-Soviet industries, while rapid development has taken place in the number of new industries and in the services sector. The share of the primary sector in GDP dropped to 5.4% in 2002 and the total number of people employed in the primary sector decreased more than threefold in 1991-2002. The share of services sector in GDP has grown fast and was 68.6% in 2002.

Industry provided approximately one-fourth of Estonia's total value added in 2002. The processing industry makes up a large share of the traditional branches of the economy and is heavily dependent on external developments. The most important branches are food, timber, machinery, equipment and light industry. Industry relies upon exports and there is a high share of exports through subcontracting for contemporary machinery and equipment, mostly managed by subsidiaries of large Nordic corporations. So far, the main problem has been the low value added content of Estonian exports.

To realise the industrial development potential, the focus should be on development and establishment of technology-consuming enterprises with a good potential for growth. It is important to switch from sub-contracting for foreign companies to development of original products and to specialise in production of single products with a high potential, because Estonian industry is too small to manufacture products extending to whole branch. The potential of food processing industry is based on availability of domestic raw materials. Wood processing industry should advance the technological processes to manufacture complicated products with a higher processing level, as this is important for changing from raw material export to more profitable export of processed wooden products. Manufacture of apparatus has the best prospects as Estonia can make use of a great number of researchers, engineers and

well-educated labour force in Estonia. A further potential is seen in the birth and growth of completely new industries, such as microbiology, pharmacy and ICT. The objective would be to turn from a country with a low technological level and cheap labour into a country with a high technological potential and qualified labour.

While the production growth of Estonian industry has been fastest among the candidate countries, the productivity of labour is rather low. According to the labour productivity indicator of Estonian industry, Estonia belongs to the lowest group of EU and candidate countries. The labour productivity is low mostly because of insufficient product development, limited search for innovative solutions and a large number of employees with qualification not matching the changed labour market demand, and also because most of the industrial output is produced in labour-intensive sectors of industry. Specific factor contributing to the low productivity in Estonia is production of electrical energy from oil shale (91% of the electricity in 2001). In order to increase the efficiency of electricity production from oil shale, reconstruction of the whole sector has been launched, during which process the hazardous waste emissions into the environment will be reduced to the minimum and the labour productivity will grow. In reference to the opening of the electricity market, an open market gives an opportunity to Estonia to participate as a partner in the Baltic and Nordic electricity markets and to control (or influence) electricity prices in the market.

Until 2000, the tendency of decreasing employment, increasing unemployment and inactivity was dominating. In 2001, the trend of employment and unemployment changed – the employment rate started to rise (the share of employed people in the population aged 15-64 increased to 61.7% in 2002) and unemployment to fall (the unemployment rate declined to 10.3% in 2002). The share of industry in employment accounted for more than one-fourth in 2002. The share of employment in services sector of total employment increased to 61.7% in 2002. The formal educational level of the labour force is relatively high. The proportion of educational level of the population aged 15-74 has been stable: about one-quarter have lower than upper secondary, half have upper secondary and the remaining quarter has tertiary education.

The relatively low-cost labour resources have been one of the attractive features of Estonia (the average wage level in Estonian industry is 26% of the average in EU). At the same time, the real wages have risen much quicker than the overall productivity of the Estonian economy. Although Estonia will still enjoy some cheap labour related competitive advantages in the short term, this may lead to the loss of this competition advantage. There are already cases of re-location of high tech manufacturing from Estonia to cheaper labour cost areas, e.g. to Russia. The increasing labour costs as a result of the rapid rise of wages probably cause a decline in subcontracting in Estonia and ultimately, also a decline in ICT sector exports, because subcontracting contributes a high share in this sector. Therefore, in the medium and long term, the Estonian industry will be probably locked in the activities of low technological and low income level if the current trend of specialisation continues.

In a changed economic situation, services have become critical for the survival of a business. In Estonian trade, marketing, juridical services, real estate and business services, transportation and communications, financial intermediation and insurance have become increasingly more important, providing network-like connections between producers as well as between producers and consumers. In sales of services, business services (advertising services, architecture and technical engineering consultations, security and guard services) have had the highest share (about 75%). The share of computer services of sales of services

has risen and the structure of computer services changed significantly – the share of creation of databases declined from 47.3% to 12.2%, but the increase in the share of other computer services (maintenance and repair of office equipment and computers and others) was notable (from 32.4% to 73.7). Tourism has turned one of the more important branches of the economy. Assessing direct indicators, the share of foreign tourism in GDP comes to 8% (7% of employed) and the indicator may even total 15% if we consider the indirect impacts.

There are regional differences in economic development within Estonia that could hinder IST development to some extent despite the small territory of the country and the relatively high share of urban population. Regional differences in GDP per capita levels in Estonia are to a large extent caused by differences in economic structures. Large regional differences in the level of employment and unemployment may be inherited from the past or/and introduced during economic restructuring after the beginning of the transition. There is still a relatively higher incidence of unemployment in the former agricultural and industrial regions. However, these have started to diminish gradually, facilitated by accelerating entrepreneurship development in many counties. Due to the greater concentration of population and ICT sector businesses in Tallinn, better ICT services are offered there and some evidences of regional digital divide can be find. Nevertheless, Internet and mobile phone services are quite well accessible in all towns and countryside as well.

Expenditures on research and development activities are very low in Estonia. The research intensity of the Estonian economy during the period of 1995-2001 fluctuated between 0.6% and 0.7% of GDP, which amounts to only about 37% of the average for EU member states. The public sector is the largest investor (78%) in research and development activities. Nevertheless, the public sector expenditures on R&D are still lower than the EU average. The share of IT budget in the state budget during 1995-2001 has been about 1%. Investments in computers increased in 1996–2001 nearly twice faster than general investments in tangible fixed assets. Estonian enterprises' expenditure on R&D amounted to only 0.26% of GDP in 2001. Though R&D development in the sphere of IT is one of the key directions of increasing the competitiveness of Estonian economy, the public sector allocated for IT R&D activity only 5% of the public sector allocations for R&D in 2000.

The development of the Estonian ICT sector has been gradual throughout the last decade, from low value added computer assembling activity to higher value added software production and telecom services. According to the European Information Technology Observatory (EITO), the estimated market for ICT products and services in 2003 was 857 MEUR (increase 17.2% compared with 2000) and increase for 2004 of 7.2%. Based on EITO estimates, the value of the Estonian telecommunication market was 604 MEUR in 2003 (510 MEUR in 2001 and the share of telecommunication market value 8.2% of GDP). The telecommunication market value is predicted to grow 7.6% in 2004. The share of telecommunications in ICT market has been about 70%. Although further developments in the ICT sector are very much dependent on how dynamic the growth in computer services and software is, the share of software and services in total ICT market has been relatively low - about 12% over the last years.

Until the year 2000, the growth of ICT market was relatively fast with the annual average of approximately 20% and higher. However, in 2001 the growth rate declined to 0.1% coping with the global ICT downturn, but in 2002 rose again to 10%. The software products growth rate dropped from 15.0% in 2001 to 7.7% in 2003, and that of IT services even more. The telecom market decline stopped in 2002 (increased compared with 2001 9.9%) and being the

engine of the ICT sector growth, is experiencing now a gradual stabilisation and even saturation in some domains (e.g. Internet subscribers).

The ICT market is shared between a few large corporations, which consolidate a substantial economic power and account for a dominant part of the entire Estonian ICT sector. In 2001, ICT sector comprised eight large enterprises (generated 85% of total turnover) and many small (250 with staff 1-5 persons) IT enterprises with lower market relevance, which specialised either in subcontracting, sold hardware and software or developed niche products. A majority of ICT sector enterprises are located in larger cities, particularly in Tallinn where about 70% of the enterprises are concentrated.

More than half of the enterprises in the sector are service providers or mediators. Several enterprises are engaged in multiple activities, like manufacturing (producing) and sales. Selling of different products generates about one-third of the turnover. The next by the volume of turnover (17%) is manufacturing, production of computers/components accounting for almost 50%, the rest is production of various electronic and telephone devices and microchips. Product development is relatively underdeveloped in the ICT sector, in many companies (85%) it is lacking. Due to the currently low science intensity, the ICT sector is not capable of creating a productivity growth, neither inside the sector nor in other sectors of the economy.

The driver segments in ICT sector are telecommunication services, telecom equipment production and computer services. Telecom spans both IT hardware and software and services, produces a substantial output in terms of ICT. Computer services are a generic heading for a number of sub-activities that all embrace primarily immaterial aspects of adding value, i.e. maintenance, integration etc. This is also the reason why this sector is overwhelmingly interconnected with the rest of business activities. The performance in ICT cluster (comprises IT hardware production that incorporates also electronics sector, IT software production and services, also some fields of manufacturing, banking, wholesale and retail and governmental structures as final users) is based to a large extent on the development of telecom, as telecom provides substantial input to computer services and equipment production. An important role in the ICT cluster's development is also associated with governmental structures, which obviously are the target groups for several ICT sector segments such as software production.

The high share of ICT production in total exports outlines the relatively high foreign demand for these products, reaffirming a potentially good starting point for sustained competitive position in the ICT cluster. The largest export partners for ICT goods are Finland and Sweden that can serve as the basis for the Estonian ICT cluster to be part of the larger Scandinavian ICT cluster. The dynamics of ICT imports in special imports of commodities has had a slightly declining trend. The relatively large export and import shares refer to high subcontracting (imported goods are partly used for re-exports) in ICT sector.

As a great majority of Estonia's ICT related exports is produced on the basis of subcontracting the main R&D expenditures are made abroad keeping Estonian R&D expenditures low. Subcontracting also enables to enter the parent company's marketing networks. There is another reason for regional cohesion with the Scandinavian ICT cluster, however at a price of being a somewhat lower value adding performer in the production value chain. Notwithstanding the quite acceptable development until now, some replacement of subcontracting with original Estonian production is badly needed. In order to escape from the

status of a cheap subcontractor, Estonia needs a comprehensive economic policy aimed at increasing technological and organisational efficiency via using new knowledge and technologies. In this sense, the most important factors are transparent innovation policies in strategic development plans and well-targeted education and training policies.

The ICT sector is primarily determined by the quality of local workforce and an advantage of Estonia in ICT implementation has been the presence of qualified ICT experts already in the stage of economic transition. The total number of employed in ICT companies was estimated to be 8793 (1.5% of total employment) in 2002, of which 56.3% were engaged in 10 companies with more than 100 employees. 75% of all people working in the ICT sector have higher education. One of the most serious problems for the ICT sector is that more than half of ICT enterprises had a shortage of R&D specialists for concrete products or technologies, 39% were looking for project managers and sales personnel, and only 10% needed R&D personnel, 20% presumed that the need for new research R&D personnel would rise in a long term.

About 700 new ICT specialists enter the Estonian labour market annually. The need for ICT specialists is estimated to be 600 people per year. Enterprises of the sector need about 400 specialists, the others go to work to companies outside the sector and ca 100 people do not work in their speciality. There is a deficit of specialists in the labour market due to the fact that employers refuse to accept vocational schools as educational establishments producing ICT specialists. Consequently, it is necessary to raise the quality of education of those graduating from vocational schools. In the long-term, the need for specialists may increase. According to the expectations of the enterprises surveyed, the need for software specialists possessing a relevant academic qualification will be the first occupational group to be recruited.

A factor that has been influencing and continues to influence the socio-economic development of Estonia, especially its educational system is the declining birth rate in the 1990s. The decreasing number of students at different levels of education has a direct impact on the schools network and teacher training.

Although the number of students indicated growing trends in the period of 1995-2001 for all levels of education (most significantly for higher education), a worryingly large number of young people leave school before completing even basic education. This can be treated as a sign of broadening educational stratification - while more and more young people continue in higher education, there has also been an increase in the drop-out rates at the upper level of basic education. The situation where, on the one hand, the share of people with high educational level is increasing and on the other hand, the share of those with only basic education is also increasing, is a cause for the increasing inequality in society based on income and other economic and social differences depending on the educational level.

Due to the very low reputation of vocational education in the society, an increasingly higher share of graduates from basic education continue education in general secondary education and less graduates go to vocational education. At the same time, the labour market situation indicates the necessity to obtain vocational education because of the relatively high unemployment among graduates from general secondary schools. Vocational education schools have introduced changes to the programs offered, but these changes are not sufficient to comprehensively respond to changes in the labour market and enhance employability also of vocational education graduates. The shortage of highly qualified skilled workers is the

most important reason of structural unemployment. Though the introduction of the modular system of curricula in the educational system has provided people with different educational level an opportunity to continue studies in any age, there is no stable, uniform principles subordinated state training and retraining system. Considering the rather high level of formal education of Estonian population, the creation of a training and retraining system should quite effectively raise the level of their knowledge and skills and increase competitiveness on the labour market. Despite the vocational education reform measures, rearrangements of vocational education have not yet yielded results that satisfy labour market demand.

Pupils in Estonia acquire very basic computer knowledge already at primary and secondary school. The success of The National Tiger Leap Program for computerisation of Estonian schools was a precondition for continuing the program under the name of Tiger Leap Plus Program to develop further ICT in Estonian schools (in 2001-2005).

The number of ICT related students has increased fast during the period of 1995-2001, but over the last years, the proportion of ICT students in secondary vocational education has decreased and in tertiary education has increased, which is in accordance with the demand for ICT graduates in the labour market. As the admittance to ICT diploma, Bachelor and Master courses in computer sciences has risen significantly, the number of graduates is expected to increase in the next years. But the share of ICT graduates with higher education is low (constituted 16.4% of all ICT graduates). In the academic year 2000/2001, ICT graduates constituted 6.9% of all graduates in Estonia: 10.1% in vocational secondary education and 2.6% in higher and higher professional education. As ICT students in tertiary level have good opportunities to find employment already during studies, therefore graduation is not of primary importance for them. Such a situation diminishes the efficiency of the educational system and is also limiting the development potentials of the ICT sector, which needs qualified and constantly upgrading highly educated specialists. So, the large number of ICT graduates from vocational training and the relatively low number of ICT specialists, programmers and engineers creates a danger of falling into a circle with low-skilled IT labour hired by companies producing low value added products and services with practically no innovation or R&D at all. The initiation of the IT college kind of joint efforts for upgrading qualification of the ICT enterprise personnel is a good example, as well as eLearning, providing opportunities for continued life-long learning.

The annual average population of Estonia decreased by more than 210.5 thousand in 1990–2002. The population decrease resulted from two factors: negative balance of external migration and negative natural increase of the population. Due to the fall in fertility and rise in life expectancy, the population of Estonia is ageing. Population projections indicate that if the current demographic trends continue, the total population will be declining and ageing quite rapidly. Changes in the demographic situation have an indirect impact on ICT-related dynamics.

Demographic factors like the increasing life expectancy combined with labour market developments have posed challenges for the pension and health insurance systems. Over the last decade, the labour market factors have been more important, causing a rapid decline in the number of contributors. To comply with the continuing squeeze in labour supply, changes and policies of more efficient use of scarce resources are badly needed. ICT developments may offer some prospects for the future, notwithstanding the fact that actual changes in employment have been rather small up till now.

The main social problem is the increasingly high stratification of the population. The number of those who live in poverty or on the edge of poverty is still high. In Estonia, the Gini coefficient was stable between 0.37 and 0.38 in 1997–2002. The ratio of decile X and decile I was 9.4 times in 1996 and increased to 11.0 times in 2001. The average nominal disposable income of a household member in 1999 was 6.6 times as high as in 1992 (in real terms, the income had increased only 1.2 times).

In 2001, 17% (more than 230,000 persons) of the Estonian population lived with income below the poverty line. It means with monthly income less than 76 EUR per household member (60% of the national median income as a poverty line criterion). In the 15 member states of the EU, the average share of population living below the poverty line was 17% in 1996. During the period 1996-2001, the share of men living below the poverty line was one percentage point higher than the share of women - 18% of men and 17% of women were living with income below the poverty line in 2001. In the EU, the share of men (16%) living below the poverty line was lower than the share of women (18%) in 1996.

Children have the highest risk of poverty in Estonia. Every fourth child lives below the poverty line (in EU every fifth child). Poverty of children is more dangerous than the poverty of elderly people. Due to poverty the development of child's potentials is inhibited and child's competitive ability will be lower in the future – he/she will find it harder to get a job and earn a decent living. Therefore, the poverty of children threatens the quality of the whole society not only now but also in the future.

In recent years, the consumption structure showed some stabilisation. A positive development in the consumption structure – a fall in the share of compulsory expenditure (food and housing) from 60% in 1996 to 46% in 2001 can be noticed. So have increased possibilities of people to spend a larger proportion of the expenditure on items of their own choice. But the average level of consumption expenditure is low (146 EUR per household member in a month) - it is limited by the low level of income.

Competitiveness of Estonia as a future EU member state can be assessed on the basis of an economic, social and demographic analysis.

Strengths

- Stable macroeconomic framework (the currency board system, the principle of balanced budget, a favourable investment environment),
- The structure of the economy has adjusted to international competition,
- Success in attracting direct foreign investments,
- Good relations with Nordic and other countries in the Baltic Sea Region;
- Production inputs are relatively cheap,
- The relatively high general educational level of the population,
- The number of ICT services available and rather fast development of the telecommunication system,
- Large number of users of such services that create good opportunities for moving towards IS, also for enhancing business.

Weaknesses

- High structural unemployment combined with social exclusion,
- Lack of qualified labour force,
- The educational system does not provide people with training essential for working life,

- Flexibility of the labour force in the labour market is low,
- Fewer opportunities and low willingness of population for life-long learning,
- Low level of productivity,
- The level of development and implementation of new technologies in companies is poor,
- Existence of Regional socio-economic disparities.

Opportunities
- Fast development and implementation of new technologies, including ICT,
- New export markets for Estonian goods and services to be opened after the accession to the EU,
- Increasing co-operation between Estonian and EU companies and research institutions after the accession to the EU.

Threats
- Estonian economy is strongly dependent on the situation in the Nordic and Russian markets,
- Increased competitiveness resulting from the membership in EU.

Assessment of competitiveness of Estonia on the basis of economic, social and demographic trends in the last decade provides a background for the development of IS-related issues.

Policy for active use of IT has developed fast in Estonia since the P*rinciples of the Estonian Information Policy* were approved by Parliament in 1998. A strategic document "Knowledge-based Estonia" defines the development of human capital, research and adoption of new knowledge and skills as the source of growth for the competitiveness of the economy, labour force and life quality.

Estonia is adjusting to a new technological-economic paradigm, which consists of widespread implementation of ICT in different areas of life and economic growth based on technological innovation. The private sector ICT services are developed mainly in banking, transport and communications sector, and trade. Government policies in the area of IST development are mainly targeted at creation of necessary institutional environment (legal basis, necessary regulation and supervision), IST development in the public sector and promoting improvement in IST knowledge of the population.

These tasks presume legislative, as well as organisational changes. Estonia has been successful in adopting regulations needed for various information society applications and the government has defined general priorities for implementing information policy for the coming year. A needful organisational structure for ICT development was created. Against the background of IS policy tasks, the purpose is to develop and integrate the ICT infrastructures of the state and local governments into a general citizen-friendly service environment that would observe the principles and requirements of the development of democracy.

There are a number of programs in public administration targeted at broad use of ICT in state agencies and local government as well as in interaction with citizens and businesses. As a result of these activities, Estonian ICT infrastructure is well developed and attracts a large part of the population to take an advantage of the information technology. Estonia has achieved one of the highest Internet (45%), mobile phones (68%) and PC (49%) penetration rates among CEE countries. The analysis of last years shows that the implementation of regulations

in some fields has been slower than expected, the IS policy needs an elaboration of long-term strategies and to increase the financing of R&D.

The high readiness of society for the implementation of contemporary technologies and experimenting new solutions has been assessed as one of the driving motivations of the IS policies. This has been supported by a positive influence of Nordic countries through investments into ICT sector, government initiative, high educational level of population and positive developments in the economy (e.g. banking, telecom).

The development and implementation of national IS policies in Estonia has been successful in the short run and good results have been achieved. Nevertheless, a large part of the population has still never used a computer or Internet (53% in 2003). The main goal in Estonia is to create new, user-friendly IT solutions for e-government, e-education, e-health care, widen the broadband access and secure information infrastructure that would motivate people to use information technology and will provide access for people living in less favourable conditions. This needs to be supported by development of education and training system, and enterprises' technological competitiveness. Although several programs and projects have been carried out to reach the broad use of ICT in the country, a certain standstill has occurred in penetration rates in last years. Hence, to guarantee stable development of information society in Estonia, it will be paramount to tackle the problem of digital divide more than has been done until now.

One of the important principles of the Estonian IT policy is to support demonopolisation in order to ensure competitiveness within the industry. The government has approved important acts concerning the telecommunication business and to ensure fair competition and avoid creation of monopolies in the market. Liberalisation of the telecommunications market has led to an increase in competition among service providers and reduction of prices for consumers of services.

Institutional structures and regulations for directing IT development in Estonia and primarily in public administration have been developed and capable to offer services for public and private sectors as well as create relevant IT environment for development of IS. The most important objective has been creation of a legal framework for ICT development and government–wide IT architecture. A progress has been achieved in elaboration of the relevant legislation, although rapid ICT development and changes require further improvement of the legislation (e.g. TC and Databases Act, e-commerce). The Estonian legal system adequately protects property rights, including intellectual copyrights, trademarks, trade secrets and industrial design. Estonian legislation fully complies with the EU directives granting protection to authors, performing artists, record producers, and broadcasting organisations. Development of secure authentication systems (ID-card, digital signature) guarantees the development of e-services.

Institutional implementation capacities seem to be more or less appropriate. Estonia was included among the group of the states with high e-government capacity (Global Index compiled by UNDPEPA and ASPA). The national development plan of information systems envisages to continue promotion of a regionally balanced development, i.e. financing and co-ordination of co-operation between the state and local governments in developing e-services in regional programs and county governments' development functions (a common environment for administration, training of officials, standards, systems). In the development

of information technology solutions, e.g. e-democracy, they are preparing an electronic voting system for the 2005 local government elections.

A SWOT analysis-IS

Strengths	Weaknesses
Stable and supporting economic environment Government initiative in co-ordinating IS development with the aim of providing equal opportunities for all Supply of e-government services and creation of government-wide information systems The existence of organisational structures for co-ordinating IT development A progress in elaboration of relevant legislation and its continuous improvement The commitment of private and public actors, incl. local governments Public awareness and motivation about ICT usage is high Developed infrastructure; high penetration rates (PC, Internet, mobile) Liberalisation of telecommunication market and creation of competition in TC market High professional level ICT specialists Relatively cheap production inputs There is a legal system that adequately protects property rights and security matters Development of secure authentication systems	IS development has concentrated on the development of ICT infrastructure and less on the supply of services Implementation of some IT systems has been slower than expected Modest financing of ICT development from the state's budget, particularly on local level Short-term policy priorities are prevailing Insufficient R&D in private sector Certain stagnation has been occurred in ICT penetration rates Existence of digital divide Limited purchasing power of local market Moderate IST use in production management Improvement of legislation is needful for the introduction of e-commerce and other new IT solutions in practice Institutional capacities need to be improved in connection with new information technology applications Low share of exports in products and services by ICT sector enterprises High share of subcontracting in ICT sector High costs related to the fast development
Opportunities	Threats
Extensive implementation of IT in all stages of life, starting from elementary education (computerisation of schools) Providing motivation for non-users – respective training programs are developed Commitment of public and private actors in IS policy elaboration, its implementation and in different actions The experience in e-government implementation is promoting the export potential (e.g. e-governance academy) Development of new ICT solutions for public and private sector services (the Internet, mobile) Development of government-wide IT architecture and modernisation program of national databases Following eEurope action plans in IS development E-citizen system development using personal authentication systems IST development in industry (production development)	Digital divide between the users and non-users of IT may become a problem in the implementation of IS policy goals (i.e. access for all) Possible standstill in IST implementation for different reasons (e.g. economic; co-ordination etc) Good specialists leave to take up international projects Deceleration of the adoption and enforcement of laws Too severe data protection regulations may limit the use of databases and also the development of national information system

SCENARIOS FOR FUTURE DEVELOPMENT

Rapid market economy reforms have developed a favourable economic environment in Estonia, providing for a considerable progress in the process of convergence towards the developed industrial countries. The structure of Estonian economy has converged towards the industrial countries. The most common characteristic of the structural changes has been the decreasing importance of agriculture and post-Soviet industries and a rapid surge of the service sector and some other new industries.

Since 1994, Estonia has enjoyed rather high economic growth rates that in recent years have exceeded those of EU15 and the Eurozone. Nevertheless, if compared by GDP per capita at PPS, the Estonian level was only 40.3% of the EU average and many acceding countries in 2002. According to the predictions for 2007 of the Ministry of Finance, GDP per capita at PPS will increase to 53.6% of EU15 average. A provisional long-term prognosis of the Bank of Estonia predicts an increase in this ratio to two-thirds in 2010.

While the production growth of Estonian industry has been fastest among the candidate countries, the productivity of labour still remains low (only 26% of the EU average). In addition, real growth of productivity is much lower than the real growth of wages (4.3% and 7.0% in 2002, respectively). According to the labour productivity indicator of Estonian industry Estonia belongs to the lowest group of EU and candidate countries (share of labour productivity indicator 20-40% of EU average). The Ministry of Finance prognosticates an increase in the productivity growth rate to 5.9% in 2007 and the Bank of Estonia predicts the same growth rate for 2010.

Until 2000, the tendency of decreasing employment, increasing unemployment and inactivity was dominating. In 2001, the trend of employment and unemployment changed – employment started to rise and unemployment started to fall. The employment rate for population aged 15-64 will increase from 61.7% in 2002 to 62.5% in 2007. The employment rate will rise to 63.0 in 2010 according to provisional prognoses of the Bank of Estonia, accounting for 90% of the Lisbon objective. A specific feature of employment in Estonia is a relatively high employment rate of older (55-64) workers. This indicator exceeded Lisbon objective for 2010 (50%) already in 2002 (was 51.3%). The same ratio is predicted also for 2010. Changes in economic environment and labour market situation enable to predict long-term unemployment to fall slightly - from 5.4% in 2002 to 4.2 in 2007 and 4.0 in 2010.

According to the prognosis of the Ministry of Finance, the business investment (changes in the physical capital stock) growth rate will slow down from 16.1% to 6.6 in 2004 and then will rise again to 7.9% in 2007 (according to prognosis of the Bank of Estonia, until 2010 7.5% annually).

According to the strategy of education, the public expenditure on education (share in GDP) will increase from 5.5% in 2002 to 7.0% in 2010. The prognosticated growth of education costs allows assuming that the human capital development trend will continue, which is necessary especially for educating highly qualified specialists as well as for raising the information technology skills of students, workers and the whole population. The latter increases demand for e-business and other services.

R&D expenditures are low compared with EU15 and their share in GDP was 0.79% in 2001 and by 2010 is expected to reach 50% of the Lisbon objective. These outlooks do not much

accelerate development in the private sector, meaning that the need for entrepreneurship support policy is growing. Quite stable business demography during the last years also clearly indicates the need for entrepreneurship support.

Regional cohesion (the coefficient of variation of employment rates across five regions in Estonia was 8.1 in 2002) has been predicted to decline considering the positive trends in socio-economic development of the regions. Although the growth rate is noticeable in some areas outside Tallinn already today, the growth at the local level is limited by small resources of local governments.

Sc1. The baseline scenario

In information technology development, Estonia has already had some spectacular achievements for a long time (even in the Soviet period), owing to the fact that the first national policy document was born in 1994. This policy development has been facilitated by foreign investment inflow to Estonia after the re-establishment of independence, as a result of that important sectors belong to foreign owners today (mostly Sweden and Finland). This ownership in banking, telecom, high-tech manufacturing has generated a strong development of the ICTs in these sectors, owing among other things to know-how transfers from owner companies and to the availability of skilled people in Estonia. These sectors have also been promoting the usage of Internet.

This situation has facilitated preparation of the legislative framework by the government to promote the development of the IS, and a number of projects for IST development in public administration and services. As a result, infrastructure has developed towards e-democracy and building a number of on-line services for citizens. In the opinion of specialists in governments and administrations, doing business and communication with residents and private sector has turned easier through the document management programs, use of electronic forms etc (e.g. Tax Board, e-citizen portal); the government information has become more easily available.

According to the Estonian information policy principles, the development of IS is based on the co-operation of public authorities, private sector and the third sector, provision of equal and secure access for all citizens and other stakeholders (e.g., businesses, public administration), the growth of national competitiveness and development of democracy.

Based on the general (so-called baseline) economic situation, a continuing economic growth facilitates IS development outlooks, but the productivity gap and low GDP/per capita are the main obstacles to an extensive growth of information technology use in public administration, in businesses and among population. A favourable political environment (prioritisation of IS development) continues to promote improvement of legislation. The presence of relevant infrastructure also contributes to the fact that IST technology introduction process will continue in public administration, although at a slower rate than so far. Based on the government priorities, the purposeful implementation of IT is promoted in public administration, culture and education, health care, etc. The importance of strengthening the information technology basis of education is also emphasised among government priorities. These new developments should be accompanied by a certain spill-over effect throughout the society.

Based on the information policy principles, the main emphasis in the Estonian public sector development is laid on building infrastructure. ICT penetration in Estonia has been successful compared with other accession countries and also in accomplishing e-Europe objectives. This

has helped to archive a kind of necessary IT development level with a trend from *back-office*-oriented developments to more *front-office*-oriented developments. Such an information policy trend in the Estonian public sector serves also as the basis for the development plan for the years 2004-2006. In public administration this means the need for a higher degree of centralisation both technologically and organizationally (creation information systems).

Although most of the enterprises have ICT facilities, due to limited economic possibilities of enterprises (low R&D), the use of information technology in production management is quite small, except for subcontracting industries for re-export to foreign owners. The industry is burdened by the high cost of electrical energy. And the attractiveness of the labour market is decreasing as costs increase faster than productivity (i.e. wage catch-up). Hence, the advantage of low wages, especially for subcontracting, is disappearing and enterprises must start looking for new possibilities to reduce production costs. One possibility is the use of information technology. Development of new products and introduction of innovation policy have also arisen to the agenda. The growth of education costs and people's income allows presuming a reduction of skills' gap among population, which may increase demand for e-business and other services.

The precondition of growing competitiveness necessitates that enterprises introduce IST technology in production management to increase productivity. The focus should be from traditional industrial branches to manufacture of products with higher value added. Production branches with higher potential are estimated to be food and wood processing industry, manufacture of apparatus, as well as the birth of completely new industries (e.g. microbiology, pharmacy and ICT). The baseline scenario, however, does not enable to predict an essential rise in growth rate here. The development of e-banking probably is most capable of further development, especially in terms of innovative customer services.

The ICT sector will stay operating as a cluster of Nordic ICT industry for a short term. Although this means creation of low value added for the sector, these enterprises can use world-level know-how. However, Estonian ICT sector developments (particularly exports) are highly dependent on how dynamic the growth in computer services and software is in global terms. Domestic demand for computer and information services, and for telecommunication services incites development of small enterprises which offer new solutions and service new technologies (both hardware and software technology). New value added opportunities can be found in the development of mobile services.

Estonia has at least now a number of examples of so-called "best practice" in the field of services supply, but it is a fact that possibilities of using IT increase as a result of fulfilling the objectives of planned policies by the public sector and on the other hand, as a result of private sector and individuals' concern and improvement of the welfare. The presence of "best practices" enables Estonian enterprises to export technology applications (an example here might be e-governance academy experience) into the countries where the development of ICT implementation has been slower. This will conduce to the growth of capital and labour productivity. Obviously, there will be more opportunities, though a part of the population will remain passive: those who have no possibilities and/or interest.

Sc2: Progressive development scenario (strictly to be taken as a "proposal")

To provide for faster development of an information society and to overcome digital gap, the implementation of new technology must become more effective. This requires much higher financing for the R&D and innovation in enterprises as well as in public administration, but also active enterprise support policies, progress in improvement of regulatory environment,

successful rearrangement of educational development. The opportunities of accession, particularly EU structural funds will help to get more resources, which will enable to accelerate IST development with domestic ICT enterprise development for serving new technologies.

Based on the scope of using IT in the economy, households as well as in the public sector, we have achieved a kind of spillover effect in saving resources (e.g. time, money) according to the baseline scenario. Additional financing, tax allowances and other favourable environment conditions may accelerate introduction of IST technologies in the above-mentioned sectors, which in turn creates preconditions for GDP growth and decline of productivity gap. The growing competitiveness of enterprises enables them to accelerate product/and service development, which requires highly qualified labour resources, including IST specialists. Adaptation of educational policies to these developments and growth of financing would enable to fulfil these requirements better. Changes in fiscal policy as well as improvement of the entrepreneurship environment in less developed counties would help to reduce regional differences.

Resulting from prognosticated trends, the proportion between demand for and supply of new ICT solutions and services stimulates the growth of ICT sector in Estonia. But due to the growth of production inputs (wages, energy etc.) it is not expedient for foreign firms in Estonia to use subcontracting in the present volumes. Therefore, the share of subcontracting may diminish, meaning contraction of the ICT sector in technology production, but the services market and export outlooks of knowledge intensive services may still grow. The export outlooks of knowledge intensive services may depend on the growth rate of information society in Estonia and in other countries. Acceleration of economic growth will cause an increase in domestic demand and therefore, ICT promotes small business development.

New developments are improving the overall living environment. (e.g. e-commerce). It is important to create new, user-friendly IT solutions for e-government, e-education, e-health-care that would motivate people to use information technology. It is important to increase the awareness of society about IT opportunities and services and to improve the access to these services for groups suffering from social disparities. Despite the improved financial conditions, digital divide is decreasing, but remains on a certain level.

Sc3: Unfavourable development scenario (strictly to be taken as a “proposal”)

According to this scenario, public spending on IST would decrease in connection with other government priorities coming up (e.g. social targets), world economy impacts on Estonian economy (e.g. financial crisis), some political or other undesirable changes. These will decelerate introduction of IST programs primarily in the public sector, including public administration, digital divide prevention, education. Reduction of public finance may diminish the possibilities of using EU structural and many other funds.

IST introduction in the business sector may be curbed by the entrepreneurship environment turning less favourable (changes in regulation, reduction of state support to small enterprises), diminishing of R&D possibilities caused by economic development, decreased orders for new IST solutions due to slower introduction of public administration programs.

Decline in household income growth is also slowing down the introduction of ICT and IST in households. This is also influenced by the declining supply of public and business services, decline in advanced training opportunities and low perception of IST.

However, considering the quite good development level of IT implementation in many fields in Estonia, a too unfavourable development is not very realistic. It is more likely that IT implementation rate will slow down, but IST diffusion will be deeper throughout the economy and society, influenced by possible developments.

POLICY RECOMMENDATIONS

- ***Guaranteeing an equal access to information for everybody (citizens, businesses); e-democracy development***

The emerging digital divide is an issue the government needs to address. Regional socio-economic disparities, increasing educational stratification as a result of drop-outs already at the basic educational level and disparities in the families' economic situation is distinguishing groups of people who have different competence levels for information society. And, the access to the Internet and information of these population groups depends on these possibilities, which ultimately may start shaping different attitudes towards the government in the society and its aspirations. As IS cannot work without attracting most of the society to take part, we need to minimise these divides (i.e. regionally, between groups of population etc). This presumes improvement of the dialogue between different societal groups by creating the motivation (by providing interesting and essential content), overcoming individual barriers (providing training, education and improving skills) and providing easier access (easy access to information and its processing means and reduction of the costs).

Regionally balanced development: it is necessary to create conditions for funding and co-ordinating projects that promote information society development based on regional initiative and co-operation between state and local governments, providing for relevant measures in regional programs and in the county governments' development functions. Local governments will be invited to join in the development of e-services in public administration.

With the help of economic policy measures (tax policy supporting investments, measures that support business development, various regional programs, financial schemes), create socio-economic catch-up possibilities for population in rural regions.

Find and analyse information technology solutions that would help to develop e-democracy. Create an effective electronic voting system.

Maintain the high international reputation of Estonia in the sphere of information technology and telecommunications. In the spheres with some backwardness, achieve at least the EU average level. Join actively in the EU *eEurope 2005* program with the objective of integrating our activities into the respective EU development programs and projects (*eContent, eLearning, eTEN, IDA, Northern eDimension* etc).

- ***Improve online public services***

The establishment of the citizen-oriented e-government and development of the framework for customer-friendly business-to-consumer and business-to-business services should be a strong priority. Certain efforts have already been made by government to communicate with citizens and businesses (e.g. adoption of regulatory framework, e-citizen portal project, Look@World training programs), a number of e-services are provided for citizens (e.g. tax declarations for citizens and businesses; health care issues, e-learning etc), and a favourable IT environment has been created for providing services. These experiences are an important precondition for further development.

Legislative provision of new applied solutions of public sector activity. An e-country regulative environment will be established and the system of public sector registers and databases will be organised.

- ***E-Government development***

Continue the development of e-government and state information systems. Development of databases with the purpose of providing the quality, availability and access of information. Implementation of a modernisation program of national databases.

- ***E-business environment development***

Promote e-business development by increasing the use of ID-cards, digital signature and electronic methods of identification, by elaborating relevant IT standards for e-business and improving legislation.

Finish the introduction of digital document management in the public sector and introduce digital archiving. Special attention should be focused on the organisation of electronic communication and exchange of information between the state and local governments.

Using the developed telecommunications infrastructure, which is a precondition for mobile communication, introduction of new m-services should be promoted both in private and in public sector. It would be reasonable to conduct a research and weigh promotion of m-government services to increase the use of e-government services.

- ***Stimulating RTD and IST use in enterprises***

Due to the slow take-up and use of ICT technologies in industry and service sectors the contribution of ICT technologies to productivity growth is low. It is a result of inadequate investment in ICT technologies accompanied by insufficient measures for training and organisational reform of companies. The national innovation system needs to be strengthened to converge the research potential and companies' requirements while supporting the establishment of technology-based enterprises with high value added.

On the enterprise level, conditions should be created to support introduction of IST in different processes in enterprises, including small enterprises. Enterprises need consultations and advice how to introduce IT in management and production process.

To increase the number of enterprises benefiting from direct support (grants, loans or equity financing) or indirect support (advisory and consulting services etc) provided through enterprise support network schemes to stimulate RTDI. A broader sectoral coverage with an increasing penetration of leading enterprises in each of the main industrial sectors should be encouraged.

Promote development and introduction of new information technology solutions for industry. Stimulate ICT research and development and innovation in enterprises**.**

Funding for the development of the research base that indirectly leads to knowledge creation and economic development should be concentrated to provide a better view about the possibilities and use resources more effectively.

Support to small and medium-sized enterprises (incl. IT-sector enterprises) for going to export markets and for elaboration of relevant competencies in enterprises.

- ***E-commerce development***

Improvement of the legislation relevant for the development of e-business and development of information technology support systems; promotion of the use of ID-card, digital signature and electronic identification methods.

Elaboration of e-business development standards and improving of e-business perception.

- ***Education and e-learning services development***

The Ministry of Education and Research should within the framework of vocational education reform work out a stable system of training and retraining to create possibilities for people in all stages of their life with certain educational level to get new upgrading to be competitive in the labour market. For providing a fast development capacity and avoiding increase in unemployment all possibilities for life-long learning, especially the system of eLearning has to be created.

The Ministry of Education and Research has to pay more attention in the preparation procedure of ICT students to the proportion of students between secondary vocational and higher education as industrial development demands highly qualified ICT specialists. In addition, a broad-based education of the population will be increased to ensure their coping in information society and to enable the use of information technology solutions.

- ***E-health services development***

Modernisation of healthcare system is a priority in E-health project. This includes implementation of the digital health record or personal consolidated records of health events from birth to death. The digital health record creates an environment for exchange of information in the health sector, uniting different information into one system. The major sub-parts of the system will be: a national digital health card, which provides for movement of patient's important information and examinations performed on the basis of severe security requirements between medical establishments through information exchange based on common principles; an elaboration of a system of digital prescriptions; development of e-services in health care.

- ***A secure information infrastructure***

Provision for the security of information systems. Establishment of a regulative environment for a systemic implementation of information systems' security measures.

Continuing harmonisation of the EU information society and ICT *acquis*; for harmonisation of information society legislation and for sharing the best experience with other countries, joining with the European Council convention No 180.

Work out the main principles for a common information security policy. In co-operation with the private sector, establish a national information security centre as a contact point with the respective EU structures with the task to register assaults, inform parties involved, elaborate

and disseminate protection measures and improve knowledge about information systems' security.

Protection of the citizens against information society risks. A human rights charter will be created to regulate the relations of the citizens to various information. The legislative bodies will keep watching that all principal human rights are continuously granted with the transition to e-environment.

- ***Availability of broadband access***

Attention should be focused on the access of leased line Internet connection in smaller rural regions and development of broadband strategies in the whole country.

- ***Monitoring policy and statistics***

As a matter of priority, a clear framework for the evaluation of the RTDI measures and other existing schemes are needful to increase transparency and clearness about current situation and plans for the future.

There is a need to establish realistic and precise targets for monitoring policy outcomes (indicators, regular surveys).

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LIST OF ABBREVIATIONS

AEF:	Open Estonia Foundation
ACC:	10 EU accession countries (in 2004)
ATM:	Automated Teller Machines
BCM:	Baltic Council of Ministers
BSCV:	Basic Support of Co-operative work
CA:	Current Account
CBSS:	Council of the Baltic Sea
CC:	Candidate Countries in process of joining the European Union: Bulgaria, the Czech Republic, Cyprus, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia, Slovenia, Turkey
CIS:	Commonwealth of Independent States
CPB:	The Estonian Consumer Protection Board
CPI:	Consumer Price Index
CSC:	Centre for Strategic Competence (Tartu)
DIDIX:	Digital Divide Index
EBRD:	European Bank for Reconstruction and Development
ECDS:	Estonian Central Depository for Securities
EENet:	Estonian Educational and Research Network
EIF:	Estonian Innovation Fund
EIONET:	*European Environment Information and Observation*
EITO:	European Information Technology Observatory
EITF:	The Estonian Information Technology Foundation
EITS:	The Estonian Information Technology Society
EKI:	Estonian Institute of Economic Research
EMT:	Estonian Mobile Telephone
ENCB:	The Estonian National Communications Board
EPO:	Estonian Patent Office
ERDA:	Regional Development Agency
ERDF:	Regional Development Foundation
ESIS:	European Survey of Information Society
ESTAG:	Estonian Technology Agency
EstSF:	The Estonian Science Foundation
EU:	European Union
EU15:	The present 15 member states of the European Union
GDP:	Gross Domestic Product
HEX:	Helsinki Stock Exchange
ICA:	International Council for Information Technology in Government Administration
ICEG EC:	International Center for Economic Growth, European Center
ICT:	Information and Communication Technology

IDA:	Interchange of Data between Administrations
IMD:	International Institute for Management Development
IMF:	International Monetary Fund
IPO:	International Public Offering
IPTS:	Institute of Prospective Technological Studies
IS:	Information Society
ISCED:	International Standard Classification of Education
ISP:	Internet Service Providers
IST:	Information Society Technology
ISTAG:	Information Society Technologies Advisory Group
ITL:	Association of Estonian Information Technology and Telecommunications Companies
JHLC:	Joint High Level Committee
KIS:	Knowledge–Intensive Services
KredEx:	Credit Guarantee and Export Insurance Foundation
MEUR:	million EUR
NeD:	Northern eDimension
OSI:	Open Society Institute
PAA:	Public Administration Agencies
PIAP:	Public Internet Access Points
POS:	Points of Sale
PPS:	Purchasing Power Standard
RIA:	Estonian Informatics Centre
RISO:	Department of State Information Systems of Estonia
RTDI:	Research Technological Development and Innovation
SIBIS:	Statistical Indicators Benchmarking the Information Society
TSE:	Tallinn Stock Exchange
TEKES:	Finnish Technology Agency
UNDP:	United Nations Development Program

ANNEX – TABLE OF CONTENTS

A. NATIONAL AND REGIONAL ECONOMY

Table A1.: Annual GDP growth rates by country

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
US	4.0	2.7	3.6	4.4	4.3	4.1	3.8	0.3	2.4	2.4[f]
Japan	1.0	1.9	3.4	1.8	-1.1	0.1	2.8	0.4	0.3	1.5[f]
EU15	2.8	2.4	1.6	2.5	2.9	2.8	3.5	1.5	1.0	1.2[f]
Eurozone	2.4	2.2	1.4	2.3	2.9	2.8	3.5	1.4	0.8	1.0[f]
ACC	:	6.6	4.6	4.8	3.8	3.1	9.6[p]	2.4[p]	2.1[f]	3.6[f]
Belgium	3.2	2.4	1.2	3.6	2.0	3.2	3.7	0.8	0.7[f]	1.2[f]
Denmark	5.5	2.8	2.5	3.0	2.5	2.6	2.9	1.4	1.6	1.5[f]
Germany	2.3	1.7	0.8	1.4	2.0	2.0	2.9	0.6	0.2	0.4[f]
Greece	2.0	2.1	2.4	3.6	3.4	3.6	4.2	4.1	4.0	3.6[f]
Spain	2.4	2.8	2.4	4.0	4.3	4.2	4.2	2.7	2.0[f]	2.0[f]
France	2.1	1.7	1.1	1.9	3.4	3.2	3.8	1.8	1.2[f]	1.1[f]
Ireland	5.8	9.9	8.1	10.9	8.8	11.1	10	5.7	6.0[f]	3.3[f]
Italy	2.2	2.9	1.1	2.0	1.8	1.7	3.1	1.8	0.4	1.0[f]
Luxembourg	3.8	1.3	3.7	7.7	7.5	6.0	8.9	1.0	0.4[f]	1.1[f]
Netherlands	2.6	3.0	3.0	3.8	4.3	4.0	3.3	1.3	0.3[f]	0.5[f]
Austria	2.6	1.6	2.0	1.6	3.9	2.7	3.5	0.7	1.0	1.2[f]
Portugal	1.0	4.3	3.5	4.0	4.6	3.8	3.7	1.6	0.5[f]	0.5[f]
Finland	4.0	4.1	3.9	6.4	4.9	3.4	5.5	0.6	1.6	2.2[f]
Sweden	4.2	4.0	1.3	2.4	3.6	4.6	4.4	1.1	1.9	1.4[f]
United Kingdom	4.7	2.9	2.6	3.4	2.9	2.4	3.1	2.1	1.8	2.2[f]
Bulgaria	1.8	2.9	-9.4	-5.6	4.0	2.3	5.4	4.0	4.0[f]	5.0[f]
Cyprus	5.9	6.2	1.9	2.5	5.0	4.8	5.2[p]	4.2[p]	2.2[f]	3.5[f]
Czech Republic	2.2	5.9	4.3	-0.8	-1.0	0.5	3.3	3.1	2.0	3.2[f]
Estonia	**-2.0**	**4.3**	**3.9**	**9.8**	**4.6**	**-0.6**	**7.1**	**5.0**	**5.8**	**4.7[f]**
Hungary	:	1.5	1.3	4.6	4.9	4.2	5.2	3.6	3.6	4.5[f]
Lithuania	-9.8	56.1	4.7	7.0	7.3	-1.8	4.0	6.5	6.7	3.5[f]
Latvia	0.7	-1.7	3.7	8.4	4.8	2.8	6.8	7.9	6.1	5.5[f]
Malta	5.7	6.2	4.0	4.9	3.4	4.1	6.1	-0.8	2.8[f]	3.4[f]
Poland	44.5	7.0	6.0	6.8	4.8	4.1[b]	15.8[b]	1.0	0.8[f]	3.2[f]
Romania	3.9	7.1	4.0	-6.1	-4.8	-1.2	1.8	5.3	4.2[f]	4.7[f]
Slovenia	5.3	4.1	3.5	4.6	3.8	5.2	4.6	2.9	3.2	3.6[f]
Slovak Republic	5.2	6.5	5.8	5.6	4.0	1.3	2.2	3.3	4.4	3.9[f]
Turkey	-5.5	7.2	7.0	7.5	3.1	-4.7	7.4	-7.5	3.9[f]	3.7[f]
Iceland	4.5	0.1	5.2	4.6	5.3	3.9	5.0	1.5[f]	-0.6[f]	3.0[f]
Norway	5.3	4.4	5.3	5.2	2.6	2.1	2.4	1.4	1.5[f]	2.2[f]

Source: Eurostat, 2003[1]

[1] http://europa.eu.int/comm/eurostat/Public/datashop/print-product/TableDesMatieres#TableDesMatieres

Table A2.: GDP per capita in Purchasing Power Standards (PPS), (EU-15=100)

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
US	146.7	146.2	144.9	146.6	147.0	143.5	143.2	139.9	140.6[f]	140.7[f]
Japan	120.0	119.4	122.8	121.5	116.4	107.1	107.0	105.2[f]	104.3[f]	104.7[f]
EU15	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0[f]	100.0[f]
Eurozone	100.7	101.5	100.6	100.3	100.1	100.6	100.7	99.4	99.1[f]	98.8[f]
ACC	:	41.5	42.8	43.9	44.4	44.6	:	:	:	:
Belgium	113.8	112.9	111.6	111.7	110.9	106.6	107.7	108.7	108.8[f]	108.9[f]
Denmark	116.0	117.9	120.7	119.9	118.1	118.8	117.3	114.8	113.6[f]	113.9[f]
Germany	109.9	110.3	108.0	108.0	106.3	106.5	106.6	103.3	102.7[f]	102.0[f]
Greece	64.8	65.0	65.3	64.3	65.0	66.2	65.6	64.7	66.6[f]	68.4[f]
Spain	77.5	78.4	79.5	80.1	79.4	82.2	82.4	84.0	84.4[f]	84.8[f]
France	102.6	102.4	100.0	97.9	98.1	99.3	100.6	102.8	102.5[f]	102.2[f]
Ireland	87.6	93.5	93.8	104.0	106.3	112.4	115.4	117.8	122.1[f]	122.2[f]
Italy	102.8	103.7	104.7	102.2	103.6	103.4	102.4	103.0	102.5[f]	102.4[f]
Luxembourg	173.4	172.6	170.2	175.0	180.2	188.8	196.8	191.1	188.0[f]	187.1[f]
Netherlands	105.9	109.6	109.3	112.7	115.5	114.6	111.4	114.8	112.7[f]	111.6[f]
Austria	111.1	110.6	111.9	111.2	110.1	111.3	114.5	110.8	110.4[f]	109.8[f]
Portugal	69.4	70.0	70.2	73.5	72.3	72.3	68.5	69.1	69.2[f]	68.8[f]
Finland	91.1	97.5	97.3	99.7	101.8	100.7	103.5	104.0	102.0[f]	102.3[f]
Sweden	103.4	106.4	106.2	106.1	105.3	105.2	106.8	102.3	101.7[f]	101.2[f]
United Kingdom	98.6	96.7	100.6	102.7	103.6	100.7	100.6	101.5[f]	103.2[f]	104.5[f]
Bulgaria	:	33.1	29.7	27.6	28.2	28.3	25.8	24.6	25.0[f]	:
Cyprus	:	82.8	81.9	81.0	81.9	82.9	76.2[p]	74.0[p]	:	:
Czech Republic	:	62.3	64.2	62.4	60.2	59.2	56.6	59.5	59.2	:
Estonia	:	34.0	35.4	38.4	39.6	38.7	40.4	39.9	40.3	:
Hungary	:	45.6	45.7	46.9	48.0	49.0	50.1	52.7	55.1	:
Lithuania	:	33.0	33.4	35.6	37.0	34.5	35.6	38.2	39.6	:
Latvia	:	24.7	25.6	27.4	28.3	28.6	31.1	33.8	34.9	:
Malta	:	52.6	53.6	54.6	54.7	55.3	:	:	:	:
Poland	:	34.4	36.0	37.6	38.4	39.0	40.7	40.5	41.1[f]	:
Romania	:	27.9	28.8	26.5	24.6	23.9	23.5	23.9	24.4[f]	:
Slovenia	:	62.9	64.2	65.8	66.7	68.6	70.8	72.5	72.6	:
Slovak Republic	:	46.0	47.9	49.5	50.1	49.5	46.2	47.3	47.8	:
Turkey	:	26.5	27.6	29.1	28.8	26.4	25.5	22.5	22.3[f]	:
Iceland	107.2[e]	114.4	116.9	117.1	117.8	119.5	119.8	120.0[f]	116.3[f]	116.0[f]
Norway	120.1	121.0	128.3	131.4	124.0	129.0	147.7	143.2	139.6[f]	141.1[f]

Source: Eurostat, 2003[2]

[2] europa.eu.int/comm/eurostat/Public/datashop/print-product/EN??catalogue=Eurostat&product=1-eb011-EN&mode=download

Table A3.: Change of GDP compared with previous year at 2000 constant prices

	1994	1995	1996	1997	1998	1999	2000	2001	2002
BY EXPENDITURE APPROACH									
Private consumption expenditure	0.6	3.3	9.2	7.8	4.3	-2.9	6.5	4.9	8.2
General government final consumption expenditure	5.5	16.3	-1.0	1.8	4.5	3.8	0.1	2.1	5.0
Consumption expenditure of non-profit institutions serving households	-5.6	12.3	14.0	4.5	3.8	15.5	21.1	-0.7	44.4
Gross fixed capital formation	6.3	4.1	11.4	17.6	11.3	-14.8	13.3	9.1	17.5
Change in inventories	-72.2	41.3	53.5	225.7	..	..	..	-26.0	127.3
DOMESTIC DEMAND	1.6	6.4	7.6	10.6	3.2	-4.7	9.7	4.6	12.1
Exports of goods and services (f.o.b.)	3.5	5.3	2.4	29.5	12.0	0.5	28.6	-0.2	5.5
..exports of goods	5.9	6.5	0.9	35.6	16.3	-2.6	40.9	-5.5	2.9
..exports of services	0.1	3.6	4.7	20.4	4.7	6.3	7.8	11.7	10.4
Imports of goods and services (f.o.b.)	12.2	5.4	7.6	29.1	12.9	-5.4	27.9	2.1	10.2
..imports of goods	14.6	5.9	6.9	33.7	10.6	-7.9	32.6	0.3	5.2
..imports of services	3.5	3.4	10.2	11.5	23.4	4.9	10.9	9.9	29.9
Statistical discrepancy	..	..	..	..	..	..	..	..	..
TOTAL	**-2.0**	**4.3**	**3.9**	**9.8**	**4.6**	**-0.6**	**7.1**	**5.0**	**5.8**
BY ACTIVITIES									
Agriculture and hunting	-12.2	-4.5	-6.8	-3.3	-3.9	-7.9	0.1	-9.3	-4.7
Forestry	9.5	27.6	12.4	23.9	8.2	10.0	-1.5	-2.9	2.5
Fishing	6.9	8.6	14.5	25.0	-3.6	-22.5	-9.8	-6.1	-2.5
Mining and quarrying	-6.0	-6.8	7.4	13.4	-7.1	-10.5	0.9	10.0	10.6
Manufacturing	-3.4	10.5	1.3	14.5	5.4	-2.3	16.7	8.2	9.8
Electricity, gas and water supply	1.2	-3.5	2.2	-2.4	-7.7	-7.5	1.2	-0.7	-1.9
Construction	0.8	15.0	6.9	15.2	18.3	-8.2	13.8	1.6	14.7
Wholesale and retail trade ...*	-1.3	9.1	7.9	3.3	5.1	0.5	6.8	8.1	10.1
Hotels and restaurants	1.8	-4.9	10.9	7.3	11.8	12.8	14.7	2.0	12.7
Transport, storage and communication	1.4	-2.7	8.5	16.7	10.0	5.6	6.6	9.3	3.3
Real estate, renting and business activities	-5.1	0.6	0.7	12.0	11.2	-0.3	5.3	4.7	2.0
Financial intermediation	6.5	4.3	8.6	17.0	-7.9	7.6	10.3	7.6	8.5
Public administration and defence; compulsory social security	1.1	1.1	0.1	5.4	0.6	0.8	1.2	0.8	2.0
Education	1.1	4.2	2.2	0.6	1.5	-0.3	0.7	0.7	1.1
Health and social work	0.6	-0.2	-1.4	3.9	3.5	2.8	0.4	0.4	-1.0
Other community, social and personal service activities	-7.8	2.1	14.0	7.1	-0.1	-1.6	5.3	2.1	2.5
VALUE ADDED TOTAL	-1.7	3.7	4.2	9.3	4.9	-0.1	7.2	4.9	5.7
FISIM (-)	6.5	2.0	6.0	10.9	-25.5	10.0	10.0	9.7	10.9
GDP AT BASIC PRICES	-1.9	3.7	4.2	9.2	5.5	-0.2	7.1	4.9	5.6
Net taxes on products	-2.6	8.1	2.2	13.6	-1.5	-3.5	7.3	6.3	7.1
GDP AT MARKET PRICES	-2.0	4.3	3.9	9.8	4.6	-0.6	7.1	5.0	5.8

Source: Statistical Office of Estonia[3]

[3] http://gatekeeper.stat.ee:8000/px-web.2001/Dialog/statfileri.asp

Table A4.: Indices of political rights and civil liberties

Country	Political rights						Civil liberties					
	1995	1996	1997	1998	1999	2000	1995	1996	1997	1998	1999	2000
Austria	1	1	1	1	1	1	1	1	1	1	1	1
Belgium	1	1	1	1	1	1	1	2	2	2	2	2
Denmark	1	1	1	1	1	1	1	1	1	1	1	1
Finland	1	1	1	1	1	1	1	1	1	1	1	1
France	1	1	1	1	1	1	2	2	2	2	2	2
Germany	1	1	1	1	1	1	2	2	2	2	2	2
Greece	1	1	1	1	1	1	3	3	3	3	3	3
Ireland	1	1	1	1	1	1	1	1	1	1	1	1
Italy	1	1	1	1	1	1	2	2	2	2	2	2
Luxembourg	1	1	1	1	1	1	1	1	1	1	1	1
The Netherlands	1	1	1	1	1	1	1	1	1	1	1	1
Portugal	1	1	1	1	1	1	1	1	1	1	1	1
Spain	1	1	1	1	1	1	2	2	2	2	2	2
Sweden	1	1	1	1	1	1	1	1	1	1	1	1
United Kingdom	1	1	1	1	1	1	2	2	2	2	2	2
Bulgaria	2	2	2	2	2	2	2	3	3	3	3	3
Czech Republic	1	1	1	1	1	1	2	2	2	2	2	2
Cyprus	1	1	1	1	1	1	1	1	1	1	1	1
Estonia	**2**	**1**	**1**	**1**	**1**	**1**	**2**	**2**	**2**	**2**	**2**	**2**
Hungary	1	1	1	1	1	1	2	2	2	2	2	2
Latvia	2	2	1	1	1	1	2	2	2	2	2	2
Lithuania	1	1	1	1	1	1	2	2	2	2	2	2
Malta	1	1	1	1	1	1	1	1	1	1	1	1
Poland	1	1	1	1	1	1	2	2	2	2	2	2
Romania	4	2	2	2	2	2	3	3	2	2	2	2
Slovak Republic	2	2	2	2	1	1	3	4	4	2	2	2
Slovenia	1	1	1	1	1	1	2	2	2	2	2	2
Turkey	5	4	4	4	4	4	5	5	5	5	5	5

Source: Annual freedom in the world country scores 1972-73 to 2000-2001[4]

[4] http://www.freedomhouse.org/ratings/index.htm

Table A5.: Economic freedom rankings of the EU member states and candidate countries

Rank	Country	Overall scores	Trade Policy	Fiscal Burden	Government Intervention	Monetary Policy	Foreign Investment	Banking and Finance	Wages and Prices	Property Rights	Regulations	Black Market
3	**Luxembourg**	1.70	2.0	4.0	2.0	1.0	1.0	1.0	2.0	1.0	2.0	1.0
5	**Ireland**	1.75	2.0	3.0	2.0	2.0	1.0	1.0	2.0	1.0	2.0	1.5
6	**Denmark**	1.80	2.0	4.5	3.5	1.0	2.0	1.0	1.0	1.0	1.0	1.0
6	**Estonia**	**1.80**	**1.0**	**3.5**	**2.0**	**2.0**	**1.0**	**1.0**	**1.0**	**2.0**	**2.0**	**2.5**
9	**United Kingdom**	1.85	2.0	4.0	2.0	1.0	2.0	1.0	2.0	1.0	2.0	1.5
11	**Finland**	1.90	2.0	4.0	2.0	1.0	2.0	2.0	2.0	1.0	2.0	1.0
11	**Netherlands**	1.90	2.0	4.0	2.0	2.0	1.0	1.0	2.0	1.0	3.0	1.0
11	**Sweden**	1.90	2.0	4.5	2.5	1.0	1.0	1.0	2.0	1.0	3.0	1.0
19	**Austria**	2.10	2.0	4.5	2.0	1.0	2.0	2.0	2.0	1.0	3.0	1.5
19	**Belgium**	2.10	2.0	5.0	2.0	1.0	1.0	2.0	2.0	1.0	3.0	2.0
19	**Germany**	2.10	2.0	4.5	2.0	1.0	1.0	3.0	2.0	1.0	3.0	1.5
22	**Cyprus**	2.15	2.0	3.5	3.0	1.0	3.0	2.0	2.0	1.0	2.0	2.0
29	**Italy**	2.35	2.0	5.0	2.0	1.0	2.0	2.0	2.0	2.0	3.0	2.5
29	**Lithuania**	2.35	2.0	3.5	2.0	1.0	2.0	2.0	2.0	3.0	3.0	3.0
29	**Spain**	2.35	2.0	4.0	2.5	2.0	2.0	2.0	2.0	2.0	3.0	2.0
32	**Portugal**	2.40	2.0	4.0	2.0	2.0	2.0	3.0	2.0	2.0	3.0	2.0
33	**Latvia**	2.45	2.0	4.0	2.0	1.0	2.0	2.0	2.0	3.0	3.0	3.5
35	**Czech Republic**	2.50	3.0	4.5	2.0	2.0	2.0	1.0	2.0	2.0	3.0	3.5
40	**France**	2.55	2.0	4.5	3.0	1.0	3.0	3.0	2.0	2.0	3.0	2.0
44	**Hungary**	2.65	3.0	4.0	2.0	3.0	2.0	2.0	3.0	2.0	3.0	2.5
52	**Malta**	2.70	3.0	4.0	3.0	1.0	3.0	3.0	3.0	1.0	2.0	4.0
56	**Greece**	2.80	2.0	4.0	2.0	2.0	3.0	3.0	3.0	3.0	3.0	3.0
62	**Slovenia**	2.85	4.0	4.0	2.0	3.0	3.0	3.0	2.0	3.0	2.0	2.5
66	**Poland**	2.90	3.0	4.5	2.0	3.0	3.0	2.0	3.0	2.0	3.0	3.5
66	**Slovak Republic**	2.90	3.0	4.5	2.0	3.0	2.0	2.0	3.0	3.0	3.0	3.5
104	**Bulgaria**	3.35	4.0	4.0	2.0	5.0	3.0	3.0	2.0	3.0	4.0	3.5
119	**Turkey**	3.50	3.0	4.5	3.0	5.0	3.0	3.0	3.0	3.0	4.0	3.5
138	**Romania**	3.75	4.0	4.5	3.0	5.0	3.0	3.0	3.0	4.0	4.0	4.0

Source: The Heritage Foundation, The Wall Street Journal[5]

[5] http://www.heritage.org/research/features/index/

Table A6.: Indices of economic freedom: Overall index (acronym OVER)[6]

Country	1994	1995	1996	1997	1998	1999	2000	2001
Austria	2.10	2.10	2.10	2.10	2.10	2.05	2.05	2.10
Belgium	...	2.10	2.10	2.10	2.10	2.10	2.10	2.10
Bulgaria	3.50	3.50	3.60	3.65	3.50	3.40	3.30	3.40
Czech Republic	2.20	2.20	2.20	2.35	2.20	2.20	2.20	2.40
Cyprus	...	2.60	2.60	2.70	2.65	2.55	2.15	2.15
Denmark	...	2.00	2.05	2.25	2.25	2.25	2.05	1.90
Estonia	**2.40**	**2.50**	**2.50**	**2.30**	**2.35**	**2.20**	**2.05**	**1.80**
Finland	...	2.35	2.20	2.15	2.20	2.20	2.15	1.95
France	2.30	2.30	2.40	2.40	2.35	2.50	2.50	2.70
Germany	2.10	2.20	2.20	2.30	2.20	2.20	2.10	2.10
Greece	3.00	2.90	2.80	2.85	2.85	2.75	2.70	2.80
Hungary	3.00	3.00	3.00	3.00	2.95	2.55	2.55	2.40
Ireland	2.10	2.10	2.10	1.90	1.90	1.85	1.65	1.80
Italy	2.50	2.60	2.50	2.40	2.30	2.30	2.30	2.35
Latvia	...	3.05	2.95	2.85	2.75	2.65	2.65	2.50
Lithuania	...	3.45	3.10	3.00	3.05	2.90	2.55	2.35
Luxembourg	...	2.00	2.00	1.85	1.95	1.80	1.75	1.80
Malta	3.35	3.25	3.15	3.05	3.05	2.95	2.80	2.70
Poland	3.30	3.10	3.10	2.90	2.80	2.80	2.75	2.70
Portugal	2.70	2.65	2.40	2.40	2.30	2.30	2.30	2.30
Romania	3.60	3.65	3.40	3.30	3.30	3.30	3.65	3.70
Slovak Republic	2.80	3.00	3.05	3.15	3.10	3.00	2.85	2.90
Slovenia	...	3.50	3.30	3.00	2.90	3.00	2.90	3.10
Spain	2.50	2.70	2.55	2.45	2.40	2.40	2.40	2.30
Sweden	2.65	2.65	2.45	2.45	2.35	2.35	2.25	2.05
The Netherlands	...	1.90	1.95	2.10	2.05	2.05	1.85	1.80
Turkey	2.80	2.90	2.70	2.60	2.80	2.75	2.90	3.35
United Kingdom	1.90	1.90	1.90	1.85	1.80	1.90	1.80	1.85

[6] Indices of economic freedom (from The Heritage Foundation, adjusted to previous year)

Table A7.: Indices of economic freedom: Trade policy (acronym TRAD_)[7]

Country	1994	1995	1996	1997	1998	1999	2000	2001
Austria	2	2	3	2	2	2	2	2
Belgium	...	2	2	2	2	2	2	2
Bulgaria	3	3	3	4	4	4	4	4
Czech Republic	1	1	1	2	1	1	2	2
Cyprus	...	3	3	3	3	3	1	1
Denmark	...	2	2	2	2	2	2	2
Estonia	**1**	**2**	**2**	**1**	**1**	**1**	**1**	**1**
Finland	...	2	2	2	2	2	2	2
France	2	2	2	2	2	2	2	2
Germany	2	2	2	2	2	2	2	2
Greece	2	2	2	2	2	2	2	2
Hungary	4	4	4	4	4	3	2	2
Ireland	2	2	2	2	2	2	2	2
Italy	2	3	3	2	2	2	2	2
Latvia	...	4	4	2	2	2	2	2
Lithuania	...	4	2	1	1	1	1	1
Luxembourg	...	2	2	2	2	2	2	2
Malta	4	4	4	4	4	4	3	3
Poland	4	4	4	2	2	2	2	2
Portugal	2	2	2	2	2	2	2	2
Romania	1	3	2	2	2	2	3	3
Slovak Republic	2	2	2	3	3	3	2	2
Slovenia	...	4	4	4	4	3	3	4
Spain	2	2	2	2	2	2	2	2
Sweden	2	2	2	2	2	2	2	2
The Netherlands	...	2	2	2	2	2	2	2
Turkey	2	2	1	2	2	2	2	2
United Kingdom	2	2	2	2	2	2	2	2

[7] Indices of economic freedom (from The Heritage Foundation, adjusted to previous year)

Table A8.: Indices of economic freedom: Fiscal burden of government (acronym FISC_) [8]

Country	1994	1995	1996	1997	1998	1999	2000	2001
Austria	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Belgium	...	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Bulgaria	5.0	5.0	5.0	4.5	4.0	4.0	4.0	4.5
Czech Republic	4.0	4.0	4.0	4.5	4.0	4.0	4.0	4.5
Cyprus	...	3.0	3.0	4.0	3.5	3.5	3.5	3.5
Denmark	...	4.0	4.5	4.5	4.5	4.5	4.5	4.5
Estonia	**4.0**	**4.0**	**4.0**	**4.0**	**4.0**	**4.0**	**3.5**	**3.5**
Finland	...	4.0	4.0	4.5	4.5	4.5	4.5	4.5
France	4.0	4.0	5.0	5.0	4.5	5.0	5.0	5.0
Germany	5.0	5.0	5.0	5.0	5.0	5.0	5.0	4.5
Greece	4.0	4.0	4.0	4.0	4.0	4.0	4.5	4.0
Hungary	5.0	4.0	4.0	4.0	4.0	4.0	4.5	4.5
Ireland	4.0	4.0	4.0	4.0	4.0	3.5	3.5	3.5
Italy	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Latvia	...	2.5	3.5	3.5	3.5	3.5	3.5	3.5
Lithuania	...	3.0	4.0	4.0	4.5	4.0	3.5	3.5
Luxembourg	...	4.5	4.5	3.0	4.0	3.0	4.0	4.0
Malta	3.5	3.5	3.5	3.5	3.5	3.5	4.0	4.0
Poland	4.0	4.0	4.0	4.0	4.0	4.0	4.5	4.5
Portugal	4.0	5.0	4.0	4.0	4.0	4.0	4.0	4.0
Romania	5.0	5.0	5.0	5.0	5.0	5.0	4.5	4.0
Slovak Republic	4.0	4.0	4.5	4.5	4.0	4.0	4.5	4.5
Slovenia	...	4.0	4.0	4.0	4.0	4.0	4.0	4.5
Spain	4.0	4.5	4.5	4.5	4.0	4.0	4.0	4.0
Sweden	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
The Netherlands	...	4.5	5.0	5.0	4.5	4.5	4.5	4.0
Turkey	3.0	4.0	4.0	3.0	4.0	3.5	4.0	4.5
United Kingdom	4.5	4.5	4.0	4.0	4.0	4.0	4.0	4.0

[8] Indices of economic freedom (from The Heritage Foundation, adjusted to previous year)

Table A9.: Indices of economic freedom: Government intervention in the economy (acronym GOVE_) [9]

Country	1994	1995	1996	1997	1998	1999	2000	2001
Austria	2.5	2.5	2.5	2.5	2.5	2.0	2.0	2.0
Belgium	...	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Bulgaria	3.0	3.0	3.0	3.0	3.0	3.0	2.0	3.0
Czech Republic	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Cyprus	...	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Denmark	...	4.0	4.0	4.0	4.0	4.0	3.0	3.5
Estonia	**2.0**	**2.0**	**2.0**	**2.0**	**2.5**	**2.0**	**2.0**	**2.0**
Finland	...	2.5	2.0	2.0	2.5	2.5	2.0	2.0
France	2.0	2.0	2.0	2.0	2.0	2.0	2.0	3.0
Germany	2.0	2.0	3.0	2.0	2.0	2.0	2.0	2.0
Greece	3.0	2.0	2.0	2.5	2.5	2.5	2.5	2.0
Hungary	2.0	3.0	3.0	3.0	2.5	1.5	2.0	1.0
Ireland	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Italy	3.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Latvia	...	2.0	2.0	2.0	2.0	2.0	3.0	2.0
Lithuania	...	2.5	2.0	2.0	2.0	2.0	2.0	2.0
Luxembourg	...	2.5	2.5	2.5	2.5	2.0	2.5	3.0
Malta	4.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Poland	3.0	3.0	2.0	2.0	2.0	2.0	2.0	2.0
Portugal	3.0	2.5	2.0	2.0	2.0	2.0	2.0	2.0
Romania	5.0	4.5	3.0	3.0	3.0	3.0	2.0	3.0
Slovak Republic	3.0	3.0	3.0	3.0	3.0	3.0	2.0	3.0
Slovenia	...	2.0	3.0	3.0	3.0	3.0	3.0	3.0
Spain	2.0	2.5	2.0	2.0	3.0	3.0	3.0	3.0
Sweden	5.0	5.0	5.0	5.0	4.0	4.0	4.0	4.0
The Netherlands	...	2.5	2.5	2.0	2.0	2.0	2.0	2.0
Turkey	2.0	2.0	2.0	1.0	2.0	2.0	2.0	2.5
United Kingdom	3.5	2.5	2.0	2.5	2.0	2.0	2.0	2.0

[9] Indices of economic freedom (from The Heritage Foundation, adjusted to previous year)

Table A10.: Indices of economic freedom: Monetary policy (acronym MONE_) [10]

Country	1994	1995	1996	1997	1998	1999	2000	2001
Austria	2	2	1	1	1	1	1	1
Belgium	...	1	1	1	1	1	1	1
Bulgaria	5	5	5	5	5	5	5	5
Czech Republic	4	4	3	3	3	3	2	2
Cyprus	...	2	2	2	2	1	1	2
Denmark	...	1	1	1	1	1	1	1
Estonia	**5**	**5**	**5**	**5**	**5**	**4**	**3**	**2**
Finland	...	1	1	1	1	1	1	1
France	1	1	1	1	1	1	1	1
Germany	2	2	1	1	1	1	1	1
Greece	4	4	3	3	3	2	2	2
Hungary	5	5	5	5	5	4	4	3
Ireland	1	1	1	1	1	1	1	2
Italy	2	2	2	2	1	1	1	1
Latvia	...	5	5	5	4	3	2	2
Lithuania	...	5	5	5	5	4	2	1
Luxembourg	...	1	1	1	1	1	1	1
Malta	2	2	2	2	2	1	1	1
Poland	5	5	5	5	4	4	3	3
Portugal	3	3	2	2	1	1	1	1
Romania	5	5	5	5	5	5	5	5
Slovak Republic	4	4	3	3	3	2	3	3
Slovenia	...	5	5	4	3	3	3	3
Spain	2	2	2	2	1	1	1	1
Sweden	2	2	1	1	1	1	1	1
The Netherlands	...	1	1	1	1	1	1	1
Turkey	5	5	5	5	5	5	5	5
United Kingdom	1	1	2	1	1	2	1	1

[10] Indices of economic freedom (from The Heritage Foundation, adjusted to previous year)

Table A11.: Indices of economic freedom: Capital flows and foreign investment (acronym FORE_) [11]

Country	1994	1995	1996	1997	1998	1999	2000	2001
Austria	2	2	2	2	2	2	2	2
Belgium	...	2	2	2	2	2	2	1
Bulgaria	2	2	3	3	2	2	2	2
Czech Republic	2	2	2	2	2	2	2	2
Cyprus	...	2	2	2	3	3	3	3
Denmark	...	2	2	2	2	2	2	2
Estonia	1	1	1	1	1	1	1	1
Finland	...	2	2	2	2	2	2	2
France	3	3	3	3	3	3	3	3
Germany	2	2	2	2	2	2	1	1
Greece	2	2	2	2	2	2	2	3
Hungary	2	2	2	2	2	2	2	2
Ireland	2	2	2	2	2	2	1	1
Italy	2	2	2	2	2	2	2	2
Latvia	...	3	2	2	2	2	2	2
Lithuania	...	3	2	2	2	2	2	2
Luxembourg	...	2	2	2	2	2	1	1
Malta	2	2	2	2	2	2	3	3
Poland	2	2	2	2	2	2	2	2
Portugal	3	2	2	2	2	2	2	2
Romania	2	2	2	2	2	2	3	3
Slovak Republic	2	2	3	3	3	3	2	2
Slovenia	...	4	3	2	2	3	3	3
Spain	2	2	2	2	2	2	2	2
Sweden	2	2	2	2	2	2	2	1
The Netherlands	...	2	2	2	2	2	1	1
Turkey	2	2	2	2	2	2	2	3
United Kingdom	2	2	2	2	2	2	2	2

[11] Indices of economic freedom (from The Heritage Foundation, adjusted to previous year)

Table A12.: Indices of economic freedom: Banking and Finance (acronym BANK_)[12]

Country	1994	1995	1996	1997	1998	1999	2000	2001
Austria	1	1	1	2	2	2	2	2
Belgium	...	2	2	2	2	2	2	2
Bulgaria	3	3	3	3	3	3	3	3
Czech Republic	1	1	1	1	1	1	1	1
Cyprus	...	2	2	2	2	2	2	2
Denmark	...	2	2	2	2	2	2	1
Estonia	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**1**
Finland	...	3	3	3	3	3	3	2
France	3	3	3	3	3	3	3	3
Germany	2	2	2	3	3	3	3	3
Greece	4	4	4	4	4	4	3	3
Hungary	3	2	2	2	2	2	2	2
Ireland	2	2	2	2	2	2	1	1
Italy	3	3	2	2	2	2	2	2
Latvia	...	3	2	2	2	2	2	2
Lithuania	...	4	3	3	3	3	3	3
Luxembourg	...	2	2	2	2	2	1	1
Malta	3	3	3	3	3	3	2	2
Poland	3	3	3	3	3	3	3	2
Portugal	3	3	3	3	3	3	3	3
Romania	3	3	3	3	3	3	4	4
Slovak Republic	3	3	3	3	3	3	3	2
Slovenia	...	2	2	2	2	3	3	3
Spain	2	3	3	2	2	2	2	2
Sweden	3	3	2	2	2	2	2	1
The Netherlands	...	1	1	1	1	1	1	1
Turkey	2	2	2	2	2	2	3	3
United Kingdom	1	1	1	1	1	1	1	1

[12] Indices of economic freedom (from The Heritage Foundation, adjusted to previous year)

Table A13.: Indices of economic freedom: Wages and prices (acronym WAGE _)[13]

Country	1994	1995	1996	1997	1998	1999	2000	2001
Austria	2	2	2	2	2	2	2	2
Belgium	...	2	2	2	2	2	2	2
Bulgaria	3	3	3	3	3	3	3	2
Czech Republic	2	2	2	2	2	2	2	2
Cyprus	...	3	3	3	3	3	2	2
Denmark	...	1	1	1	1	1	1	1
Estonia	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**1**
Finland	...	3	3	2	2	2	2	2
France	3	3	3	3	3	3	3	3
Germany	2	2	2	2	2	2	2	2
Greece	3	3	3	3	3	3	3	3
Hungary	2	2	2	2	2	2	2	2
Ireland	2	2	2	2	2	2	2	2
Italy	2	3	2	2	2	2	2	2
Latvia	...	2	2	2	2	2	2	2
Lithuania	...	3	3	3	3	3	2	2
Luxembourg	...	2	2	2	2	2	2	2
Malta	4	4	4	4	4	4	4	3
Poland	3	3	3	3	3	3	3	3
Portugal	2	2	2	2	2	2	2	2
Romania	2	2	2	2	2	2	3	3
Slovak Republic	3	3	3	3	3	3	3	3
Slovenia	...	3	3	3	3	3	3	3
Spain	3	3	3	3	3	3	3	2
Sweden	2	2	2	2	2	2	2	2
The Netherlands	...	2	2	3	3	3	2	2
Turkey	3	3	3	3	3	3	3	3
United Kingdom	2	2	2	2	2	2	2	2

[13] Indices of economic freedom (from The Heritage Foundation, adjusted to previous year)

Table A14.: Indices of economic freedom: Property rights (acronym PROP _) [14]

Country	1994	1995	1996	1997	1998	1999	2000	2001
Austria	1	1	1	1	1	1	1	1
Belgium	...	1	1	1	1	1	1	1
Bulgaria	3	3	3	3	3	3	3	3
Czech Republic	2	2	2	2	2	2	2	2
Cyprus	...	3	3	3	2	2	1	1
Denmark	...	1	1	1	1	1	1	1
Estonia	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**
Finland	...	1	1	1	1	1	1	1
France	2	2	2	2	2	2	2	2
Germany	1	1	1	1	1	1	1	1
Greece	2	2	2	2	2	2	2	3
Hungary	2	2	2	2	2	2	2	2
Ireland	1	1	1	1	1	1	1	1
Italy	2	2	2	2	2	2	2	2
Latvia	...	3	3	3	3	3	3	3
Lithuania	...	3	3	3	3	3	3	3
Luxembourg	...	1	1	1	1	1	1	1
Malta	3	3	3	2	2	2	1	1
Poland	3	2	2	2	2	2	2	2
Portugal	2	2	2	2	2	2	2	2
Romania	4	4	4	4	4	4	4	4
Slovak Republic	2	3	3	3	3	3	3	3
Slovenia	...	4	3	2	2	2	2	3
Spain	2	2	2	2	2	2	2	2
Sweden	2	2	2	2	2	2	1	1
The Netherlands	...	1	1	1	1	1	1	1
Turkey	2	2	2	2	2	2	2	3
United Kingdom	1	1	1	1	1	1	1	1

[14] Indices of economic freedom (from The Heritage Foundation, adjusted to previous year)

Table A15.: Indices of economic freedom: Regulation (acronym REGU_)[15]

Country	1994	1995	1996	1997	1998	1999	2000	2001
Austria	3	3	3	3	3	3	3	3
Belgium	...	3	3	3	3	3	3	3
Bulgaria	4	4	4	4	4	4	4	4
Czech Republic	1	1	1	2	2	2	2	3
Cyprus	...	2	2	2	2	2	2	2
Denmark	...	2	2	2	2	2	2	2
Estonia	2	2	2	2	2	2	2	2
Finland	...	4	3	3	3	3	3	2
France	2	2	2	2	2	3	3	3
Germany	2	3	3	4	3	3	3	3
Greece	3	3	3	3	3	3	3	3
Hungary	2	3	3	3	3	3	3	3
Ireland	2	2	2	2	2	2	2	2
Italy	2	3	3	3	3	3	3	3
Latvia	...	3	2	3	3	3	3	3
Lithuania	...	3	3	3	3	3	3	3
Luxembourg	...	2	2	2	2	2	2	2
Malta	3	3	3	3	3	3	3	3
Poland	3	3	3	3	3	3	3	3
Portugal	3	3	3	3	3	3	3	3
Romania	4	4	4	4	4	4	4	4
Slovak Republic	2	3	3	3	3	3	3	3
Slovenia	...	3	3	3	3	3	2	2
Spain	3	3	3	3	3	3	3	3
Sweden	3	3	3	3	3	3	3	3
The Netherlands	...	2	2	3	3	3	3	3
Turkey	2	2	3	3	3	3	3	4
United Kingdom	1	2	2	2	2	2	2	2

[15] Indices of economic freedom (from The Heritage Foundation, adjusted to previous year)

Table A16.: Indices of economic freedom: Black market (acronym BLAC_) [16]

Country	1994	1995	1996	1997	1998	1999	2000	2001
Austria	1	1	1	1	1	1	1	1.5
Belgium	...	1	1	1	1	1	1	2
Bulgaria	4	4	4	4	4	3	3	3.5
Czech Republic	3	3	4	3	3	3	3	3.5
Cyprus	...	3	3	3	3	3	3	2
Denmark	...	1	1	3	3	3	2	1
Estonia	**3**	**3**	**3**	**2**	**2**	**2**	**2**	**2.5**
Finland	...	1	1	1	1	1	1	1
France	1	1	1	1	1	1	1	2
Germany	1	1	1	1	1	1	1	1.5
Greece	3	3	3	3	3	3	3	3
Hungary	3	3	3	3	3	2	2	2.5
Ireland	3	3	3	1	1	1	1	1.5
Italy	2	1	2	2	2	2	2	2.5
Latvia	...	3	4	4	4	4	4	3.5
Lithuania	...	4	4	4	4	4	4	3
Luxembourg	...	1	1	1	1	1	1	1
Malta	5	5	4	4	4	4	4	4
Poland	3	2	3	3	3	3	3	3.5
Portugal	2	2	2	2	2	2	2	2
Romania	5	4	4	3	3	3	4	4
Slovak Republic	3	3	3	3	3	3	3	3.5
Slovenia	...	4	3	3	3	3	3	2.5
Spain	3	3	2	2	2	2	2	2
Sweden	1	1	1	1	1	1	1	1
The Netherlands	...	1	1	1	1	1	1	1
Turkey	5	5	3	3	3	3	3	3.5
United Kingdom	1	1	1	1	1	1	1	1.5

[16] Indices of economic freedom (from The Heritage Foundation, adjusted to previous year)

Table A17.: EU member states and candidate countries in World Competitiveness Scoreboard 2002 (the list includes 49 countries)

2002 ranking	Countries (with 2001 ranking in brackets)	Score for 2002	Score for 2001
2.	(3) Finland	84.351	83.380
3.	(4) Luxembourg	84.292	82.814
4.	(5) Netherlands	82.802	81.457
6.	(15) Denmark	80.429	71.788
10.	(7) Ireland	76.218	79.199
11.	(8) Sweden	76.193	77.862
13.	(14) Austria	74.665	72.539
15.	(12) Germany	70.942	74.043
16.	(19) United Kingdom	68.930	64.781
18.	(17) Belgium	66.734	66.026
21.	**(22) Estonia**	**63.444**	**60.196**
22.	(25) France	61.641	59.556
23.	(23) Spain	61.519	60.135
28.	(27) Hungary	56.702	55.638
29.	(35) Czech Republic	55.322	46.676
32.	(32) Italy	51.856	49.581
33.	(34) Portugal	49.318	48.363
36.	(30) Greece	46.978	49.956
37.	(37) Slovak Republic	45.714	43.590
38.	(39) Slovenia	45.499	42.485
45.	(47) Poland	30.209	32.007
46.	(44) Turkey	27.965	35.438

Source: IMD, World Competitiveness Yearbook[17]

[17] http://www01.imd.ch/wcy/ranking/

Table A18. Gross capital formation as per cent of GDP in EU member states and candidate countries

Country	1994	1995	1996	1997	1998	1999	2000	2001
Austria	23.6	24.3	23.7	24.2	24.2	24.0	24.2	23.0
Belgium	20.3	20.1	19.9	20.4	20.9	21.2	21.5	20.7
Bulgaria	...	...	8.4	11.4	16.9	19.1	16.6	16.9
Czech Republic	29.8	34.0	34.3	32.6	30.2	27.9	29.7	30.0
Cyprus	...	...	22.3	19.8	20.8	19.4	18.2	18.6
Denmark	17.6	19.7	18.9	20.8	21.7	20.2	22.1	21.1
Estonia	**27.4**	**26.6**	**27.8**	**30.9**	**29.4**	**24.6**	**25.8**	**28.5**
Finland	16.9	17.5	16.8	18.4	19.7	19.3	19.8	20.1
France	19.0	19.2	18.3	17.9	19.1	19.4	20.6	20.1
Germany	23.2	22.7	21.7	21.6	21.8	22.2	22.7	19.6
Greece	19.2	18.9	19.8	20.2	21.9	22.3	22.7	…
Hungary	22.1	23.9	27.2	27.7	29.7	28.5	30.6	27.3
Ireland	16.1	18.1	19.6	21.5	23.4	23.3	23.9	23.4
Italy	18.5	19.3	18.7	18.9	19.3	19.8	20.5	19.7
Latvia	...	...	18.8	22.8	27.6	27.0	27.1	27.7
Lithuania	...	...	24.5	26.5	24.4	22.7	20.7	21.9
Luxembourg	20.4	21.8	20.2	20.4	19.5	22.8	21.2	22.3
Malta	...	...	28.6	25.6	23.7	24.0	27.9	...
Poland	17.6	19.7	21.9	24.6	26.2	26.4	26.5	27.2
Portugal	23.0	24.3	23.8	25.7	26.7	27.2	28.2	28.2
Romania	...	...	25.9	20.6	17.8	17.0	19.4	19.0
Slovak Republic	21.4	26.5	37.1	36.6	36.1	31.9	30.1	34.7
Slovenia	...	...	23.5	24.2	25.6	28.4	27.8	25.5
Spain	21.5	22.3	21.9	22.2	23.2	24.7	25.9	25.5
Sweden	15.9	16.6	15.9	15.6	16.8	17.0	17.9	17.6
The Netherlands	20.3	21.0	21.3	21.6	21.9	22.0	22.3	21.9
Turkey	21.5	25.5	24.6	25.1	24.2	23.4	24.4	15.5
United Kingdom	16.5	16.9	16.8	17.2	18.0	17.5	17.9	16.6

Source: The World Bank. Data Query[18]

[18] http://www.worldbank.org/data/dataquery.html

Table A19.: Capital and financial account, ECU/EUR mill.

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Capital and Financial Account	**188.1**	**144.7**	**191.4**	**424.3**	**699.0**	**435.3**	**378.1**	**480.1**	**352.3**	**866.8**
Capital account	0.0	-0.5	-0.6	-0.5	-0.1	1.6	1.1	17.8	5.8	20.4
Financial account	188.1	145.3	192.0	424.9	699.1	433.7	377.0	462.3	346.5	846.4
Direct Investment	133.9	181.7	154.1	88.2	113.7	506.2	205.0	358.0	377.1	199.5
Abroad	-5.3	-1.9	-2.0	-32.1	-122.1	-5.2	-79.2	-66.7	-225.6	-130.4
Estonia	139.2	183.7	156.1	120.4	235.7	511.4	284.3	424.7	602.7	329.9
Portfolio Investment	-0.2	-11.9	-17.2	118.4	233.3	-1.5	10.0	118.5	104.1	235.5
Assets	-0.3	-18.8	-25.8	-41.7	-148.0	-8.1	-121.1	36.6	14.6	-122.9
Equity securities	-0.3	-12.2	3.9	-12.0	-79.0	31.7	12.0	3.4	15.2	4.1
Debt securities	0.0	-6.5	-29.7	-29.7	-69.0	-39.8	-133.1	33.2	-0.6	-127.0
Liabilities	0.2	6.8	8.6	160.1	381.3	6.6	131.1	81.9	89.5	358.4
Equity securities	0.1	6.8	7.7	138.9	112.5	25.4	210.4	-34.4	36.2	61.1
Debt securities	0.1	0.0	0.9	21.2	268.7	-18.8	-79.3	116.4	53.3	297.3
Other investment	54.4	-24.5	55.1	218.3	352.2	-71.1	162.0	-14.2	-134.7	411.4
Assets	-123.5	-121.2	-75.5	-7.1	-295.8	-157.1	-105.5	-180.2	-332.3	-7.7
Long-term	-0.6	-2.4	-15.0	-1.2	-67.8	-49.8	27.0	-70.9	-20.6	-66.9
Short-term	-122.9	-118.8	-60.5	-6.0	-228.0	-107.3	-132.5	-109.3	-311.7	59.2
Liabilities	177.9	96.7	130.6	225.4	648.0	86.1	267.5	166.0	197.6	419.1
Long-term	109.1	7.4	70.6	118.3	293.9	79.7	108.1	-35.1	116.1	142.9
Short-term	68.7	89.4	60.0	107.1	354.2	6.3	159.4	201.1	81.5	276.2

Source: Bank of Estonia[19]

[19] http://www.ee/epbe/en/statistical.html

Table A20.: Direst investment flows by fields of activity, EUR mill.

	1994	1995	1996	1997	1998	1999	2000	2001	2002
Agriculture, hunting, forestry	2.4	-1.9	-6.3	0.1	6.7	8.7	4.2	-2.0	0.3
Fishing	0.0	x	-0.1	-0.1	0.1	0.7	-0.1	0.1	x
Mining, quarrying	0.0	x	0.5	0.5	3.0	0.9	4.4	2.8	1.6
Manufacturing	96.5	63.3	32.9	79.0	97.9	73.2	70.4	93.7	50.8
Electricity, gas and water supply	x	1.2	-1.1	5.1	8.0	16.8	12.3	136.4	-34.9
Construction	1.2	0.4	2.6	4.0	10.2	1.6	12.6	17.1	18.4
Wholesale, retail trade	28.6	55.5	59.4	35.3	59.7	28.3	26.9	94.9	55.2
Hotels, reastaurants	2.5	4.3	3.9	4.9	2.4	2.6	17.2	5.8	3.0
Transport, storage, communication	33.8	21.6	14.9	54.9	19.0	68.7	66.8	63.9	76.9
Finance	5.7	9.9	1.7	39.8	273.0	58.1	112.3	127.6	91.5
Real estate, renting and business activities	4.8	3.6	8.4	10.7	26.9	16.8	79.8	46.5	53.2
Public administration and defence; compulsory social security	x		x	x		x	x	0.8	x
Education	0.1	0.0	0.1	0.0	0.0	0.1	0.0	0.6	0.0
Health care	0.0	-0.5	x	x	0.0	x	x	0.8	0.1
Other community, social and personal service activities	0.1	2.1	3.0	-0.3	3.4	3.8	16.5	11.7	1.0
Not classified	7.0	-3.7	0.4	1.8	1.4	3.6	1.3	2.1	12.3
Total	183.7	156.1	120.4	235.7	511.4	284.3	424.7	602.7	329.5
DI from Estonia to other countries									
Agriculture, hunting, forestry				x	x	x	x	x	x
Fishing				x				x	x
Mining, quarrying							x	x	x
Manufacturing	0.0	-0.5	-3.1	-12.9	2.7	-20.9	-18.3	-39.5	7.1
Electricity, gas and water supply						x	x	x	x
Construction		0.0	-0.1	-0.9	0.3	0.3	-1.3	-1.8	-2
Wholesale, retail trade	-0.4	-1.4	0.5	-4.8	-11.3	-0.3	3.3	-4.7	-14.5
Hotels, restaurants				x	x	x	-0.1	x	-3.9
Transport, storage, communication		-0.2	-17.0	-20.8	24.7	2.3	-4.8	-28.6	-58.1
Finance	x	x	-11.5	-70.7	-20.1	-55.4	3.7	-122.0	-39.9
Real estate, renting and business activities	x	0.3	-0.7	-11.2	-0.6	-5.3	-47.9	-26.8	-18.2
Public administration and defence; compulsory social security			x			x			
Education									
Health care									
Other community, social and personal service activities		x	x	-0.6	x	0.1	-0.5	-1.0	-0.01
Not classified	-2.0	0.1	x	0.0	-0.3	-0.1		x	x
Total	-1.9	-2.0	-32.1	-122.1	-5.2	-79.2	-66.7	-225.5	-130.0
FDI NET	**181.7**	**154.1**	**88.2**	**113.7**	**506.2**	**205.0**	**358.0**	**377.2**	**199.3**

x - not published due to data security requirement (less than 3 projects) "-" - data not available.

Source: Bank of Estonia[20]

[20] http://www.ee/epbe/en/statistical.html

Table A21.: Special exports (1993 and 1994 general exports) by HS commodity chapter at current prices, EUR mill.

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Commodities total	661.1	1102.9	1285.0	1412.0	1888.1	2232.3	2238.5	3444.6	3697.5	3633.8
I Live animals; animal products	65.5	84.7	100.8	97.1	118.1	110.6	88.6	125.7	155.1	153.0
..01 Live animals	1.7	1.7	1.5	0.5	0.6	0.6	0.9	1.7	7.1	10.2
..02 Meat and edible meat offal	5.9	2.8	6.1	2.9	5.2	8.2	9.8	14.8	17.6	16.6
..03 Fish and crustaceans, molluscs and other aquatic invertebrates	8.8	30.6	32.1	22.1	31.1	45.1	39.0	59.3	68.2	62.1
..04 Dairy products; bird's eggs; natural honey; edible products of animal origin, ...	49.0	49.3	60.7	71.3	80.9	56.5	38.7	49.4	61.6	63.3
..05 Products of animal origin, not elsewhere specified or included	0.1	0.3	0.5	0.2	0.3	0.1	0.2	0.5	0.6	0.8
II Vegetable products	7.3	19.0	15.6	17.2	21.1	20.9	16.1	18.1	18.5	21.0
..06 Live trees and other plants; bulbs, roots and the like; cut flowers and ornamental foliage	0.6	1.6	2.1	2.0	1.3	0.9	0.7	1.0	0.8	1.1
..07 Edible vegetables and certain roots and tubers	0.8	1.0	1.3	1.2	0.9	1.5	1.4	2.4	2.4	2.6
..08 Edible fruit and nuts; peel of citrus fruit or melons	2.4	6.2	3.0	5.7	6.1	4.4	2.5	2.9	2.5	5.4
..09 Coffee, tea, mate, spices	1.2	4.1	3.9	4.4	6.8	6.6	4.8	4.4	3.5	3.3
..10 Cereals	0.5	0.2	0.4	0.3	1.4	0.2	1.1	2.3	2.4	3.5
..11 Products of the milling industry; malt; starches; inulin; wheat gluten	0.6	1.0	1.6	1.2	1.9	4.4	2.8	2.5	2.6	1.3
..12 Oil seeds and oleaginous fruits; miscellaneous grains, seeds and fruit; ...	0.8	0.9	1.5	1.5	1.6	2.1	1.9	1.4	2.6	2.7
..13 Shellac; gums, resins and other vegetable saps and extracts	0.1	3.6	1.4	0.6	0.6	0.4	0.3	0.6	0.9	0.7
..14 Vegetable plaiting materials; vegetable products not elsewhere specified or included	0.3	0.3	0.4	0.4	0.3	0.4	0.5	0.6	0.8	0.4
III Animal or vegetable fats and oils and their cleavage products; prepared edible fats; ...	4.8	5.1	4.4	2.5	1.4	0.9	0.9	5.2	7.2	13.2
..15 Animal or vegetable fats and oils or their cleavage products; prepared edible fats; ...	4.8	5.1	4.4	2.5	1.4	0.9	0.9	5.2	7.2	13.2
IV Prepared foodstuffs; beverages, spirits and vinegar; tobacco and ...	73.2	135.6	89.3	96.9	75.6	86.1	63.2	54.8	115.3	113.8
..16 Preparations of meat, of fish, or of crustaceans	30.0	58.5	56.3	60.3	37.2	38.9	28.0	22.4	71.6	68.1
..17 Sugar and sugar confectionery	12.1	15.9	4.9	4.4	7.7	8.5	4.4	3.7	3.8	3.2
..18 Cocoa and cocoa preparations	15.7	23.9	6.7	4.2	7.2	6.9	3.7	2.8	2.3	2.1
..19 Preparations of cereals, flour, starch or milk; pastry cooks' products	1.4	3.5	1.6	0.9	0.8	4.2	4.0	2.2	3.6	2.6

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
..20 Preparations of vegetables, fruit, nuts or other parts of plants	1.9	5.2	1.7	3.0	2.2	2.0	1.7	1.1	1.4	1.9
..21 Miscellaneous edible preparations	1.9	4.7	4.2	6.3	4.6	5.1	5.4	6.4	8.7	9.5
..22 Beverages, spirits and vinegar	5.9	14.6	8.7	14.5	14.0	19.3	15.4	14.8	19.9	22.9
..23 Residues and waste from the food industries; prepared animal fodder	1.9	1.9	4.4	1.4	1.7	1.2	0.6	1.3	3.9	3.5
..24 Tobacco and manufactured tobacco substitutes	2.3	7.3	0.9	1.8	0.2	0.0	0.0	0.0	0.0	0.0
V Mineral products	36.5	90.1	83.2	81.7	88.1	61.4	57.3	84.2	78.9	96.8
..25 Salt; sulphur; earths and stone, lime and cement	3.2	11.6	13.7	13.1	16.4	15.4	15.4	15.3	16.3	14.4
..26 Ores, slag and ash	1.2	0.1	0.3	0.5	0.1	0.2	0.2	0.2	0.3	0.2
..27 Mineral fuels, mineral oils and products of their distillation; bituminous substances; ..	32.1	78.4	69.3	68.0	71.5	45.8	41.7	68.7	62.3	82.2
VI Products of the chemical or allied industries	32.9	74.8	102.4	114.7	121.6	110.8	91.3	127.7	159.4	161.7
..28 Inorganic chemicals; organic or inorganic compounds of precious metals, ...	7.2	19.7	26.3	29.1	23.8	22.7	18.1	16.3	19.7	15.7
..29 Organic chemicals	6.6	10.3	14.4	16.3	19.2	20.4	16.1	20.9	19.7	16.4
..30 Pharmaceutical products	4.6	11.6	15.1	19.5	24.3	19.4	20.0	24.1	20.5	20.4
..31 Fertilizers	3.3	7.8	13.1	11.4	7.4	6.4	4.3	19.9	23.2	18.6
..32 Tanning or dyeing extracts; tannins and their derivatives; dyes, pigments and ...	4.9	12.6	18.9	27.5	32.9	25.5	18.7	29.1	56.4	67.7
..33 Essential oils and resinoids; perfumery, cosmetic or toilet preparations	1.8	5.0	2.7	2.2	3.5	4.4	2.6	1.6	2.1	2.6
..34 Soap, organic surfaceactive agents, washing and lubricating preparations, prepared waxes, ...	1.8	4.9	6.2	4.0	3.3	3.9	4.5	4.7	5.6	7.0
..35 Albuminoidal substances; modified starches;	1.4	0.8	1.1	1.5	1.9	2.7	2.9	5.0	4.8	5.4
..36 Explosives; pyrotechnic products; matches; pyrophoric alloys; …	0.6	0.1	0.5	1.0	1.3	1.0	0.7	1.2	1.6	1.4
..37 Photographic or cinematographic goods	0.3	0.9	0.4	0.3	0.2	0.2	0.2	0.6	0.2	0.1
..38 Miscellaneous chemical products	0.4	1.0	3.5	2.0	3.7	4.2	3.4	4.2	5.6	6.3
VII Plastics and articles thereof; rubber and articles thereof	10.1	19.7	32.3	28.6	38.2	47.1	45.3	61.2	73.9	94.4
..39 Plastics and articles thereof	7.9	14.6	27.4	24.8	33.5	40.1	37.8	50.9	63.3	79.8
..40 Rubber and articles thereof	2.3	5.1	4.9	3.8	4.7	7.0	7.5	10.3	10.6	14.5
VIII Raw hides and skins, leather, furskins and articles thereof; saddlery and harness; ...	11.9	13.6	15.6	20.0	23.0	24.1	24.2	32.4	43.1	44.5
..41 Raw hides and skins (other than furskins) and leather	5.7	7.8	8.5	6.8	8.0	6.9	6.1	5.3	5.2	4.1

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
..42 Articles of leather; saddlery and harness, travel goods, hand-bags and similar containers; ...	3.0	2.1	2.3	2.9	3.5	3.9	4.4	5.0	6.6	7.5
..43 Furskins and artificial fur; manufactures thereof	3.2	3.8	4.9	10.3	11.6	13.4	13.8	22.1	31.3	32.9
IX Wood and articles of wood; wood charcoal; cork and articles of cork; manufactures of straw, ...	51.8	112.7	167.0	176.7	293.6	358.8	400.2	460.6	489.4	548.4
..44 Wood and articles of wood; wood charcoal	51.7	112.6	166.6	176.4	293.4	358.5	399.8	460.3	489.1	548.0
..45 Cork and articles of cork	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
..46 Manufactures of straw, of esparto or of other plaiting materials; basketware and wickerwork	0.1	0.1	0.4	0.3	0.2	0.3	0.4	0.3	0.4	0.4
X Pulp of wood or of other fibrous cellulosic material; waste and scrap of paper or paperboard; ...	4.1	9.1	15.5	26.2	36.5	43.6	47.8	63.4	72.4	84.2
..47 Pulp of wood or of other fibrous cellulosic material; waste and scrap of paper or paperboard	0.4	0.4	0.8	0.7	0.9	0.8	0.9	1.5	1.4	1.6
..48 Paper and paperboard; articles of paper pulp, of paper or of paperboard	2.7	6.6	12.6	23.3	32.7	38.4	40.5	54.7	59.9	68.5
..49 Printed books, newspapers, pictures and other products of the printing industry; ...	0.9	2.1	2.1	2.2	2.9	4.3	6.4	7.2	11.1	14.2
XI Textiles and textile articles	84.5	151.5	188.8	225.0	276.7	320.1	314.9	389.6	424.4	438.2
..50 Silk	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0
..51 Wool, fine or coarse animal hair; horsehair yarn and woven fabric	0.5	0.4	0.6	1.0	1.8	1.8	2.2	3.2	4.0	5.7
..52 Cotton and articles thereof	18.7	30.2	38.2	51.1	63.4	60.0	42.3	56.8	53.5	53.1
..53 Other vegetable fibres; paper yarn and woven fabrics of paperyarn	0.2	0.4	3.6	1.8	0.9	8.9	13.9	24.5	31.8	34.1
..54 Man-made filaments	0.7	0.5	0.7	0.8	1.1	1.0	1.0	1.6	1.5	1.4
..55 Man-made staple fibres	0.5	0.8	0.4	3.3	1.3	2.2	1.3	2.5	2.5	2.2
..56 Wadding, felt and nonwovens; special yarns; twine, cordage, ropes and cables ...	2.9	8.9	12.8	16.2	17.3	18.9	13.2	17.4	18.6	12.1
..57 Carpets and other textile floor coverings	3.2	1.2	1.5	1.9	2.1	2.5	2.6	6.0	8.0	9.0
..58 Special woven fabrics; tufted textile fabrics; lace; tapestries; trimmings; embroidery	0.3	0.1	0.3	0.2	0.3	0.3	0.3	0.4	1.1	1.4
..59 Impregnated, coated, covered or laminated textile fabrics; ...	0.4	0.4	0.5	0.7	2.0	1.4	1.0	1.7	1.6	1.7
..60 Knitted or crocheted fabrics	0.0	0.1	0.2	0.1	0.5	0.5	0.6	0.9	2.6	4.0
..61 Articles of apparel and clothing accessories; knitted or crocheted	14.2	28.3	30.6	33.1	42.7	46.7	49.4	54.5	55.6	57.3

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
..62 Articles of apparel and clothing accessories, not knitted or crocheted	32.0	61.9	78.0	87.6	108.5	129.9	138.6	158.9	176.2	192.0
..63 Other made-up textile articles; sets; worn clothing and worn textile articles; rags	10.9	18.2	21.3	27.1	34.7	45.9	48.4	61.3	67.3	64.2
XII Footwear, headgear, umbrellas, sun umbrellas, walking sticks, seat-sticks, whips, ...	8.4	16.2	20.3	25.5	27.9	34.3	39.6	49.2	48.4	52.9
..64 Footwear, gaiters and the like; parts of such articles	7.7	14.9	18.1	23.1	25.2	31.2	36.5	45.5	44.4	48.1
..65 Headgear and parts thereof	0.6	1.2	2.1	2.2	2.6	2.9	2.9	3.6	3.8	4.4
..66 Umbrellas, sun umbrellas, walking-sticks, seat-sticks, whips, riding-crops and parts thereof	0.0	0.1	0.2	0.1	0.1	0.3	0.1	0.1	0.1	0.1
..67 Prepared feathers and down and articles made of feathers or of down; artificial flowers; ...	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.2
XIII Articles of stone, plaster, cement, asbestos, mica and similar materials; ...	13.1	18.7	21.0	24.2	33.1	31.5	34.7	41.4	44.5	50.1
..68 Articles of stone, plaster, cement, asbestos, mica or similar materials	7.1	8.3	5.3	5.5	7.7	7.0	12.0	11.8	11.6	14.7
..69 Ceramic products	1.0	1.6	1.6	2.1	2.6	2.3	2.3	3.2	4.6	5.0
..70 Glass and glassware	5.1	8.8	14.1	16.6	22.9	22.2	20.4	26.4	28.4	30.4
XIV Natural or cultured pearls, precious or semi-precious stones, precious metals, ...	8.3	4.2	5.1	4.6	6.3	6.5	6.5	8.8	10.4	9.9
..71 Natural or cultured pearls, precious or semi-precious stones, precious metals, metals clad ...	8.3	4.2	5.1	4.6	6.3	6.5	6.5	8.8	10.4	9.9
XV Base metals and articles of base metal	72.2	88.0	88.2	92.2	137.0	173.5	173.8	244.7	253.9	283.3
..72 Iron and steel	18.2	27.6	24.0	21.8	36.4	61.4	52.2	87.4	66.1	69.9
..73 Articles of iron or steel	9.4	16.5	30.5	44.6	71.6	83.5	83.2	98.8	126.8	139.1
..74 Copper and articles thereof	11.4	6.5	7.2	4.6	6.0	5.3	6.9	13.0	11.5	9.9
..75 Nickel and articles thereof	17.0	11.3	6.1	1.9	0.1	0.0	0.3	0.3	0.3	0.5
..76 Aluminium and articles thereof	3.3	4.2	6.3	5.6	7.4	8.2	13.9	29.8	30.4	33.2
..78 Lead and articles thereof	0.1	0.3	0.4	1.1	0.2	0.1	0.5	0.2	0.3	0.2
..79 Zinc and articles thereof	0.3	0.9	1.2	1.2	1.2	1.0	1.3	0.9	0.9	1.0
..80 Tin and articles thereof	0.3	0.2	0.2	0.2	0.0	0.1	0.2	0.3	0.2	0.1
..81 Other base metals; cermets; articles thereof	10.4	14.4	6.4	3.8	4.1	4.5	6.0	1.8	3.3	14.3
..82 Tools, implements, cutlery, spoons and forks of base metal; parts thereof	0.9	1.2	1.3	2.2	3.4	3.4	3.9	5.2	5.4	6.5
..83 Miscellaneous articles of base metal	0.9	4.8	4.5	5.3	6.7	6.2	5.3	7.0	8.8	8.5
XVI Machinery and mechanical appliances; electrical equipment; parts thereof; sound recorders ...	52.8	102.4	179.4	199.8	365.5	526.6	544.5	1289.9	1222.5	901.3

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
..84 Nuclear reactors, boilers, machinery and mechanical appliances; parts thereof	28.7	40.4	113.0	103.4	97.7	96.7	86.6	120.1	130.6	137.5
..85 Electrical machinery and equipment and parts thereof; sound recorders and reproducers, ...	24.2	62.1	66.4	96.4	267.8	429.9	457.9	1169.8	1091.9	763.8
XVII Vehicles, aircraft, vessels and associated transport equipment	73.5	83.9	60.7	57.8	71.2	76.3	67.8	88.4	119.0	149.6
..86 Railway and tramway locomotives, rolling-stock and parts thereof; ...	0.5	1.5	1.5	2.9	1.9	1.9	3.4	7.0	7.0	6.8
..87 Vehicles other than railway or tramway rolling-stock, and parts and accessories thereof	69.2	75.3	50.9	45.3	61.8	64.7	57.5	69.9	99.1	126.0
..88 Aircraft, spacecraft and parts thereof	0.7	1.2	0.6	0.8	1.6	4.2	2.5	3.9	4.6	7.1
..89 Ships, boats and floating structures	2.9	5.9	7.8	8.7	5.9	5.4	4.5	7.6	8.4	9.8
XVIII Optical, photographic, cinematographic, measuring, checking, precision, medical ..	10.4	13.5	16.5	24.8	34.7	49.2	44.7	68.8	61.0	67.3
..90 Optical, photographic, cinematographic, measuring, checking, precision, medical ..	9.2	12.8	15.6	23.0	33.0	47.1	42.6	65.7	57.8	63.9
..91 Clocks and watches and parts thereof	0.2	0.2	0.3	0.4	0.2	0.4	0.5	0.5	0.6	0.5
..92 Musical instruments; parts and accessories of such articles	1.1	0.6	0.7	1.4	1.5	1.7	1.6	2.6	2.6	2.8
XIX Arms and ammunition; parts and accessories thereof	0.3	0.1	0.3	0.0	0.6	0.1	0.1	0.0	0.0	0.0
..93 Arms and ammunition; parts and accessories thereof	0.3	0.1	0.3	0.0	0.6	0.1	0.1	0.0	0.0	0.0
XX Miscellaneous manufactured articles	35.4	59.8	78.5	96.1	117.7	149.5	176.1	228.7	298.6	348.6
..94 Furniture; bedding; mattresses, mattress supports, cushions and similar stuffed furnishings;...	29.4	49.0	64.7	83.1	101.6	134.2	160.7	204.3	269.6	318.9
..95 Toys, games and sports requisites; parts and accessories	5.5	10.0	12.7	11.4	14.6	13.1	13.2	19.0	19.9	18.9
..96 Miscellaneous manufactured articles	0.6	0.9	1.1	1.6	1.6	2.3	2.2	5.4	9.1	10.8
XXI Works of art, collectors' pieces, and antiques	3.8	0.1	0.1	0.2	0.3	0.3	0.5	0.9	1.5	1.5
..97 Works of art, collectors' pieces and antiques	3.8	0.1	0.1	0.2	0.3	0.3	0.5	0.9	1.5	1.5
XXII Supplies for foreign vessels	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.8	0.0	0.0
..99 Supplies for foreign vessels	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.8	0.0	0.0

Source: Statistical Office of Estonia[21]

[21] http://gatekeeper.stat.ee:8000/px-web.2001/Dialog/statfileri.asp

Table A22.: Special imports (1993 and 1994 general imports) by HS commodity section at current prices, EUR mill.

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Commodities total	737.3	1399.9	1851.8	2317.7	3122.6	3498.8	3223.6	4615.2	4798.2	5078.9
I Live animals; animal products	8.5	29.2	38.7	65.6	95.8	87.2	60.7	76.2	96.9	96.1
..01 Live animals	0.7	1.6	0.7	0.6	0.9	1.1	0.8	1.0	1.3	1.2
..02 Meat and edible meat offal	2.8	9.6	11.2	24.8	27.4	27.5	28.4	36.3	44.3	37.1
..03 Fish and crustaceans, molluscs and other aquatic invertebrates	1.8	9.5	9.9	13.9	24.1	23.4	16.2	20.6	31.2	33.6
..04 Dairy products; bird's eggs; natural honey; edible products of animal origin, ...	3.1	8.0	16.1	25.4	42.1	33.3	13.0	16.8	18.0	21.9
..05 Products of animal origin, not elsewhere specified or included	0.1	0.4	0.8	0.9	1.3	2.0	2.2	1.7	2.2	2.3
II Vegetable products	17.2	38.2	58.8	78.1	79.7	95.3	95.2	108.5	114.9	122.3
..06 Live trees and other plants; bulbs, roots and the like; cut flowers and ornamental foliage	0.8	3.1	4.3	5.3	6.1	6.6	5.9	6.6	7.6	7.9
..07 Edible vegetables and certain roots and tubers	1.1	3.2	5.0	6.2	7.6	10.3	12.5	12.2	15.5	17.2
..08 Edible fruit and nuts; peel of citrus fruit or melons	3.5	10.1	13.4	16.7	16.6	20.8	28.0	29.4	32.1	32.3
..09 Coffee, tea, mate, spices	5.7	12.2	19.3	18.1	27.6	26.9	24.9	25.0	23.0	23.0
..10 Cereals	2.7	2.5	5.9	15.8	5.8	8.1	6.8	15.7	10.8	16.8
..11 Products of the milling industry; malt; starches; inulin; wheat gluten	0.9	4.4	8.7	13.2	11.1	18.7	13.8	14.9	15.7	13.3
..12 Oil seeds and oleaginous fruits; miscellaneous grains, seeds and fruit; ...	2.3	1.8	1.4	2.3	4.0	3.3	2.7	4.2	9.6	11.1
..13 Shellac; gums, resins and other vegetable saps and extracts	0.3	0.9	0.8	0.6	0.9	0.7	0.6	0.4	0.6	0.7
..14 Vegetable plaiting materials; vegetable products not elsewhere specified or included	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
III Animal or vegetable fats and oils and their cleavage products; prepared edible fats; ...	9.0	17.0	21.8	21.1	22.3	20.7	18.6	17.7	24.2	33.3
..15 Animal or vegetable fats and oils or their cleavage products; prepared edible fats; ...	9.0	17.0	21.8	21.1	22.3	20.7	18.6	17.7	24.2	33.3
IV Prepared foodstuffs; beverages, spirits and vinegar; tobacco and ...	77.9	139.1	135.4	168.4	198.8	192.7	173.5	192.2	215.3	239.1
..16 Preparations of meat, of fish, or of crustaceans	1.7	6.0	4.2	6.0	5.0	4.9	4.9	7.0	7.8	9.0
..17 Sugar and sugar confectionery	20.5	28.2	19.3	23.3	23.4	22.3	19.0	25.0	27.3	26.6
..18 Cocoa and cocoa preparations	14.1	24.2	13.7	15.8	16.3	14.4	12.3	12.7	13.6	16.0
..19 Preparations of cereals, flour, starch or milk; pastrycooks' products	5.5	11.2	13.2	15.5	16.2	16.8	17.4	17.6	21.2	22.7

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
..20 Preparations of vegetables, fruit, nuts or other parts of plants	3.0	9.0	11.5	16.6	17.7	20.1	20.1	20.6	22.5	23.2
..21 Miscellaneous edible preparations	8.2	17.2	22.0	22.6	28.1	25.5	19.9	22.0	27.7	33.0
..22 Beverages, spirits and vinegar	8.9	26.9	28.3	33.4	44.2	46.9	40.6	44.5	47.6	55.2
..23 Residues and waste from the food industries; prepared animal fodder	9.0	6.6	14.6	20.2	17.9	18.8	15.1	20.3	25.6	28.2
..24 Tobacco and manufactured tobacco substitutes	6.9	9.8	8.6	15.1	30.1	23.1	24.2	22.4	21.9	25.2
V Mineral products	91.3	197.7	195.7	213.9	246.9	202.7	194.5	282.1	295.1	310.2
..25 Salt; sulphur; earths and stone, lime and cement	1.6	4.3	8.4	7.6	8.9	10.7	10.8	10.9	11.8	15.0
..26 Ores, slag and ash	0.0	0.1	0.8	0.9	0.8	1.2	1.8	0.4	2.7	12.1
..27 Mineral fuels, mineral oils and products of their distillation; bituminous substances; ..	89.7	193.4	186.5	205.3	237.2	190.9	181.8	270.8	280.5	283.1
VI Products of the chemical or allied industries	49.1	106.0	152.4	196.3	237.7	250.3	254.6	306.2	337.0	372.2
..28 Inorganic chemicals; organic or inorganic compounds of precious metals, ...	3.4	7.2	12.0	16.5	14.7	14.5	14.3	9.4	11.5	17.4
..29 Organic chemicals	6.0	9.0	12.1	12.3	19.2	17.1	17.7	26.4	22.0	22.4
..30 Pharmaceutical products	12.0	26.6	38.8	44.8	57.0	71.3	71.0	83.3	93.5	106.8
..31 Fertilizers	1.0	1.7	5.2	7.7	8.6	8.0	9.2	22.3	27.9	22.9
..32 Tanning or dyeing extracts; tannins and their derivatives; dyes, pigments and ...	7.2	16.5	23.7	31.7	40.1	41.2	37.2	45.4	53.0	61.2
..33 Essential oils and resinoids; perfumery, cosmetic or toilet preparations	6.6	15.5	17.4	22.6	32.2	39.0	38.3	40.0	44.0	46.3
..34 Soap, organic surfaceactive agents, washing and lubricating preparations, prepared waxes, ...	2.4	8.6	13.4	15.1	18.0	19.7	21.7	23.6	25.9	29.6
..35 Albuminoidal substances; modified starches;	1.2	2.3	3.7	5.0	4.4	6.7	6.8	9.3	10.4	9.2
..36 Explosives; pyrotechnic products; matches; pyrophoric alloys; …	4.3	9.0	11.2	17.2	18.7	5.1	2.5	3.2	2.5	2.7
..37 Photographic or cinematographic goods	1.1	3.4	6.1	7.0	7.4	7.3	7.8	9.4	8.9	9.4
..38 Miscellaneous chemical products	4.0	6.3	9.0	16.5	17.6	20.3	28.3	33.8	37.4	44.4
VII Plastics and articles thereof; rubber and articles thereof	24.7	54.9	84.8	106.6	143.9	154.0	157.0	208.2	229.2	257.3
..39 Plastics and articles thereof	19.5	41.6	66.9	83.6	111.7	124.4	127.1	171.0	188.0	209.2
..40 Rubber and articles thereof	5.3	13.3	17.9	23.0	32.3	29.6	29.8	37.2	41.2	48.1
VIII Raw hides and skins, leather, furskins and articles thereof; saddlery and harness; ...	5.1	12.3	15.2	24.5	29.2	33.8	34.0	45.5	57.1	62.3
..41 Raw hides and skins (other than furskins) and leather	2.9	7.6	8.3	10.6	12.3	12.7	13.0	15.4	17.3	20.4

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
..42 Articles of leather; saddlery and harness, travel goods, hand-bags and similar containers; ...	1.9	3.9	5.3	7.1	9.0	10.0	9.1	10.4	13.1	14.6
..43 Furskins and artificial fur; manufactures thereof	0.3	0.8	1.6	6.8	8.0	11.1	12.0	19.6	26.7	27.2
IX Wood and articles of wood; wood charcoal; cork and articles of cork; manufactures of straw, ...	5.9	19.5	28.7	33.7	48.2	62.4	67.1	85.2	109.4	123.2
..44 Wood and articles of wood; wood charcoal	5.9	19.4	28.5	33.5	47.9	62.1	66.8	84.7	108.9	122.3
..45 Cork and articles of cork	0.0	0.1	0.1	0.1	0.3	0.2	0.2	0.2	0.2	0.5
..46 Manufactures of straw, of esparto or of other plaiting materials; basketware and wickerwork	0.0	0.0	0.1	0.1	0.1	0.2	0.2	0.3	0.3	0.4
X Pulp of wood or of other fibrous cellulosic material; waste and scrap of paper or paperboard; ...	15.8	37.1	64.5	78.4	98.7	110.4	101.4	138.9	141.5	138.9
..47 Pulp of wood or of other fibrous cellulosic material; waste and scrap of paper or paperboard	0.1	0.2	0.1	0.7	0.4	0.1	0.3	0.5	1.7	0.6
..48 Paper and paperboard; articles of paper pulp, of paper or of paperboard	13.1	32.7	55.6	65.9	81.4	86.8	80.6	111.6	118.1	119.0
..49 Printed books, newspapers, pictures and other products of the printing industry; ...	2.6	4.2	8.9	11.8	16.8	23.6	20.5	26.9	21.8	19.3
XI Textiles and textile articles	80.7	144.5	199.9	233.5	273.7	307.0	287.1	346.0	381.1	415.3
..50 Silk	1.2	0.2	0.3	0.3	0.4	0.6	0.7	0.3	0.3	0.3
..51 Wool, fine or coarse animal hair; horsehair yarn and woven fabric	4.6	4.1	6.2	7.0	8.2	8.6	9.1	11.2	12.8	13.7
..52 Cotton and articles thereof	19.8	32.3	54.6	60.0	68.2	69.2	55.9	68.0	73.3	79.3
..53 Other vegetable fibres; paper yarn and woven fabrics of paperyarn	0.2	1.3	3.4	2.0	2.3	6.2	7.2	11.9	14.7	15.7
..54 Man-made filaments	9.7	17.8	24.5	26.9	30.0	26.6	24.9	30.0	34.0	35.6
..55 Man-made staple fibres	8.2	17.4	22.4	23.4	30.6	36.6	37.7	48.6	48.0	51.6
..56 Wadding, felt and nonwovens; special yarns; twine, cordage, ropes and cables ...	1.8	3.8	6.3	8.2	7.8	8.7	8.2	10.9	12.7	15.9
..57 Carpets and other textile floor coverings	0.7	1.4	2.2	4.2	5.1	5.3	4.0	4.1	4.5	5.0
..58 Special woven fabrics; tufted textile fabrics; lace; tapestries; trimmings; embroidery	2.2	3.9	6.9	6.9	7.7	11.2	12.4	14.1	17.7	19.4
..59 Impregnated, coated, covered or laminated textile fabrics; ...	2.0	3.9	8.2	8.8	12.8	16.4	16.4	21.9	24.6	25.7
..60 Knitted or crocheted fabrics	2.6	5.1	7.7	9.0	12.0	17.8	16.3	19.3	18.7	23.4
..61 Articles of apparel and clothing accessories; knitted or crocheted	6.1	13.0	15.0	24.5	28.4	31.4	28.1	33.5	39.2	43.0

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
..62 Articles of apparel and clothing accessories, not knitted or crocheted	12.5	26.7	31.8	40.8	49.6	56.8	54.3	58.0	62.2	64.4
..63 Other made-up textile articles; sets; worn clothing and worn textile articles; rags	9.0	13.5	10.4	11.4	10.6	11.6	11.8	14.0	18.3	22.4
XII Footwear, headgear, umbrellas, sun umbrellas, walking sticks, seat-sticks, whips, ...	7.7	22.1	25.6	30.1	39.4	44.4	41.2	48.7	56.5	56.0
..64 Footwear, gaiters and the like; parts of such articles	7.0	20.6	23.4	27.7	36.8	41.3	38.0	45.6	52.5	51.9
..65 Headgear and parts thereof	0.2	0.8	1.1	1.5	1.8	2.2	2.3	2.1	2.8	2.8
..66 Umbrellas, sun umbrellas, walking-sticks, seat-sticks, whips, riding-crops and parts thereof	0.1	0.2	0.4	0.3	0.4	0.5	0.5	0.6	0.6	0.6
..67 Prepared feathers and down and articles made of feathers or of down; artificial flowers; ...	0.4	0.6	0.7	0.5	0.4	0.5	0.4	0.5	0.5	0.7
XIII Articles of stone, plaster, cement, asbestos, mica and similar materials; ...	9.3	25.2	40.9	52.1	63.7	71.6	61.3	74.1	83.5	96.4
..68 Articles of stone, plaster, cement, asbestos, mica or similar materials	2.6	8.3	14.1	16.9	23.2	26.1	22.7	26.9	30.3	35.0
..69 Ceramic products	2.7	7.2	11.1	15.1	16.5	18.7	15.4	17.7	19.9	21.7
..70 Glass and glassware	4.0	9.7	15.7	20.2	24.0	26.8	23.2	29.6	33.4	39.7
XIV Natural or cultured pearls, precious or semi-precious stones, precious metals, ...	4.0	3.8	5.6	4.8	6.0	6.6	6.1	7.7	7.2	9.5
..71 Natural or cultured pearls, precious or semi-precious stones, precious metals, metals clad ...	4.0	3.8	5.6	4.8	6.0	6.6	6.1	7.7	7.2	9.5
XV Base metals and articles of base metal	38.5	83.4	132.4	187.1	264.3	324.2	263.4	375.1	389.1	456.1
..72 Iron and steel	11.5	22.2	43.1	60.6	101.8	130.2	101.4	161.2	137.4	150.0
..73 Articles of iron or steel	14.2	32.8	45.9	70.5	90.3	110.1	82.1	108.0	125.8	154.1
..74 Copper and articles thereof	1.3	2.2	3.8	4.8	7.4	10.1	8.4	12.8	13.1	16.1
..75 Nickel and articles thereof	0.6	0.1	0.2	0.1	0.1	0.2	0.5	0.6	8.1	7.5
..76 Aluminium and articles thereof	3.7	8.3	13.1	15.3	20.4	23.2	22.9	36.3	40.4	53.0
..78 Lead and articles thereof	0.0	0.0	0.1	0.3	0.0	0.1	0.3	0.1	0.2	0.3
..79 Zinc and articles thereof	1.2	2.6	4.2	4.1	4.1	3.7	3.9	4.2	4.3	4.4
..80 Tin and articles thereof	0.0	0.1	0.1	0.1	0.1	0.1	0.2	0.4	0.4	0.3
..81 Other base metals; cermets; articles thereof	0.1	0.1	0.1	0.3	0.2	0.8	0.8	0.5	0.6	1.0
..82 Tools, implements, cutlery, spoons and forks of base metal; parts thereof	2.7	5.9	8.2	11.2	13.6	17.1	16.3	18.7	21.1	23.7
..83 Miscellaneous articles of base metal	3.1	9.1	13.7	19.8	26.3	28.6	26.6	32.4	37.7	45.8
XVI Machinery and mechanical appliances; electrical equipment; parts thereof; sound recorders ...	135.6	276.4	419.1	526.3	789.4	1030.5	988.7	1776.1	1606.4	1508.0

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
..84 Nuclear reactors, boilers, machinery and mechanical appliances; parts thereof	80.8	139.1	242.8	280.5	387.0	394.0	323.8	410.8	459.0	597.7
..85 Electrical machinery and equipment and parts thereof; sound recorders and reproducers, ...	54.8	137.3	176.3	245.8	402.4	636.5	664.9	1365.3	1147.4	910.3
XVII Vehicles, aircraft, vessels and associated transport equipment	108.7	118.8	128.7	169.2	330.5	336.0	246.2	319.4	427.4	548.8
..86 Railway and tramway locomotives, rolling-stock and parts thereof; ...	0.6	5.6	3.5	5.8	7.5	16.2	22.2	8.5	25.2	49.1
..87 Vehicles other than railway or tramway rolling-stock, and parts and accessories thereof	97.8	110.0	122.8	160.7	308.5	307.6	217.6	292.1	380.5	470.2
..88 Aircraft, spacecraft and parts thereof	0.8	0.8	0.7	1.2	4.8	7.7	3.4	5.0	5.7	9.6
..89 Ships, boats and floating structures	9.4	2.4	1.7	1.6	9.7	4.5	3.0	13.8	16.0	20.0
XVIII Optical, photographic, cinematographic, measuring, checking, precision, medical ..	18.5	33.2	47.6	60.7	72.0	75.8	83.4	100.3	95.9	102.3
..90 Optical, photographic, cinematographic, measuring, checking, precision, medical ..	17.6	31.8	45.0	57.1	67.3	70.8	78.5	94.7	90.6	97.4
..91 Clocks and watches and parts thereof	0.4	0.9	1.7	2.3	3.4	3.4	3.3	4.0	3.5	3.0
..92 Musical instruments; parts and accessories of such articles	0.6	0.5	1.0	1.3	1.4	1.6	1.5	1.6	1.8	1.9
XIX Arms and ammunition; parts and accessories thereof	1.9	2.5	0.8	0.6	0.5	1.6	7.2	2.8	2.3	2.7
..93 Arms and ammunition; parts and accessories thereof	1.9	2.5	0.8	0.6	0.5	1.6	7.2	2.8	2.3	2.7
XX Miscellaneous manufactured articles	22.4	38.9	55.3	66.6	81.7	91.3	82.3	104.1	124.0	128.2
..94 Furniture; bedding; mattresses, mattress supports, cushions and similar stuffed furnishings;...	16.8	26.3	38.1	44.6	54.0	61.8	54.1	66.7	76.9	84.3
..95 Toys, games and sports requisites; parts and accessories	3.3	7.0	9.0	10.9	16.1	17.2	17.0	22.4	29.9	25.2
..96 Miscellaneous manufactured articles	2.3	5.6	8.2	11.1	11.6	12.3	11.3	15.0	17.2	18.7
XXI Works of art, collectors' pieces, and antiques	5.4	0.0	0.0	0.1	0.0	0.1	0.0	0.2	0.4	0.3
..97 Works of art, collectors' pieces and antiques	5.4	0.0	0.0	0.1	0.0	0.1	0.0	0.2	0.4	0.3
XXII Supplies for foreign vessels	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.9	0.0
..99 Supplies for foreign vessels	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.9	0.0

Source: Statistical Office of Estonia[22]

[22] http://gatekeeper.stat.ee:8000/px-web.2001/Dialog/statfileri.asp

Table A23.: Employment rate by age group, %, annual average

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
15-19	26.7	26.2	16.3	16.9	15.3	13.3	8.7	9.6	8.6	5.8
20-24	61.1	65.3	65.3	60.6	62.7	62.1	57.2	55.4	55.7	51.8
25-29	77.2	74.4	74.7	72.4	74.5	73.1	72.1	72.7	72.8	70.9
30-34	83.3	83.0	80.7	80.2	80.5	79.9	76.1	78.4	74.4	75.0
35-39	87.6	85.5	81.7	81.1	83.2	80.4	78.5	75.1	77.2	76.4
40-44	88.3	86.8	82.6	84.5	80.9	80.8	78.9	79.5	80.9	82.5
45-49	88.6	87.5	86.9	84.0	82.4	82.0	78.5	75.1	77.3	81.6
50-54	82.4	80.9	78.8	78.7	80.5	79.5	75.9	73.3	73.0	73.2
55-59	55.2	55.5	55.1	56.5	58.8	59.5	57.1	56.6	57.9	63.7
60-64	30.6	29.5	27.9	29.0	30.0	32.6	32.6	32.5	35.1	41.2
65-69	20.7	18.6	12.3	14.2	11.9	12.8	16.0	17.7	17.7	20.1
70-74	0.0	0.0	0.0	0.0	7.7	6.9	6.7	6.9	8.8	10.0
Total 15-74	62.9	61.8	58.8	58.1	58.5	57.7	55.3	54.7	55.2	55.9
15-24	43.7	45.7	40.7	38.6	38.6	37.1	32.1	31.5	31.1	27.8
25-49	84.9	83.5	81.3	80.5	80.4	79.3	76.8	76.2	76.6	77.4
50-69	49.5	47.8	44.8	45.4	45.8	46.5	46.1	46.0	47.3	50.9
50-74	43.8	41.9	38.9	38.9	40.1	40.4	39.8	39.7	40.9	44.0
16 until pension age	76.0	75.1	72.2	71.4	70.8	70.1	66.3	65.2	65.3	65.6
15-64	68.7	68.1	65.5	64.9	65.2	64.5	61.6	60.7	61.1	61.7
15-69	65.5	64.6	61.7	61.2	61.3	60.6	58.2	57.6	58.1	58.8
15 and older	59.0	58.1	55.3	54.6	54.9	54.1	51.8	51.1	51.4	52.0

Source: Statistical Office of Estonia[23]

[23] http://gatekeeper.stat.ee:8000/px-web.2001/dialog/statfileri.asp

B. NATIONAL AND REGIONAL INFORMATION SOCIETY POLICIES

Table B1.: Main actors and their tasks

***T**he Research and Development Council (RDC)* counsels the government of the Republic on the issues concerning research and development strategy, thereby directing the organised development of national research and development and innovation system.
In its operation, RDC relies on two permanent committees that focus on research, development and innovation policy. The committees are headed by the Ministers of Education and Economic Affairs who submit at least once a year to the Research and Development Council a report on the effectiveness of the work of the policy committees and an activity plan for the coming period. The responsibility for the smooth operation and daily performance of the tasks of the permanent committee rests with the policy adviser of the ministry. If necessary, special committees are established for particular tasks (for example, for updating the collection of national statistics, working out development plans in the key areas indicated in the strategy of Knowledge-Based Estonia, etc.).

In order to perform its tasks, RDC annually approves a renewable three-year action plan that includes, among other things:

- securing of the analytical basis required for the planning and assessment of research and development as well as innovation strategies for the coming periods, including organisation of analytical surveys and evaluation of the measures implemented, technology foresight, comparative policy studies, etc.;
- issues related to the coordination and association of policies falling within the areas of administration of different ministries, national research and development programmes, other measures related to research and development and innovation or affecting thereof, taking into account respective international initiatives as well as the necessity and opportunities to participate therein;
- planning of resources required to achieve research and development as well as innovation policy goals, including the provision of sufficient human resources and finances.

The Secretariat of the Research and Development Council ensures the performance of the above functions through its own activities that are, on the one hand, related to the collection and systematising of information necessary for analysing and shaping policy, and on the other hand, related to the organisation and assessment of the effectiveness of the measures implemented by public sector and expenses incurred; and eventually, also to the feedback concerning the need for adjusting administrative policy to the general development trend.

Inspectorate of Data Protection[24]**.** The main task of the Data Protection Inspectorate is the implementation of the independent supervision over the legality of processing personal data and keeping databases, as well as organising data protection activities. The issue of precepts to the responsible and authorised personnel dealing with databases, and the administrative penalisation for violating the order of keeping and processing of personal data, will also fall within the competence of the Data Protection Inspectorate.

The Estonian National Communications Board (ENCB) is a government agency in the administrative field of the Ministry of Economic Affairs and Communications. The main

[24] www.dp.gov.ee

tasks of ENCB include promotion of business competition in the fields of telecommunication and postal services; ensuring the quality of telecommunications and postal services through regulation; planning and ensuring the rational use of the limited resources (radio frequencies and numbering); performing surveillance of the companies operating in the fields of telecommunications and postal services. The main activities of ENCB proceed from various legislative acts: Telecommunications Act, Postal Act, Cable Distribution Act, Digital Signatures Act and Broadcasting Act.

The Estonian Consumer Protection Board (CPB, founded in 1994). The CPB is a national authority, the main task of which is to protect the legitimate rights of consumers and to represent their interests, to develop and implement consumer policies in accordance with the provisions of the UN Guidelines, of the Consumer Protection Act and of the European Union consumer policy.

Cybernetica is the first private law R&D institution in Estonia. With more than 35 years of experience in various fields of information technology and with the help of Estonian liberal legislation, Cybernetica provides innovative solutions to IT problems. Over the last two years, Cybernetica has achieved 80% share of the national InfoSecurity market. The product range currently covers the full scale of data communication security from a firewall solution to client/server communication security applications to an IPSec-compliant secure VPN system. Besides product development, Cybernetica is also involved in two major research programs initiated by the Estonian Government. These projects - Estonian ID-Card and Electronic Documents - share a common aim of developing the Information Society.

The enterprises' support structure includes a number of **non-profit organisations**, which can help find proper partners for R&D projects, or they might be themselves good partners in projects.

The Foundation Archimedes is an independent agency established by the Estonian Government with the objective to co-ordinate and implement various EU programs and projects in the field of research, technological development, innovation, training and education. The Innovation Centre of Archimedes Foundation is the Estonian National Contact Point Organisation for EU RTD Framework Program and eContent Program, and responsible for co-ordination and promotion of Estonia's participation in FP6 through a large variety of services.

Enterprise Estonia[25] (founded in 2000) is one of the largest institutions within the national support system for entrepreneurship in Estonia, providing financing products, counselling, co-operation opportunities and training for entrepreneurs, research establishments, the public and third sector. The ultimate purpose of the projects financed by the Enterprise Estonia (EAS) consists in the introduction of elaborated technologies and innovations (incl. IST solutions and use) in the Estonian business sphere aiming at the improvement of the overall efficiency and performance of the Estonian enterprise sector. *Enterprise Estonia* actively operates in five areas: the enhancement of the competitiveness of Estonian enterprises in foreign markets, inclusion of foreign direct investments, development of tourism export and internal tourism, elaboration of technological and innovative products and services and the development of Estonian enterprises and entrepreneurial environment as well as the enhancement of general entrepreneurial awareness. Subsequently to Estonia's accession to the European Union,

[25] www.eas.ee

Enterprise Estonia will become one of the implementing institutions of the EU structural funds in Estonia, being the main provider of support and development programs, directed towards entrepreneurs. To support the private sector, the government has established several investment agencies and foundations such as:

- *The Estonian Science Foundation*[26] (EstSF) that supports most promising applied research initiatives in all fields;
- *Regional Development Foundation*[27] (ERDF) that supports regional entrepreneurial activities;
- A public *Venture Capital Fund* is in the process of being developed.

The Estonian Information Technology Foundation[28] (EITF, founded in 2000) has a role in supporting the IT research and development activities of the academic universities and the private sector. EITF founders are Estonian State (represented by Ministry of Education), University of Tartu, Tallinn Technical University, Estonian Telecom and the Estonian Union of Telecommunications and Computer Companies. The first major project was setting up of Estonian IT College. EITF administers the state funded higher education program "Tiger University 2002-2004" and more than 15 different scholarship funds. Currently the EITF is also working to establish the Estonian E-University In the future, the IT Foundation sees its role in supporting the development of the College, but more importantly tackling new challenges in advancing the increase of IT and telecommunication-related competitiveness of Estonia on the global scale via promoting high-tech science education.

The Estonian Information Technology Society[29] (EITS) was organised in the late spring of 1989 as a voluntary association of individuals, collectives and organisations, and until the end of 1998 it bore the name the Estonian Software Society (ETS). The Society supports the training of IT specialists, research and development work in the field of IT, analysis of practices, generalisation, exchange and publication of the experience, and provides advisory assistance in the field of IT. The Society co-operates with other specialised associations, and government institutions guiding IT policy. Society participates in the development of the legal and normative acts relevant to IT, and, if necessary, submits proposals. The Society promotes the dissemination throughout Estonia of internationally recognised methods, technologies and standards. The Society guides the formation and development of good business practices within the IT field, and supervises members adherence to the rules. The Society establishes organisations for accreditation of internationally recognised IT professional qualifications. The Society organises IT events, grants and applications for scholarships and awards. The Society certifies, based on the requirements, the qualification and professional skills of its members.

EITS is represented in the following Estonian organisations: the Estonian Confederation of Employers and Industry, the Estonian Informatics Council, the Information Technology Standardisation Technical Committee TK4, the vocational council of information technology and telecommunications (at ECEI), the IT statistics work group of the Statistical Office of Estonia.

[26] www.etf.ee
[27] www.erda.ee
[28] www.itcollege.ee/eitsa/
[29] www.eits.ee

University of Tartu Institute of Technology[30] is a research and development institution that aims to create a new cultural environment to facilitate the generation of new technological solutions (through R&D, innovation process and development of intellectual capital). The Institute was established in June 2001. The Institute works in close co-operation with its support units and R&D centres, which have a key role in commercialising the generated intellectual property.

Tartu Science Park[31]. Its main goal is to enhance competitiveness of local ICT sector. Core competencies are: technology transfer; business case analysis for ICT start-ups; provision of finances & equipment for ICT start-ups; international co-operation in ICT field; participation in innovation related EU projects. The company covers South-Estonia (mainly Tartu region). Tartu Science Park (TSP) has launched the well-equipped ICT Centre for product developers. TSP works closely with local companies and R&D institutions and has permanent ties to counterpart organisations in Scandinavia and in other Baltic States. TSP together with the University of Tartu organises industry-sponsored seminars and courses on state-of-art technologies. TSP is looking for co-operation with small ICT incubators (esp. in Baltic Sea region) in order to find new business opportunities for clients. It is also organising joint company missions.

Connect Estonia is an independent non-profit organisation (founded in 2002 by six founders, by now 14 members). Connect Estonia activities include screening and coaching of start-up technology and other growing companies, organising of brokerage events and seminars in the areas of entrepreneurship, venture capital and related topics. Additionally, *Connect Estonia* arranges training courses in the areas of entrepreneurship, intellectual property rights and business development as well as springboards for early stage companies. *Connect Estonia* has established collaborative relationships with local consultancy companies, patent attorneys, financial advisors and venture capital fund providers for helping start-up companies as well as network members. *Connect Estonia* builds upon the business resources from our local network members as well as Connect networks in neighbouring countries.

To carry out particular policies or campaigns various non-profit foundations have been organised. State Infocommunication Foundation[32] (RIKS) has been set up in the national interests to govern and use state holdings and is responsible for operational radio communication, maritime communication, telephone services and data communication services to the state and local governments. The establishment of RIKS created preconditions for the development of a unified system of information communication-related services of state institutions, for the provision of a harmonious development of operational communications as a part of a unified information communication system and for the achievement of notable saving for the state under the rapidly opening telecommunication market.

The Tiger Leap Foundation[33] was established for improving IT knowledge in education. The Tiger Leap Foundation supports access of pupils with special needs to general education by making information and communication technologies (ICT) available for that purpose. The project is called "ICT in the Education of Pupils with Special Needs". It provides backing to support centres, counselling children with special needs, their parents, teachers, officials in education and all interested parties. The Tiger Leap Foundation's budget allocations in 2001-2003 were 25,000,000 EEK per year.

[30] www.tuit.ut.ee/index.php?lang=2
[31] http://park.tartu.ee/uus/
[32] http://www.riks.ee
[33] www.tiigrihype.ee/eng/index.php

C. INDUSTRIAL DEVELOPMENT AND COMPETITIVENESS

Table C1.: Share of value added at current prices by economic activity, %

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Agriculture and hunting	9.2	8.1	6.1	5.8	4.9	4.3	3.7	3.4	3.3	3.0
Forestry	1.2	1.7	2.0	2.1	2.4	2.4	2.6	2.4	2.3	2.2
Fishing	0.7	0.6	0.6	0.5	0.6	0.5	0.3	0.3	0.2	0.2
Mining and quarrying	1.8	1.8	1.6	1.6	1.5	1.2	1.1	1.0	1.0	1.1
Manufacturing	20.5	20.3	19.0	18.1	18.0	17.7	16.5	18.1	18.4	18.6
Electricity, gas and water supply	3.6	3.3	3.9	4.1	3.5	3.7	3.6	3.3	3.3	3.2
Construction	6.4	6.5	6.4	6.3	6.3	6.7	6.0	6.1	5.9	6.5
Wholesale and retail trade ...*	15.2	13.9	14.8	15.8	15.1	14.9	14.4	13.9	14.2	14.6
Hotels and restaurants	1.4	1.2	1.2	1.4	1.3	1.3	1.4	1.5	1.4	1.5
Transport, storage and communication	12.9	11.9	10.9	11.4	12.8	14.3	15.2	16.3	16.4	15.9
Real estate, renting and business activities	7.8	8.8	10.3	10.0	10.4	11.1	11.2	11.0	11.3	11.1
Financial intermediation	3.8	4.2	3.6	3.9	4.2	3.6	4.0	4.1	4.3	4.4
Public administration and defence; compulsory social security	3.4	4.5	4.9	4.7	4.6	4.4	5.1	4.7	4.5	4.6
Education	5.6	5.7	6.1	5.7	5.5	5.5	6.1	5.7	5.4	5.5
Health and social work	2.6	3.6	4.1	4.3	3.9	3.7	4.0	3.6	3.4	3.3
Other community, social and personal service activities	3.9	3.9	4.4	4.5	5.0	4.8	4.8	4.6	4.5	4.5
VALUE ADDED TOTAL	100	100	100	100	100	100	100	100	100	100

Source: Statistical Office of Estonia[34]

[34] http://gatekeeper.stat.ee:8000/px-web.2001/Dialog/statfileri.asp

Table C2.: Structure of industrial production by sectors, current prices, EUR mill.

	1993	1994	1995	1996	1997	1998	1999	2000	2001
Economic activities total	939.9	1292.2	1762.5	2083.9	2577.3	2799.0	2693.3	3294.9	3027.7
Energy supply	119.3	189.0	238.2	277.5	295.3	308.7	329.7	278.7	347.9
Mining	44.1	59.8	80.2	103.0	114.2	105.2	111.4	116.6	113.8
mining and agglomeration of oil-shale	38.0	50.9	65.9	85.5	95.0	84.5	84.0	77.3	82.0
extraction of peat	3.5	7.9	12.3	15.1	15.3	14.8	19.6	26.3	22.4
Manufacturing	776.5	1043.4	1444.1	1703.4	2167.8	2385.1	2252.2	2899.6	2566.0
food products and beverages	353.9	424.4	509.8	566.2	695.8	684.4	542.9	624.4	622.2
meat and meat products	89.4	79.6	83.7	82.1	92.8	97.1	84.6	95.9	102.6
fish and fish products	40.5	75.3	70.1	99.0	131.1	122.8	79.8	96.8	88.6
dairy products	77.3	89.1	127.1	149.9	190.4	191.5	129.8	163.0	182.2
grain mill products	3.3	4.0	5.3	6.0	5.6	6.5	4.9	3.3	4.9
prepared animal feeds	23.5	23.5	19.7	16.3	22.4	26.1	26.3	15.3	16.8
bakery products	32.8	39.5	51.0	61.6	62.8	63.0	64.1	64.6	57.4
beverages	57.6	71.1	104.3	103.9	115.3	109.0	110.2	121.0	109.2
textiles	42.9	59.2	104.3	142.8	165.0	176.6	162.1	214.4	208.7
wearing apparel	35.5	41.9	60.8	72.4	88.8	99.0	107.4	133.7	110.4
tanning and dressing of leather and manufacture of footwear	13.6	17.7	21.3	23.2	27.3	32.6	36.6	45.4	36.6
footwear	9.6	11.4	14.8	17.4	21.1	25.5	30.2	37.1	…
wood	32.9	60.1	117.6	136.3	213.7	254.7	300.6	398.7	324.1
paper and paper products	3.1	8.1	17.9	27.8	41.3	47.1	47.5	69.5	73.3
publishing, printing and reproduction of recorded media	28.0	32.1	63.2	76.3	91.1	125.5	135.9	142.5	49.7
chemicals and chemical products	63.1	97.9	141.8	149.3	158.5	146.1	113.5	151.7	161.1
rubber and plastic products	8.7	13.6	20.7	27.5	55.9	54.1	53.9	87.5	75.9
other non-metallic mineral products	34.9	60.1	66.3	78.6	99.5	129.2	112.4	146.4	127.8
glass and glass products	7.2	12.3	18.3	21.6	30.0	36.7	35.3	42.6	…
metals and fabricated metal products	25.2	40.1	66.8	93.5	123.5	163.8	131.8	205.5	148.3
machinery and equipment	21.8	32.5	36.0	46.2	48.6	59.6	59.7	88.4	83.0
office machinery and computers	0.7	2.9	8.8	8.8	13.8	23.9	16.4	15.6	14.8
electrical machinery and apparatus	12.9	19.9	28.4	32.8	37.5	37.2	46.5	65.6	66.7
radio, television and communication equipment and apparatus	5.0	3.7	6.4	20.0	28.7	32.3	40.3	75.2	67.6
medical, precision and optical instruments, watches and clocks	7.6	9.2	10.9	13.5	26.0	46.4	47.0	66.4	41.0
motor vehicles, trailers and semi-trailers	22.2	26.6	31.6	33.8	43.6	37.8	42.8	54.0	64.8
other transport equipment	15.2	26.1	32.7	35.0	39.6	45.9	46.8	56.7	46.9
furniture and other manufactured goods	46.6	64.2	93.1	112.5	165.3	181.5	183.7	217.9	207.5

	1993	1994	1995	1996	1997	1998	1999	2000	2001
furniture	42.2	57.9	83.3	98.4	146.0	159.1	162.7	189.5	…
other manufacturing n.e.c.	2.6	3.3	5.6	7.0	4.5	7.3	24.3	40.0	35.9

Source: Statistical Office of Estonia[35]

Table C3.: Structure of industrial production, % of output at current price

	1993	1994	1995	1996	1997	1998	1999	2000	2001
Economic activities total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Energy supply	12.7	14.6	13.5	13.3	11.5	11.0	12.2	8.5	11.5
Mining	4.7	4.6	4.5	4.9	4.4	3.8	4.1	3.5	3.8
mining and agglomeration of oil-shale	4.0	3.9	3.7	4.1	3.7	3.0	3.1	2.3	2.7
extraction of peat	0.4	0.6	0.7	0.7	0.6	0.5	0.7	0.8	0.7
Manufacturing	82.6	80.7	81.9	81.7	84.1	85.2	83.6	88.0	84.8
food products and beverages	37.7	32.8	28.9	27.2	27.0	24.5	20.2	18.9	20.6
meat and meat products	9.5	6.2	4.8	3.9	3.6	3.5	3.1	2.9	3.4
fish and fish products	4.3	5.8	4.0	4.7	5.1	4.4	3.0	2.9	2.9
dairy products	8.2	6.9	7.2	7.2	7.4	6.8	4.8	4.9	6.0
grain mill products	0.4	0.3	0.3	0.3	0.2	0.2	0.2	0.1	0.2
prepared animal feeds	2.5	1.8	1.1	0.8	0.9	0.9	1.0	0.5	0.6
bakery products	3.5	3.1	2.9	3.0	2.4	2.3	2.4	2.0	1.9
beverages	6.1	5.5	5.9	5.0	4.5	3.9	4.1	3.7	3.6
textiles	4.6	4.6	5.9	6.9	6.4	6.3	6.0	6.5	6.9
wearing apparel	3.8	3.2	3.4	3.5	3.4	3.5	4.0	4.1	3.6
tanning and dressing of leather and manufacture of footwear	1.5	1.4	1.2	1.1	1.1	1.2	1.4	1.4	1.2
footwear	1.0	0.9	0.8	0.8	0.8	0.9	1.1	1.1	
wood	3.5	4.6	6.7	6.5	8.3	9.1	11.2	12.1	10.7
paper and paper products	0.3	0.6	1.0	1.3	1.6	1.7	1.8	2.1	2.4
publishing, printing and reproduction of recorded media	3.0	2.5	3.6	3.7	3.5	4.5	5.0	4.3	1.6
chemicals and chemical products	6.7	7.6	8.0	7.2	6.1	5.2	4.2	4.6	5.3
rubber and plastic products	0.9	1.0	1.2	1.3	2.2	1.9	2.0	2.7	2.5
other non-metallic mineral products	3.7	4.7	3.8	3.8	3.9	4.6	4.2	4.4	4.2
glass and glass products	0.8	1.0	1.0	1.0	1.2	1.3	1.3	1.3	
metals and fabricated metal products	2.7	3.1	3.8	4.5	4.8	5.9	4.9	6.2	4.9
machinery and equipment	2.3	2.5	2.0	2.2	1.9	2.1	2.2	2.7	2.7
office machinery and computers	0.1	0.2	0.5	0.4	0.5	0.9	0.6	0.5	0.5
electrical machinery and apparatus	1.4	1.5	1.6	1.6	1.5	1.3	1.7	2.0	2.2
radio, television and communication equipment and apparatus	0.5	0.3	0.4	1.0	1.1	1.2	1.5	2.3	2.2

[35] http://gatekeeper.stat.ee:8000/px-web.2001/Dialog/statfileri.asp

	1993	1994	1995	1996	1997	1998	1999	2000	2001
medical, precision and optical instruments, watches and clocks	0.8	0.7	0.6	0.6	1.0	1.7	1.7	2.0	1.4
motor vehicles, trailers and semi-trailers	2.4	2.1	1.8	1.6	1.7	1.3	1.6	1.6	2.1
other transport equipment	1.6	2.0	1.9	1.7	1.5	1.6	1.7	1.7	1.5
furniture and other manufactured goods	5.0	5.0	5.3	5.4	6.4	6.5	6.8	6.6	6.9
furniture	4.5	4.5	4.7	4.7	5.7	5.7	6.0	5.8	
other manufacturing n.e.c.	0.3	0.3	0.3	0.3	0.2	0.3	0.9	1.2	1.2

Source: Statistical Office of Estonia[36]

Table C4.: Structure of industrial production by sectors, volume indices at comparable prices (1993 = 1)

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Economic activities total	1.000	0.969	0.989	1.017	1.164	1.212	1.172	1.342	1.434	1.499
Energy supply	1.000	0.976	0.957	1.016	0.985	0.949	0.897	0.902	0.912	0.923
Mining	1.000	0.989	0.945	1.000	0.996	0.953	0.822	0.864	0.902	1.036
mining and agglomeration of oil-shale	1.000	0.964	0.894	0.971	0.961	0.905	0.736	0.807	0.814	0.853
extraction of peat	1.000	1.043	1.146	1.053	1.022	0.979	1.096	0.923	0.973	1.337
Manufacturing	1.000	0.968	0.996	1.018	1.206	1.275	1.242	1.450	1.561	1.630
food products and beverages	1.000	0.896	0.867	0.796	0.931	0.886	0.720	0.772	0.817	0.820
meat and meat products	1.000	0.697	0.699	0.652	0.679	0.679	0.601	0.667	…	…
fish and fish products	1.000	1.255	1.139	1.280	1.789	1.742	1.080	1.169	…	…
dairy products	1.000	0.903	0.796	0.864	1.088	0.964	0.659	0.742	…	…
grain mill products	1.000	0.951	0.963	0.781	0.747	0.954	0.608	0.651	…	…
prepared animal feeds	1.000	0.825	0.538	0.234	0.304	0.321	0.273	0.207	…	…
bakery products	1.000	1.018	0.964	0.936	0.910	0.900	0.920	0.814	…	…
beverages	1.000	0.886	1.153	0.844	0.873	0.819	0.780	0.834	…	…
textiles	1.000	0.980	1.256	1.684	2.027	2.080	2.086	2.542	3.024	3.454
wearing apparel	1.000	0.952	0.974	0.962	0.932	0.990	1.016	1.156	1.233	1.236
tanning and dressing of leather and manufacture of footwear	1.000	0.891	0.847	0.790	0.902	1.060	1.087	1.243	1.074	1.067
footwear	1.000	0.856	0.856	0.845	1.024	1.197	1.309	1.501	…	…
wood	1.000	1.449	1.770	2.454	3.359	4.110	5.060	6.011	6.492	6.751
paper and paper products	1.000	1.667	2.437	2.782	3.839	4.609	4.908	7.149	7.743	9.315
publishing, printing and reproduction of recorded media	1.000	1.140	1.092	0.929	1.023	1.138	1.341	1.425	1.658	1.282
chemicals and chemical products	1.000	1.133	1.228	1.197	1.203	1.006	0.950	0.958	0.932	0.881
rubber and plastic products	1.000	1.728	1.874	2.322	3.509	4.026	3.731	4.781	5.641	5.901
other non-metallic mineral products	1.000	1.031	0.937	0.913	1.213	1.365	1.136	1.304	1.332	1.438
glass and glass products	1.000	1.034	1.565	1.604	2.219	2.604	2.193	2.392	…	…
metals and fabricated metal products	1.000	1.246	1.412	1.615	2.042	2.553	2.425	3.073	3.589	3.855
machinery and equipment	1.000	1.073	1.194	1.150	1.162	1.220	1.166	1.741	2.333	2.713

[36] http://gatekeeper.stat.ee:8000/px-web.2001/Dialog/statfileri.asp

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
office machinery and computers	1.000	2.088	2.383	2.938	4.221	4.517	4.011	3.570	4.276	5.311
electrical machinery and apparatus	1.000	0.704	0.692	0.704	0.741	0.915	1.073	1.275	1.459	1.751
radio, television and communi-cation equipment and apparatus	1.000	0.373	0.343	0.373	0.428	0.620	0.759	1.187	0.560	0.550
medical, precision and optical instruments, watches and clocks	1.000	0.655	0.561	0.503	0.712	1.224	1.539	2.048	1.510	1.576
motor vehicles, trailers and semi-trailers	1.000	0.636	0.522	0.483	0.608	0.543	0.585	0.647	0.802	0.884
other transport equipment	1.000	0.803	0.658	0.690	0.762	0.835	0.871	0.964	1.115	1.285
furniture and other manufactured goods	1.000	1.239	1.384	1.583	1.987	2.121	2.178	2.522	2.731	2.868
furniture	1.000	1.262	1.425	1.622	2.052	2.202	2.283	2.642	2.914	3.037
other manufacturing n.e.c.	1.000	0.916	0.874	1.011	0.696	0.799	0.897	1.347	…	…

Source: Statistical Office of Estonia[37]

Table C5.: Industrial production by regions at current prices, EUR mill.

	1993	1994	1995	1996	1997	1998	1999	2000	2001
Whole country	939.9	1292.2	1762.5	2083.9	2577.3	2799.0	2693.3	3294.9	3840.0
Harju county	…	…	805.0	957.2	1168.7	1281.5	1153.0	1247.0	1497.0
Tallinn	…	…	690.5	812.1	974.5	1047.4	898.4	961.0	1171.0
Hiiu county	…	…	7.6	7.4	9.5	9.8	8.3	9.9	12.1
Ida-Viru county	…	…	299.3	343.7	399.8	395.4	471.1	596.9	609.4
Narva city	…	…	80.7	105.5	126.0	137.2	223.3	296.2	..
Kohtla-Järve city	…	…	113.9	105.0	117.9	92.8	62.6	9.8	..
Sillamäe city	…	…	15.7	18.0	16.6	19.1	33.6	39.2	..
Jõgeva county	…	…	20.3	23.7	24.8	22.4	20.9	27.8	33.0
Järva county	…	…	40.2	47.8	54.0	55.3	59.5	101.1	104.6
Lääne county	…	…	17.7	23.0	30.4	35.4	32.3	35.1	44.4
Lääne-Viru county	…	…	98.0	106.9	126.9	149.5	141.7	163.4	188.3
Põlva county	…	…	29.5	39.2	46.1	27.9	22.4	39.7	56.7
Pärnu county	…	…	88.4	99.2	126.5	147.2	149.5	193.9	228.0
Pärnu city	…	…	66.3	82.6	87.2	104.3	69.8	125.7	..
Rapla county	…	…	29.7	28.7	35.1	40.9	55.8	76.2	82.8
Saare county	…	…	34.3	37.4	38.0	39.0	32.4	39.5	59.2
Tartu county	…	…	97.9	116.0	147.8	215.0	188.2	201.0	232.6
Tartu city	…	…	63.2	90.7	102.6	169.0	123.4	145.1	..
Valga county	…	…	26.0	29.8	37.0	46.4	45.1	51.6	62.6
Viljandi county	…	…	40.6	51.8	76.4	68.6	74.6	96.8	121.5
Võru county	…	…	21.6	36.8	49.9	62.2	59.0	67.7	84.7
Not divided by county	…	…	106.2	135.3	206.5	202.6	179.6	347.2	423.1

Data on totally surveyed enterprises have been presented by counties. Data on enterprises surveyed by simple random sampling have not been divided by counties. Source: Statistical Office of Estonia, 2003[38]

[37] http://gatekeeper.stat.ee:8000/px-web.2001/Dialog/statfileri.asp

Table C6.: Main areas of activity of the Estonian Regional Development Agency

The main areas of activity of the ERDA are:

1. With respect to regional development programs:
   - organisation of the use of funds provided for regional development programs,
   - co-ordination of the implementation of regional development programs,
   - monitoring of the use of funds allocated for the programs.
2. With respect to the national Business Support System:
   - formation and further development of an effective business advisory system on the basis of the business development centres and business advisory service bureaus of the counties,
   - co-ordination of the activities and exchange of information between the business development centres and business advisory service bureaus that belong to the Business Support System, development of an information system,
   - development of new measures for business development,
   - organisation of training for the employees of business development centres and business advisory service bureaus.
3. Other activities:
   - organisation of surveys concerning regional development,
   - participation in the implementation of projects financed by the European Union.

Source: http://www.erda.ee

[38] http://gatekeeper.stat.ee:8000/px-web.2001/Dialog/statfileri.asp

Table C7.: Description of the Regional Business Support System in Estonia

Estonian Business Support Network includes 16 Regional Centres with a contractual obligation to provide a service package to new private small- and medium-sized firms. The network of Regional Business Promotion Centres covers all Estonian counties. The unified minimum service is guaranteed by bilateral contracts signed by ERDA and Regional Centres. Regional Centres have different levels of human and technical resources.

According to the Regional Development Strategy, one of the main components of Estonia's regional development policy is the regional development policy of target areas, which is implemented in the form of **regional development programs** in specific target areas. Measures of regional development programs are planned for the development of human resources, business activities and infrastructure. Seven regional development programs are run during the EU pre-accession period:

- Program for the Islands,
- Program for the Areas of Agricultural Restructuring,
- Program for the Areas of Industrial Structuring,
- Program for the Network of Centres,
- Program for the Setomaa Region,
- Program for the Local Initiative,
- Program for Cross-Border Co-operation.

Application for financing from funds allocated to the above-mentioned programs and processing of the applications shall follow the general Rules of Procedure. A joint Program Committee has been set up for the implementation of the programs. The technical assessment of the quality, effect and feasibility of the projects submitted for regional development programs shall be conducted by independent experts.

In addition to the above-mentioned regional development programs, the Regional Development Agency of Enterprise Estonia administrates the following regional development measures:

- Support of investments in regional programs related to children, young people, families, elderly and disabled people from gambling tax,
- Development funds of the counties.

Aktiva.ee (http://www.aktiva.ee**)** is a G2B (Government-to-Business, i.e. from the state to the commercial sector) information and service portal for small and medium-sized businesses. Its main function is to supply entrepreneurs with the information and services necessary for business activities and provision of advice and assistance to them for the establishment and development of the business and organisation of day-to-day activities. Aktiva.ee allows an entrepreneur to find free systematised, integral and updated information provided to entrepreneurs by the public and non-profit sectors, read business and economic news, get an overview of the resources available on the Internet for the organisation of business activities, and learn more about the organisation of different functions of an enterprise.

Table C8.: Industrial production, value added per employee, EUR thous. (calculated on the basis on SNA value added data and employment in industry)

Code		1994	1995	1996	1997	1998	1999	2000
D	Manufacturing	2.268	3.075	4.042	4.609	5.549	6.147	7.591
DA	Manufacture of food products,							
	beverages and tobacco	3.255	4.313	4.847	4.983	5.796	7.212	8.552
DB.17	Manufacture of textiles	1.446	2.024	4.606	6.544	4.449	5.195	6.042
DB.18	Manufacture of wearing apparel; dressing and dyeing of fur	1.583	2.334	2.401	2.804	3.438	3.424	4.436
DC	Manufacture of leather and leather products	1.552	1.816	2.865	3.056	3.591	4.400	4.347
DD	Manufacture of wood and wood products	1.493	2.097	3.283	3.394	4.983	5.956	8.618
DE.21	Manufacture of pulp, paper and paper products	1.537	3.248	4.428	8.455	9.840	8.457	11.030
DE.22	Printing and publishing	2.426	4.654	5.709	5.004	7.822	7.786	10.665
DF	Manufacture of coke, refined petroleum products and nuclear fuel	…	…	…	…	…	…	…
DG	Manufacture of chemicals, chemical products and man-made fibres	3.389	2.813	4.771	4.416	4.700	7.189	10.429
DH	Manufacture of rubber and plastic products	1.753	4.458	4.233	7.862	7.712	6.334	9.185
DI	Manufacture of other non-metallic mineral products	2.741	3.161	4.312	6.705	9.429	9.735	10.221
DJ	Manufacture of basic metals and fabricated metal products	2.345	3.184	4.086	4.091	6.480	7.649	8.604
DK	Manufacture of machinery and equipment n.e.c.	1.403	2.441	3.601	3.390	4.464	4.006	7.243
DL	Manufacture of electrical and optical equipment	1.427	2.382	3.261	4.841	6.215	6.317	6.923
DM	Manufacture of transport equipment	4.540	5.192	5.719	7.283	8.828	9.334	10.203
DN.36	Manufacture of furniture	1.525	2.226	2.911	3.511	3.862	4.851	5.397
DN.37	Recycling, manufacturing n.e.c.	8.111	8.057	15.306	27.206	23.348	6.345	8.184

Source: Statistical Office of Estonia[39]

[39] http://gatekeeper.stat.ee:8000/px-web.2001/Dialog/statfileri.asp

Table C9.: Industrial production per employee by economic activity at constant prices, previous year = 100

	1994	1995	1996	1997	1998	1999	2000
Economic activities total	109.4	108.4	105.8	115.4	102.2	104.2	117.6
Energy supply	186.3	97.2	110.7	99.0	84.2	95.3	144.2
Mining	100.5	99.0	107.6	105.6	100.5	97.1	123.4
mining and agglomeration of oil-shale	102.3	96.4	108.9	103.6	97.7	93.1	136.9
extraction of peat	97.7	113.2	96.0	112.4	108.5	116.3	82.2
Manufacturing	102.0	110.4	105.1	118.7	104.4	105.6	115.3
food products and beverages	90.7	103.1	96.9	114.5	98.3	98.3	114.3
meat and meat products	65.9	102.4	91.9	114.3	98.7	106.6	113.2
fish and fish products	127.4	105.3	132.7	127.1	106.1	100.2	116.9
dairy products	97.0	93.0	109.2	122.9	88.0	74.9	120.0
grain mill products	107.3	95.4	81.5	104.0	142.9	81.4	220.6
prepared animal feeds	87.4	76.4	49.4	130.6	111.6	89.7	96.7
bakery products	112.7	90.4	92.8	96.6	98.5	100.9	92.8
beverages	82.8	131.6	75.2	103.6	98.7	107.8	105.8
textiles	104.7	157.8	150.6	127.2	98.1	144.2	114.8
wearing apparel	87.0	100.6	93.4	92.8	103.3	105.5	118.0
tanning and dressing of leather and manufacture of footwear	105.3	110.8	101.8	120.9	116.6	103.4	114.6
footwear	105.7	119.1	108.1	118.8	110.8	104.3	115.5
wood	151.1	123.2	135.3	134.3	110.7	120.3	127.5
paper and paper products	210.9	104.4	94.8	134.9	116.1	110.5	125.3
publishing, printing and reproduction of recorded media	104.4	95.5	89.7	105.2	105.6	113.3	114.3
chemicals and chemical products	148.6	127.2	100.9	110.5	99.9	101.1	99.8
rubber and plastic products	159.3	114.1	116.9	133.2	107.6	93.8	108.7
other non-metallic mineral products	113.8	98.8	101.7	129.9	106.1	93.8	109.3
glass and glass products	93.4	144.5	105.4	138.1	101.6	90.8	101.2
metals and fabricated metal products	121.4	116.8	110.1	119.7	123.2	93.6	110.6
machinery and equipment	116.4	126.6	108.3	125.3	110.8	100.2	156.4
office machinery and computers	155.1	80.9	102.8	124.1	85.8	79.0	97.9
electrical machinery and apparatus	94.9	124.2	99.9	112.6	127.0	120.2	97.3
radio, television and communication equipment and apparatus	47.0	91.1	97.5	82.0	116.4	102.2	108.5
medical, precision and optical instruments, watches and clocks	79.8	109.4	102.1	163.5	187.7	128.9	125.1
motor vehicles, trailers and semi-trailers	70.4	89.0	114.2	125.7	94.5	130.1	115.7
other transport equipment	80.4	79.0	111.9	115.7	125.3	109.6	121.9
furniture and other manufactured goods	130.2	117.7	115.5	126.0	100.8	110.5	112.8
furniture	128.2	118.7	114.1	118.8	102.6	109.4	112.0
other manufacturing n.e.c.	101.9	113.8	143.9	75.2	115.0	82.4	138.0

Source: Statistical Office of Estonia[40]

[40] http://gatekeeper.stat.ee:8000/px-web.2001/Dialog/statfileri.asp

Table C10.: Changes in the structure of services (sales, renting, computer, business and personal service activities) at current prices, EUR mill.

	1994	1995	1996	1997	1998	1999	2000
Sales of services total	76.7	125.9	177.9	213.7	311.9	355.1	392.4
Renting services	5.2	5.7	7.4	8.3	19.3	22.0	24.3
renting of transport equipment	0.4	2.6	3.7	2.2	7.5	8.8	8.8
renting of machinery and equipment	3.6	3.0	3.2	5.0	8.9	9.4	12.4
renting of personal and household goods	1.3	0.1	0.6	1.1	3.0	3.8	3.1
Computer and related services	7.4	18.3	21.9	28.8	31.5	38.7	45.2
data processing	1.2	1.4	3.7	3.4	3.4	2.8	4.0
creation of databases	3.5	8.3	9.5	7.2	5.5	4.8	5.5
maintenance and repair of office equipment and computers	0.3	0.5	1.7	2.4	2.7	3.4	2.5
other computer services	2.4	8.2	7.0	15.8	19.8	27.7	33.3
Business services	56.9	94.5	138.5	165.5	245.9	276.9	303.7
advertising services	8.8	15.4	15.9	29.5	75.1	93.1	103.4
security and guard services	9.2	15.9	24.4	27.2	34.0	35.8	40.9
building-cleaning services	2.8	2.4	4.0	3.3	7.8	8.0	12.5
photographic services	1.7	3.2	6.8	4.1	4.2	5.4	6.0
architecture and technical engineering consultations	17.9	25.1	30.8	40.3	57.5	52.1	51.2
technical testing and analysis	1.1	4.9	6.0	5.5	6.5	8.2	9.5
other business services	15.4	27.5	50.5	55.6	60.8	74.4	80.3
Personal services	7.2	7.4	10.1	11.1	15.2	17.5	19.2
cleaning, dyeing and drycleaning of textiles and furs	3.3	3.3	5.6	5.9	8.3	8.6	9.3
hairdressing	1.1	2.1	2.3	3.1	3.8	4.0	3.8
bath-house services	0.6	0.4	0.4	0.4	0.4	0.4	0.5
funeral and related services	1.0	1.3	1.7	1.5	2.4	3.5	4.4
other personal services	1.2	0.2	0.1	0.2	0.3	0.9	1.1
Other sales revenue	35.2	45.7	67.3	87.6	83.3	118.0	146.5
sales of goods	24.0	32.9	37.8	46.5	50.1	61.7	84.0
Net sales	**111.9**	**171.6**	**245.2**	**301.3**	**395.1**	**473.1**	**538.9**

Source: Statistical Office of Estonia[41]

[41] http://gatekeeper.stat.ee:8000/px-web.2001/Dialog/statfileri.asp

Table C11.: Changes in investments

	1993	1994	1995	1996	1997	1998	1999	2000	2001
Changes in investment at current prices, EUR mill.									
Gross capital formation	376.4	533.2	734.3	967.2	1266.5	1366.8	1196.1	1550.0	1711.2
Gross fixed capital formation	341.4	521.5	713.7	929.8	1146.3	1378.8	1215.8	1418.4	1611.0
Change in inventories	35.0	11.8	20.6	37.4	120.1	-12.0	-19.7	131.6	100.2
Changes in investment at constant prices, % change y-on-y									
Gross fixed capital formation		6.3	4.1	11.4	17.6	11.3	-14.8	13.3	9.1
Change in inventories		-72.2	41.3	53.5	225.7	..	..	..	-26.0

Source: Statistical Office of Estonia[42]

Table C12.: Major ICT companies in Estonia

Elcoteq Tallinn – a subsidiary of Elcoteq Networks Corporation with headquarters located in Finland. Elcoteq Tallinn manufactures primarily electronic subassemblies such as mobile phones' electronic parts and accessories, but also provides engineering and after-sales services. As most of the production is subcontracting work to Ericsson Corporation and Nokia, sales and performance of Elcoteq Tallinn has been substantially reliant on large-scale subcontracting orders. Moreover, as Elcoteq is by far the most influential actor in Estonian ICT landscape, accounting for 83% of total Estonian ICT exports, the company has a direct impact on the growth rates of the whole ICT sector. Though, such kind of heavy dependency on one exporter is harmful to the entire economy, as it makes ICT exports particularly vulnerable to the developments taking place within a single company. Elcoteq Tallinn is the leading exporting company in Estonia - in 1998 and 1999, exports from Elcoteq Tallinn amounted to 350 MEUR, while the year 2000 witnessed almost a threefold export growth to approximately 1 billion EUR. However, the global slowdown on telecom markets in 2001 has vigorously affected Elcoteq's business, which has resulted in unused capacities such as a conserved new plant in Tallinn and remarkable downsizing in personnel. At the beginning of 2000, Elcoteq employed as many as 3600 persons, while in August 2001 the number of employees had dropped to 2000. According to the Estonian Business Registry, the turnover of Elcoteq Tallinn was 25.9 MEUR, which obviously did not incorporate the transactions between the subsidiary and headquarters.

JOT Estonia – JOT Estonia is a company established in 1997 via foreign direct investments from JOT Automation Group (51%) and JOT Robotics (49%). The main field of activity of JOT Estonia is embedded in industrial automation production, which is entirely channelled to exports. JOT Estonia relies much on subcontracting work to telecom companies, though presently a reorientation to automotive electronics device production is attempted. Export revenues and turnover of JOT Estonia amounted to 37 MEUR in 2002. JOT Estonia is one of the largest Estonian ICT exporters, and the leading company in the industrial automation domain. JOT Estonia employed 200 people in 2001.

Tarkon – majority shares owned by Swedish capital Hallbergs-Sekrom Fabriks AB as a result of privatisation in 1996. Formerly, Tarkon was a military control apparatus plant and

[42] http://gatekeeper.stat.ee:8000/px-web.2001/Dialog/statfileri.asp

manufacturer of black boxes. Today Tarkon performs a relatively important role in Estonian electronics industry. Like most of other local electronics plants, Tarkon is also orientated to subcontracting. Most of the subcontracting is done to Scandinavia, while the largest partners are Elcoteq and Ericsson. Tarkon's turnover in 2000 exceeded 11 MEUR and export MEUR. Tarkon is employer for 600 people.

MicroLink – the company was founded in August 1991. Until 1995, MicroLink's activities were concentrated on PC assembly and wholesale and retail distribution of computer equipment in Estonia. Over the years, the company has built an extensive resellers' and maintenance network across the Baltic countries. In 1995, MicroLink expanded its activities into system integration and Internet businesses, which soon became the core activities of the Company. Due to increasing competition and diminishing margins the Company decided to exit from wholesale operations by selling it to the global distribution firm CHS Electronics at the end of 1996. Presently, Microlink is the largest Estonian IT company in the domain of retail distribution of computer equipment. In the PC assembly market, Microlink holds the leading position in the Baltic States with 20% as the market share. Annual turnover of Microlink is 46 MEUR, including Baltic transactions. Total number of employees in Microlink is around 250 people.

EMT – the largest Estonian mobile operator EMT is fully owned by Estonian Telekom, where the ownership is divided between Sonera (24.5%) and Telia Corporations (24.5%), and Estonian State (27.3%). The rest of the shares belong to other private and corporate investors and are traded on Tallinn Stock Exchange. EMT's main field of activity is the establishment and maintenance of mobile communication networks and systems, and the sale and management of related services. As of 1999, the turnover of the company was 106 MEUR (20% of the ICT market turnover and 29% of the total telecom turnover) and the number of subscribers exceeded 320,000 at the end of 2000. This figure gives EMT a strong leadership as compared to other telecom operators, with subscribers based on market share approaching 60%.

Eesti Telefon (ET) – ET is another company belonging to the Estonian Telekom holding group. The ownership structure is analogous to that of EMT. ET as a private company was established in 1993 and has operated most of the time under the concession agreement conditions stipulated by the Estonian government in 1992. The year 2001 marked the end of the concession, when free access to the market was enabled. ET is primarily specialised in offering data communication, Internet and telephone solutions to companies and households. Eesti Telefon has also established itself as the market leader for Internet dial-up service and ADSL connections. ET is a substantial employer – in 2000 a total of 2900 persons were employed by the company. However, the inner restructuring process has had an effect on that number, as in 1998 the company employed 3700 persons. The total turnover of 171 MEUR in 2000 makes ET the largest company on domestic ICT market, accounting for 32% of total ICT market and 46% of telecom market.

Radiolinja Estonia – Radiolinja is a private capital based international telecommunication company founded in 1994 by Elisa Communications, Finland. Radiolinja offers a variety of telecom services with the main orientation to mobile communication solutions. As at the end of 2000, Radiolinja Estonia had 137,000 subscribers, which accounted for 25% of the total number of mobile communication subscribers. By turnover, with 16 MEUR in 1999 Radiolinja Estonia had 7% of the entire Estonian carrier services market. Radiolinja is the fastest growing telecom company in Estonia, gaining both high new subscribers rate as well

as turnover growth rates. In 2001, revenues increased by 60% as compared to the same period in 2000, amounting already to 40 MEUR.

Tele2 (OÜ Levicom Broadband) **-** TELE2 is a telecommunication company providing telephone, Internet and cable TV services. Owners of Tele2 are TELE2 AB and Levicom International Holdings BV. TELE2 entered the Estonian mobile communication market in 1999 by acquiring ownership in Q-GSM, operated by Levicom Broadband. In addition to involvement in mobile communications market, Tele2 has actively fought for the position in distance call market. The 9 months consolidated turnover of the Group in 2000 was 3 MEUR.

Source: Estonian eVikings[43]

[43] Outlooks http://www.esis.ee/eVikings/evaluation/eVikings_ICT_cluster.pdf

Table C13.: Regional cross country agreements

A. Bilateral agreements with Nordic and Baltic Sea countries

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Significant Agreements

Major economic agreements, agreements on visa-free travel, co-operation in environmental protection, crime prevention and in other areas have been concluded.

- Agreement on the Promotion and Protection of Investments (signed 13.02.92, entered into force 3.12.92)
- Agreement on Economic Co-operation and Assistance (signed 22.06.93, entered into force 16.09.93)
- Agreement on Co-operation in Air Defence (signed 2.07.93, entered into force 14.09.94)
- Agreement on Mutual Assistance in Customs Matters (signed 27.08.93, entered into force 3.06.94)
- Agreement on Aviation (signed 29.11.93, entered into force 1.02.94)
- Agreement on Co-operation in Combating Marine Pollution (signed 8.12.1993, entered into force 28.05.95)
- Agreement on Maritime Boundary (signed 4.05.94, entered into force 31.07.95)
- Agreement on Co-operation in Combating Crime (7.06.95, entered into force 12.10.95)
- Agreement on Mutual Assistance in the Event of Disasters (signed 25.06.95, entered into force 31.07.96)
- Agreement Regarding the Readmission of Persons whose Entry or Residence is Illegal (signed 22.09.95, entered into force 3.10.96)
- Agreement on the Abolition of Visas (signed 26.03.97, entered into force 1.05.97)
- Agreement on Social Security (signed 13.05.97, entered into force 1.10.97).

Estonia and Sweden 23 Sep 2002

Agreements

Estonian-Swedish trade and economic relations are regulated by an association agreement with the European Union, and fisheries relations are also handled through agreements between Estonia and the European Union.

Bilaterally, all the important economic agreements have been concluded:

- Trade agreement (enforced 28.10.1991)
- Environment-related co-operation agreement (30.03.1992)
- Agreement on the promotion and mutual protection of investments (20.05.1992)
- Agreement on the organising of international highway transportation of passengers and goods (30.07.1992)
- Agreement on mutual assistance in customs matters (30.10.1993)
- Agreement on rendering medical aid to temporary visitors (01.11.1993)
- Aviation agreement (30.11.1993)
- Convention on the avoidance of double taxation of income and capital and on the prevention of tax evasion (31.12.1993)
- Agreement on the establishing a of joint economic committee (04.04.1995)
- Agreement on the abolition of visa requirements (01.05.1997)

Estonia and Norway 14 Oct 2002

Agreements

Estonia and Norway have concluded all major economic agreements. Free trade is granted by the agreement between the Republic of Estonia and the EFTA states signed on 7 December 1995, and has been provisionally in force since 1 June 1996.

In 1930, Estonia acceded to the agreement on Spitzbergen, which is currently in force. The agreement provides the terms of use of Spitzbergen by the contracting parties.

- Agreement on the Mutual Promotion and Protection of Investments (entered into force 15.06.1992)
- Convention on the Avoidance of Double Taxation and the Prevention of Fiscal Evasion with Respect to Income Tax and Capital Tax (entered into force 30.12.1993)
- Air Services Agreement (entered into force 29.11.1993)
- Agreement concerning International Road Transport (entered into force 09.02.1994)
- Air Services Agreement (entered into force 29.11.1993)
- Agreement concerning International Road Transport (entered into force 09.02.1994)
- Agreement Regarding Mutual Assistance between the Customs Authorities (entered into force 19.08.1994)
- Protocol of Agriculture (entered into force 01.06.1996)
- Agreement on the Abolishment of Visa Requirements (entered into force 01.05.1997)
- Agreement on the Readmission of Persons (entered into force 11.05.1997).

Estonia and Germany 21 Mar 2002

Agreement Basis

- Joint Statement on the Bases of Relationship (entered into force on 29.04.1993)
- Agreement on Assigning German Teachers to Estonian Schools (entered into force on 21.03.1994)
- Co-operation Agreement on Cultural Co-operation (entered into force on 15.08.2002)
- Agreement on German Wartime Graveyards in the Republic of Estonia (entered into force on 26.10.1996)
- Framework Agreement on Counselling and Co-operation (entered into force on 28.02.1997)
- Agreement on the Readmission of Persons and the Implementation Protocol of the Agreement (entered into force on 01.03.1999)
- Agreement on the Mutual Abolishment of the visa requirements (entered into force on 01.03.99)

Estonia and Denmark 27 Feb 2002

Agreements

The following agreements are in force between Estonia and Denmark:

- Agreement concerning the Promotion and Reciprocal Protection of Investments (enforced 24.02.1993)
- Agreement on the Development of Economic, Industrial and Technical Co-operation (enforced 28.07.1992)
- Agreement on International Transport of Passengers and Goods by Road (enforced 27.08.1993)
- Convention for the Avoidance of Double Taxation and the Prevention of Fiscal Evasion with respect to Taxes on Income and on Capital (enforced 30.12.1993)

- Air Services Agreement (enforced 29.11.1993)
- Agreement concerning the Abolition of Visas (01.05.1993)
- Agreement on Mutual Assistance in Customs Matters (enforced 25.11.1993)
- Free trade agreement between the Government of the Republic of Estonia and the Government of the Kingdom of Denmark and the Local self-government of the Faeroe Islands (enforced 01.12.1998).

Estonia and Poland 23 Jan 2003

Treaty basis

- Agreement on Trade and Economic Co-operation (signed on 20.11.1991; entered into force on 19.05.1992)
- Consular Convention (signed on 02.07.1992; entered into force 12.01.1997)
- Agreement on Co-operation between Regional and Local governments (signed on 02.07.1992; entered into force on 24.01.1994)
- Agreement on Friendly Co-operation and Neighbourliness of the Baltic Sea States (signed on 02.07.1992, entered into force on 06.05.1993)
- Agreement on Cultural and Scientific Co-operation (signed on 02.07.1992, entered into force on 28.01.1993)
- Agreement on International Road Transport (signed on 09.09.1992; entered into force on 30.10.1993)
- Agreement on the Abolition of Visa Requirements (signed on 26.02.1993; entered into force on 2.03.1993)
- Agreement Concerning Civil Air Transport (signed on 06.05.1993; entered into force on 06.11.1995)
- Agreement on the Reciprocal Promotion and Protection of Investments (signed on 06.05.1993; entered into force on 06.08.1993)
- Agreement on the Avoidance of Double Taxation and Prevention of Fiscal Evasion with respect to Taxes on Income and Capital (signed on 09.05.1994; entered into force on 09.12.1994)
- Free Trade Agreement (signed on 05.11.1998)
- Agreement on Rendering Legal Aid and on Legal Relations in Civil, Work and Criminal Matters (signed on 27.11.1998; entered into force on 08.02.2000).

Estonia and Latvia 07 Nov 2002

Treaty Basis

Principal economic agreements have been concluded trilaterally between Estonia, Latvia and Lithuania. There are 13 bilateral agreements between Estonia and Latvia, and the most important of them are:

- Agreement on the Renewal of the State Border and the Additional Protocol (enforced 13.09.1992)
- Agreement on Organising Common Border Control (enforced 30.08.1994)
- Agreement on the Maritime Delimitation in the Gulf of Riga, the Strait of Irbe and the Baltic (enforced 10.10.1996)
- Convention for the Avoidance of Double Taxation and the Prevention of Fiscal Evasion with Respect to Taxes on Income and on Capital (enforced 31.12.1993)
- Agreement on Social Security (enforced 29.01.1997)
- Agreement for the Promotion and Reciprocal Protection of Investments (enforced 23.05.1996).

Estonia and Lithuania 08 Nov 2002

Agreement basis

In addition to the trilateral agreements between Estonia, Latvia and Lithuania, the following bilateral agreements have been concluded between Estonia and Lithuania:

- Aviation related agreement (signed 07.07.1995, enforced 05.09.1995);
- Social insurance agreement (signed 28.05.1996, enforced 10.02.1997);
- Agreement on the mutual protection of classified information (signed 26.05.2000, enforced 15.11.2000).

Estonia and Russia 30 Jan 2003

Agreements

Estonia and Russia have concluded the following agreements:

- Agreement on Co-operation and Mutual Assistance in Customs Matters. Enforced 9.08.1999
- Agreement on Aviation. Enforced 30.08.2000
- Agreement on International Highway Transport. Enforced 26.03.2001
- Protocol to "Concerning the Agreement on Legal Aid and Legal Relations in Civil, Family and Criminal Cases". Signed on 3.10.2001. Ratification is being effected
- Agreement on Organising Shipping Traffic in the River Basin of Lake Peipus, Lake Lämmi and Lake Pskov. Enforced 06.08.2002
- Agreement on the Passage Points for Crossing the Estonian-Russian Frontier. Enforced on 25.06.2002
- Agreement on the Avoidance of Double Taxation of Income and Capital and on the Prevention of Tax Evasion. Signed 05.11.2002
- Amendment Protocol of the Co-operation Agreement (25.06.1993) for Guaranteeing Pensions
- Implementation Agreement of the Co-operation Agreement for Guaranteeing Pensions between the Ministry of Social Affairs of the Republic of Estonia and the Ministry of Work and Social Development of the Russian Federation. Concluded on 5.11.2002
- Treaty on the Handing Over of Criminal Offenders. Concluded on 5.11.2002

In the nearest future, Estonia is ready to conclude the following agreements:

- Agreement on trade-economic relations
- Agreement on cinematography-related co-operation
- The Agreement on Diplomatic Real Estate was initialled on 7.08.2002 in Moscow.

B. Sub-regional co-operation and multilateral agreements can be discussed by the following groups of countries

Estonia and the Nordic Countries
Baltic Co-operation: Estonia, Latvia and Lithuania
Co-operation between the Baltic Sea States: CBSS

C. Estonia's European co-operation and agreements can be discussed in two directions

Estonia and the European Union
Estonia and the Council of Europe

If necessary, additional information on Estonia's foreign agreements can be found on the website of Estonia's Ministry of Foreign Affairs (http://www.vm.ee/eng/kat_130/).

Source: Estonia's Ministry of Foreign Affairs

Table C14.: Trade balance of ICT industries. Special exports and imports of ICT goods, EUR mill. (EU Combined Nomenclature (2002) codes and commodity groups)

	1995	1996	1997	1998	1999	2000	2001
Special exports							
8469–8473. Office machines, data-processing machines and parts	68.8	56.0	32.2	20.8	12.6	11.8	10.5
8517. Apparatus for line telephony or line telegraphy	2.3	1.5	2.8	6.1	22.7	17.9	11.9
8518. Microphones, loudpeakers, sound amplifier sets	1.0	6.0	0.6	0.8	0.5	12.5	5.0
8519-8522. Record-players, cassette-players, magnetic tape recorders, video apparatus, parts and accessories thereof	2.1	5.7	3.1	4.5	0.4	0.5	0.6
8525-8529. Apparatus for radio and television, parts	31.7	42.0	194.7	328.7	331.9	979.5	897.7
8532–8538. Electrical capacitors, resistors, apparatus for switching, boards; parts for apparatus of heading No 8535–8537	3.4	5.3	8.9	22.6	24.0	33.1	32.7
8541, 8542. Semiconductor devices, electronic integrated circuits	0.9	0.8	1.8	3.3	1.4	9.4	9.1
8544. Insulated wire	10.7	16.4	27.0	40.3	49.5	78.4	75.7
Total of ICT special exports	**120.9**	**133.6**	**271.1**	**427.0**	**443.1**	**1143.0**	**1043.2**
SPECIAL IMPORTS							
8469–8473. Office machines, dataprocessing machines and parts	109.6	107.0	145.5	94.1	84.3	96.8	108.2
8517. Apparatus for line telephony or line telegraphy	31.6	33.4	52.2	52.3	50.4	63.7	52.4
8518. Microphones, loudpeakers,sound amplifier sets	1.6	5.0	4.6	5.9	10.1	14.6	13.0
8519-8522. Record-players, cassette-players, magnetic tape recorders, video apparatus, parts and accessories thereof	4.9	10.9	5.3	5.3	5.1	5.4	5.8
8525-8529. Apparatus for radio and television, parts	53.5	75.8	103.5	178.6	147.4	335.7	516.6
8532–8538. Electrical capacitors, resistors, apparatus for switching, boards; parts for apparatures of heading No 8535–8537	14.3	20.4	59.7	165.0	170.7	469.5	133.3
8541, 8542. Semiconductor devices, electronic integrated circuits	1.4	4.9	37.6	62.5	84.5	130.8	79.2
8544. Insulated wire	17.4	23.8	35.4	44.0	49.5	86.0	71.4
Total of ICT special imports	**234.2**	**281.2**	**443.9**	**607.7**	**601.9**	**1202.6**	**979.9**
NET EXPORTS	**-113.4**	**-147.5**	**-172.8**	**-180.7**	**-158.8**	**-59.6**	**63.3**

Source: Foreign Trade 2001 (2002). Statistical Office of Estonia, Tallinn.

D. PRESENCE OF THE MOST RELEVANT ECONOMIC ACTIVITIES FOR IST APPLICATIONS

Table D1.: Investments in tangible fixed assets of enterprises in 2001, EUR mill.

	Investments in tangible fixed assets	from this: computers	*Share of computers*	**Financial leasing**	..financial leasing: computers	*Share of computers*
Economic activities total	1287.4	**76.3**	***5.9%***	224.8	**7.5**	***3.3%***
Agriculture, hunting	25.5	**0.1**	***0.6%***	13.4	**0.1**	***0.5%***
Forestry	23.2	**0.9**	***4.0%***	12.5	**0.3**	***2.2%***
Fishing	1.1	**0.0**	***0.7%***	0.0	**0.0**	***0.0%***
Mining	18.5	**0.2**	***0.9%***	0.6	**0.0**	***0.0%***
Manufacturing	273.6	**9.9**	***3.6%***	49.2	**0.4**	***0.7%***
..manufacture of food products and beverages	53.6	**1.0**	***1.8%***	4.4	**0.0**	***0.4%***
..manufacture of textiles	21.1	**2.1**	***9.8%***	0.7	**0.0**	***2.2%***
..manufacture of wearing apparel; dressing and dyeing of fur	6.5	**0.4**	***6.9%***	1.1	**0.0**	***4.7%***
..tanning and dressing of leather and manufacture of leather products	1.9	**0.4**	***19.8%***	0.1	**0.0**	***0.0%***
..manufacture of wood and wood products	46.5	**0.6**	***1.2%***	10.6	**0.0**	***0.2%***
..manufacture of pulp, paper and paper products	23.5	**0.1**	***0.6%***	1.2	**0.0**	***0.0%***
..publishing, printing and reproduction of recorded media	7.9	**1.5**	***19.6%***	14.4	**0.0**	***0.3%***
..manufacture of chemicals ...*	10.9	**0.4**	***3.4%***	1.3	**0.0**	***1.8%***
..manufacture of rubber and plastic products	13.0	**0.1**	***1.0%***	4.5	**0.0**	***0.0%***
..manufacture of other non-metallic mineral products	23.3	**0.4**	***1.9%***	1.5	**0.0**	***0.0%***
..manufacture of metal and metal products	10.3	**0.4**	***4.1%***	3.1	**0.0**	***0.8%***
..manufacture of machinery and equipment not elswhere classified	6.9	**0.2**	***3.6%***	0.9	**0.1**	***6.2%***
..manufacture of electrical and optical equipment	20.4	**1.4**	***6.9%***	1.6	**0.1**	***5.2%***
..manufacture of transport equipment	6.6	**0.3**	***3.9%***	0.7	**0.0**	***1.5%***
..manufacture of furniture and manufacturing not elswhere classified	21.0	**0.5**	***2.6%***	3.2	**0.0**	***0.4%***
Electricity, steam, gas and water supply	131.5	**3.2**	***2.4%***	5.3	**0.1**	***1.1%***
Construction	32.7	**1.3**	***4.0%***	21.2	**0.0**	***0.2%***
Wholesale and retail trade ...*	325.7	**29.8**	***9.1%***	34.0	**4.5**	***13.3%***
..sale, maintenance and repair ...*	35.2	**0.7**	***1.9%***	4.6	**0.0**	***0.7%***
..wholesale trade and commission trade ...*	229.5	**23.4**	***10.2%***	23.2	**4.1**	***17.7%***
..retail trade (except of motor vehicles and motorcycles) ...*	61.0	**5.7**	***9.4%***	6.2	**0.4**	***5.9%***

Hotels and restaurants	20.3	**0.3**	***1.4%***	1.1	**0.2**	***18.0%***
Transport, storage and communication	239.5	**19.6**	***8.2%***	64.1	**0.5**	***0.8%***
..railway transport	14.2	**0.3**	***2.2%***	8.6	**0.0**	***0.0%***
..other road transport	19.6	**0.4**	***2.1%***	43.8	**0.1**	***0.2%***
..water transport	4.7	**0.1**	***3.0%***	0.0	**0.0**	***0.0%***
..air transport	1.5	**0.2**	***10.4%***	0.0	**0.0**	
..supporting and auxiliary transport activities ...*	106.4	**1.7**	***1.6%***	10.6	**0.0**	***0.0%***
..post and telecommunications	93.0	**16.9**	***18.1%***	1.0	**0.4**	***39.9%***
Real estate, renting and business activities	151.3	**8.3**	***5.5%***	18.8	**1.4**	***7.4%***
..real estate activities	96.6	**2.6**	***2.7%***	9.8	**0.7**	***6.7%***
..renting	8.3	**0.1**	***0.8%***	2.5	**0.0**	***0.3%***
..computer services	3.5	**1.9**	***55.4%***	0.7	**0.4**	***55.9%***
..research and development	0.2	**0.0**	***21.6%***	0.2	**0.0**	***0.0%***
..other business activities	42.8	**3.7**	***8.7%***	5.6	**0.4**	***6.3%***
Education	2.9	**0.5**	***17.1%***	0.1	**0.0**	***6.6%***
Health and social work	8.8	**0.3**	***3.4%***	1.1	**0.0**	***1.1%***
Other community, social and personal service activities	32.9	**1.9**	***5.9%***	3.5	**0.1**	***1.7%***
..sewage and refuse disposal, sanitation and similar activities	3.9	**0.1**	***1.3%***	1.5	**0.0**	***0.7%***
..recreational, cultural and sporting activities	26.6	**1.9**	***7.0%***	1.9	**0.0**	***2.6%***
..other services	2.3	**0.0**	***0.9%***	0.1	**0.0**	***0.0%***

Source: Statistical Office of Estonia.

Table D2.: Filed patent applications and utility model registration applications by share of subject areas, %*

	1997	1998	1999	2000	2001	2002
Patent applications						
Human necessities	29.8	21.4	21.4	22.8	27.2	31.02
Performing operations; transporting	10.4	7.9	7.9	5.5	7.1	6.95
Chemistry; metallurgy	44.2	30.3	30.3	31.1	39.8	45.76
Textiles; paper	0.2	1.1	1.1	0.2	0.4	1.81
Fixed constructions	4.2	3.3	3.3	2.3	3.9	3.2
Mechanical engineering; heating, weapons	3.2	2.5	2.5	1.6	2.8	1.53
Physics	5.6	7.1	7.1	8.0	5.0	1.67
Electricity	2.4	26.4	26.4	28.5	9.9	4.73
Applications not classified	0.0	0.0	0.0	0.0	3.9	3.34
Utility model registration						
Human necessities	22.6	4.6	26.2	26.0	18.6	20.83
Performing operations; transporting	13.3	23.9	19.3	20.0	23.2	12.5
Chemistry; metallurgy	6.6	6.5	6.4	8.0	0.0	8.33
Textiles; paper	6.6	0.0	0.0	0.0	0.0	0
Fixed constructions	13.3	15.2	9.6	16.0	11.6	5.56
Mechanical engineering; heating, weapons	26.6	28.2	9.6	8.0	7.0	11.11
Physics	6.6	13.0	22.5	18.0	9.3	6.94
Electricity	4.4	8.6	6.4	4.0	7.0	2.78
Applications not classified	0.0	0.0	0.0	0.0	23.3	31.94

Source: Statistical Yearbook of Estonia 2002, CD.

Table D3.: Trademark applications filed, number

	2001	2002
Number of the class of goods or services*		
1	48	32
2	21	15
3	76	137
4	23	25
5	330	273
6	26	30
7	40	37
8	10	13
9	179	155
10	26	31
11	40	46
12	45	50
13	2	3
14	15	22
15	2	6
16	228	200
17	10	13
18	28	27
19	32	48
20	38	41
21	46	49
22	10	9
23	1	5
24	11	20
25	94	100
26	8	12
27	15	4
28	40	29
29	173	205
30	261	249
31	35	31
32	103	110
33	170	179
34	47	37
35	339	303
36	133	105
37	88	79
38	78	67
39	73	121
40	16	24
41	227	208
42	311	125
43		100
44		46
45		18
Total	3498	3439

*Number of the class of goods or services, for class headings look at Q66-Q111 or : http://www.wipo.org/classifications/fulltext/nice8/enmain.htm

Source: Estonian Patent Agency[44]:

[44] http://www.epa.ee/eng/24stat.htm:

Class	Heading
1	Chemicals used in industry, science and photography, as well as in agriculture, horticulture and forestry; unprocessed artificial resins, unprocessed plastics; manures; fire extinguishing compositions; tempering and soldering preparations; chemical substances for preserving foodstuffs; tanning substances; adhesives used in industry.
2	Paints, varnishes, lacquers; preservatives against rust and against deterioration of wood; colorants; mordants; raw natural resins; metals in foil and powder form for painters, decorators, printers and artists.
3	Bleaching preparations and other substances for laundry use; cleaning, polishing, scouring and abrasive preparations; soaps; perfumery, essential oils, cosmetics, hair lotions; dentifrices.
4	Industrial oils and greases; lubricants; dust absorbing, wetting and binding compositions; fuels (including motor spirit) and illuminants; candles and wicks for lighting.
5	Pharmaceutical and veterinary preparations; sanitary preparations for medical purposes; dietetic substances adapted for medical use, food for babies; plasters, materials for dressings; material for stopping teeth, dental wax; disinfectants; preparations for destroying vermin; fungicides, herbicides.
6	Common metals and their alloys; metal building materials; transportable buildings of metal; materials of metal for railway tracks; non-electric cables and wires of common metal; ironmongery, small items of metal hardware; pipes and tubes of metal; safes; goods of common metal not included in other classes; ores.
7	Machines and machine tools; motors and engines (except for land vehicles); machine coupling and transmission components (except for land vehicles); agricultural implements other than hand-operated; incubators for eggs.
8	Hand tools and implements (hand-operated); cutlery; side arms; razors.
9	Scientific, nautical, surveying, photographic, cinematographic, optical, weighing, measuring, signalling, checking (supervision), life-saving and teaching apparatus and instruments; apparatus and instruments for conducting, switching, transforming, accumulating, regulating or controlling electricity; apparatus for recording, transmission or reproduction of sound or images; magnetic data carriers, recording discs; automatic vending machines and mechanisms for coin-operated apparatus; cash registers, calculating machines, data processing equipment and computers; fire-extinguishing apparatus.
10	Surgical, medical, dental and veterinary apparatus and instruments, artificial limbs, eyes and teeth; orthopedic articles; suture materials
11	Apparatus for lighting, heating, steam generating, cooking, refrigerating, drying, ventilating, water supply and sanitary purposes.
12	Vehicles; apparatus for locomotion by land, air or water.
13	Firearms; ammunition and projectiles; explosives; fireworks.
14	Precious metals and their alloys and goods in precious metals or coated therewith, not included in other classes; jewellery, precious stones; horological and chronometric instruments.
15	Musical instruments.
16	Paper, cardboard and goods made from these materials, not included in other classes; printed matter; bookbinding material; photographs; stationery; adhesives for stationery or household purposes; artists' materials; paint brushes; typewriters and office requisites (except furniture); instructional and teaching material (except apparatus); plastic materials for packaging (not included in other classes); printers' type; printing blocks
17	Rubber, gutta-percha, gum, asbestos, mica and goods made from these materials and not included in other classes; plastics in extruded form for use in manufacture; packing, stopping and insulating materials; flexible pipes, not of metal.
18	Leather and imitations of leather, and goods made of these materials and not included in other classes; animal skins, hides; trunks and travelling bags; umbrellas, parasols and walking sticks; whips, harness and saddlery

19	Building materials (non-metallic); non-metallic rigid pipes for building; asphalt, pitch and bitumen; non-metallic transportable buildings; monuments, not of metal.
20	Furniture, mirrors, picture frames; goods (not included in other classes) of wood, cork, reed, cane, wicker, horn, bone, ivory, whalebone, shell, amber, mother-of-pearl, meerschaum and substitutes for all these materials, or of plastics.
21	Household or kitchen utensils and containers (not of precious metal or coated therewith); combs and sponges; brushes (except paint brushes); brush-making materials; articles for cleaning purposes; steelwool; unworked or semi-worked glass (except glass used in building); glassware, porcelain and earthenware not included in other classes.
22	Ropes, string, nets, tents, awnings, tarpaulins, sails, sacks and bags (not included in other classes); padding and stuffing materials (except of rubber or plastics); raw fibrous textile materials.
23	Yarns and threads, for textile use.
24	Textiles and textile goods, not included in other classes; bed and table covers.
25	Clothing, footwear, headgear.
26	Lace and embroidery, ribbons and braid; buttons, hooks and eyes, pins and needles; artificial flowers.
27	Carpets, rugs, mats and matting, linoleum and other materials for covering existing floors; wall hangings (non-textile).
28	Games and playthings; gymnastic and sporting articles not included in other classes; decorations for Christmas trees.
29	Meat, fish, poultry and game; meat extracts; preserved, dried and cooked fruits and vegetables; jellies, jams, compotes; eggs, milk and milk products; edible oils and fats.
30	Coffee, tea, cocoa, sugar, rice, tapioca, sago, artificial coffee; flour and preparations made from cereals, bread, pastry and confectionery, ices; honey, treacle; yeast, baking-powder; salt, mustard; vinegar, sauces (condiments); spices; ice.
31	Agricultural, horticultural and forestry products and grains not included in other classes; live aniBeers; mineral and aerated waters and other non-alcoholic drinks; fruit drinks and fruit juices; syrups and other preparations for making beverages.mals; fresh fruits and vegetables; seeds, natural plants and flowers; foodstuffs for animals, malt.
32	Beers; mineral and aerated waters and other non-alcoholic drinks; fruit drinks and fruit juices; syrups and other preparations for making beverages
33	Alcoholic beverages (except beers).
34	Tobacco; smokers' articles; matches.
35	Advertising; business management; business administration; office functions.
36	Insurance; financial affairs; monetary affairs; real estate affairs
37	Building construction; repair; installation services.
38	Telecommunications.
39	Transport; packaging and storage of goods; travel arrangement.
40	Treatment of materials
41	Education; providing of training; entertainment; sporting and cultural activities.
42	Scientific and technological services and research and design relating thereto; industrial analysis and research services; design and development of computer hardware and software; legal services.
43	Services for providing food and drink; temporary accommodation.
44	Medical services; veterinary services; hygienic and beauty care for human beings or animals; agriculture, horticulture and forestry services.
45	Personal and social services rendered by others to meet the needs of individuals; security services for the protection of property and individuals.

E. Information society technologies (IST) penetration

Table E1.: Essential Target Programs and Projects in Public Administration[45]

For the implementation of the Public Information Act and the Digital Signatures Act, an extensive complex of measures was initiated called *Records Management Program (RMP) of government agencies*, which is aimed at reorganising and transferring records management of government agencies on the modern technological basis throughout the whole "life time" of the document from its initiation, signing, registering, and treatment to archiving and preserving. The purpose of RMP is to digitalise the documentary procedures and adjust to the information society demands. This means introduction of common methods, standards, information technology solutions and co-ordination.

The development and integration of ICT infrastructures of the central and local governments into a common citizen-friendly service environment has made progress also in some other programs like eCounty, x-road, e-Citizen.

The eCounty project started because of vital interests of Estonian local authorities. Over the last three years, the Public Information Act, the Digital Signature Act, and the Archives Act were passed. The three Acts made digital management of public business both possible and binding. The eCounty is a local authorities' portal which offers information about culture, public register of landed property, sports and games, lifelong learning, web library, public register of buildings, public register of residents etc.

X-Road is the modernisation program of national databases with the aim to change national databases into a common public, service-rendering resource, which would enable agencies, legal and natural persons to search data from national databases over the Internet, provided they are entitled to do so. At the same time, the system will ensure sufficient security for the treatment of inquiries made to databases and responses received. The aim of the X-road program is to develop software, hardware and organisational methods for standardised usage of national databases. According to the vision for 2003, the state has access to databases as an integral whole 7 days a week and 24 hours a day, which ensures that:

- The citizen can obtain and provide information within his or her limits of authority;
- The official can use all national databases in the decision-making process within his or her limits of authority;
- The entrepreneur can, within his or her limits of authority, use information included in national databases for carrying out business;
- The state has become more transparent, integral and intelligible for the citizen;
- The integrated use of databases helps to improve significantly the administrative capability and decrease the need for resources spent on providing the service.

The *e-Citizen project* is a nation-wide project that focuses on developing co-operation between Estonian citizens and the public sector through the Internet. In the course of the project, the e-citizen environment is created, which enables the citizens to conveniently obtain information about services provided by the state and the citizens' rights and obligations. It enables people to participate more actively in the public life at national, regional and local level and to communicate with all national information systems through their personal

[45] Sources: IT in Public administration of Estonia. Yearbook, 2003; www.riso.ee , www.ria.ee

information system.

By 2004, all state and local government agencies will be providing services through the Internet. 60% of the population will be using the Internet on a daily basis. There will be a citizen portal, which will include the following: situation layer (citizen's manual); services layer (standard services); direct services (access); procedural services (access); e-democracy systems (access); citizen's document management system, e-mailbox; my portal.

ID-card. The purpose of Estonian ID-program is to use nation-wide electronic identity and develop a new personal identification card that would be a generally acceptable identification document and contain both visually and electronically accessible information. The output of ID-program is the ID-card, which functions on an electronic crypto-processor, based on smart-card technology. It includes personal certificates and private keys of the card-owner. On 28 January 2002, the first ID-cards were issued to Estonian citizens. Thus the project came to its logical end.

The implementation of ID-card actually means establishing of new nation-wide infrastructure in Estonia. The structure includes a certification service provider (certification centre and its subunits) who issues certificates, and a catalogue service provider who takes care of making these certificates available for everyone. In addition, other services and their providers are needed to provide opportunities to use certificates. Pursuant to the Estonian Digital Signatures Act, the structure must include also time stamp service provider who would issue time stamps for digital signatures.

Information about applying for, using, and keeping ID-card can be found at http://www.pass.ee in Estonian, English and Russian. Further information about ID-card documentation, public key infrastructure, and Estonian ID-card program can be found at http://id.ee/index.html (in Estonian; summary and links in English). At the end of 2003 over 300,000 ID-cards had been issued.

Public Key Infrastructure. In order to enable sending documents electronically the Digital Signature Act was passed on 8 March 2000, which created legal effect for the implementation of digital signature. The law provides an opportunity to use digital signature equally with the hand-written signature. A document signed according to this act enables the receiver to ascertain the person behind the signature, the time of signing, and whether the document has been altered after the signing. It requires no special knowledge to give a signature or ascertain its authenticity; most of the necessary operations are made by software means. This requires respective software as well as access to the public data communication network (Internet).

G. EDUCATIONAL SECTOR AND LABOUR FORCE SUPPLY

Table G1.: Laws and regulations governing the area of government of the Ministry of Education and Research

- **Republic of Estonia Law on Education** (March 1992) defines the procedure and scope of future legislation for further development of the educational system. Within the framework of the Law on Education, other laws and concepts have been adopted by the Riigikogu (Parliament) and the Government of the Republic in recent years;
- **Law on Pre-School Child Institutions** (June 1993) regulates the operation of municipal child institutions,
- **Basic School and Upper Secondary School Act** (September 1993) provides for the revision of the content of general education. Compulsory subjects account for 70%, optional subjects for 20% and "free" subjects for 10% of the general secondary education program,
- **Universities Act** (January 1995) regulates the operation of universities,
- **Private Education Institution Act** (June 1998) provides for the operation of private schools,
- **Applied Higher Education Institution Act** (June 1998) regulates the operation of applied higher education institutions and provides principles for provision of vocational higher education,
- **The Concept of Vocational Education and Training** (January 1998) is a vocational education and training development plan, stipulating the main direction of vocational education and training policy and reform in Estonia,
- **Vocational Educational Institutions Act** (June 1998) stipulates the order for foundation, reorganisation and liquidation of a vocational education and training school; basis for organising teaching, the rules for school leadership, the budget of schools and financing principles, the membership of school and their rights and duties and the rules for monitoring. The Law on Vocational Education Institutions regulates the activities of the public and municipal vocational education and training schools. The law is applied to the private vocational education and training schools insofar as the Law on Private Schools does not stipulate otherwise,
- **Adult Education Act** (November 1993, amended in June 1998) regulates education and training provision for adults. The state budget supports adult education, the activities of public education institutions, education for the unemployed and research work on adult education. The 1993 Income Tax Act established concessions for employers who had spent money on employees' education, and for individuals spending money on education. The first draft of life-long learning strategy is prepared and presented for broader discussion. Practically every vocational education institution and higher school offers adult education,
- **Law on the University of Tartu** (February 1995) determines legal status of the University of Tartu and its relations with state institutions,
- **Law on Hobby Schools** (June 1995),
- **Youth Work Act** (February 1999) provides legal bases for the organisation of youth work,
- **Juvenile Sanctions Act** (January 1998) provides sanctions applicable to minors and the competence of juvenile committees,
- **Organisation of Research and Development Act** (March 1997) provides the bases for the organisation of research and development and ensures legal means for the

preservation and further development of scientific and technological creation as a component of Estonian culture and the Estonian economy,

- **Language Act** (February 1995) regulates the requirements for proficiency in the Estonian language and the use of Estonian and foreign languages,
- **Recognition of Foreign Professional Qualifications Act** (March 2000) establishes the bases and procedure for recognation of foreign professional qualifications in order for persons to work in regulated professions.

Source: Estonian Ministry of Education and Research[46]

Table G2.: Correspondence of Estonian educational level categories classification with ISCED-76 and ISCED-97

Estonian level category	**ISCED-76**	**ISCED-97**
0-preprimary education	Education preceding the first level	Pre-primary education, level 0
1-basic ed., grades 1-6	Ed. at the first level	Primary education, level 1
2-basic ed., grades 7-9	Ed. at the second level, first stage	Lower secondary ed., level 2
3-vocational ed.for children with special needs or without basic ed.	Ed. at the second level, second stage, level category 3	Lower secondary ed., level 2
3-gymnasium, grades 10-12	Ed. at the second level, second stage, level category 3	Upper secondary ed., level 3
3-vocational or voc. secondary ed. based on basic ed.	Ed. at the second level, second stage, level category 3	Upper secondary ed., level 3
3-vocational or voc. secondary ed. based on secondary ed.	Ed. at the second level, second stage, level category 3	Post-secondary non-tertiary ed., level 4
4-special secondary ed. based on basic ed.	Ed. at the third level, level category 5	Upper secondary ed., level 3
4-special secondary ed. based on secondary ed.	Ed. at the third level, level category 5	First stage of tertiary ed., level 5
5-higher vocational ed.	Ed. at the third level, level category 5	First stage of tertiary ed., level 5
5-diploma courses	Ed. at the third level, level category 6	First stage of tertiary ed., level 5
6-bachelor courses	Ed. at the third level, level category 6	First stage of tertiary ed., level 5
7-master courses	Ed. at the third level, level category 7	First stage of tertiary ed., level 5
8-doctor courses	Ed. at the third level, level category 7	Second stage of tertiary ed., level 6

Source: Statistical Office of Estonia, 2003

[46] http://www.hm.ee/

Table G3.: Characterisation of Estonian educational system

Pre-primary education

The organisation of pre-primary education is based on the Framework Curriculum of Pre-primary Education approved by Regulation No. 315 of the Government of the Republic on 15 October 1999. The framework curriculum is a basis for municipal and private childcare institutions for preparation of their own curriculum and it supports parents upon educating and developing their children at home.

Basic education

Basic education is the minimum general education that is obligatory for everybody. Children who attain 7 years of age by 1 October of the current year are subject to the obligation to attend school. Students are subject to the obligation to attend school until they acquire basic education or attain 17 years of age. The main form of study at the basic level is daytime study. Basic education can be obtained on the basis of three different national curricula: national curricula of basic and upper secondary schools (pupils with normal intellect); supplementary learning curriculum (pupils with a slight learning disability; 1,4% of basic school pupils study on the basis of this curriculum) national curriculum for students with a moderate and severe learning disability (0,4% of basic school pupils study on the basis of this curriculum). Each school prepares its curriculum on the basis of the national curriculum.

Secondary education

Secondary education is based on basic education and it is divided into general secondary education and secondary vocational education. Acquisition of general secondary education gives the right to continue studies for acquisition of higher education.

General secondary education is acquired in an upper secondary school, the upper secondary level is classes 10 to 12. In an upper secondary school the provision of education takes place in the daytime, evening and distance learning study form. It is permitted to finish the school as an external pupil. No tuition is charged for studying in state and municipal schools of general education. The state and local authorities have to provide those who request it with opportunities for acquiring secondary education.

National curriculum of basic and upper secondary schools stipulates the objectives of schooling and education, the principles of the national curriculum, the acquired competencies, the bases of organisation for studies, mandatory subjects and timetables and requirements of the school level and of finishing the school. Each school prepares its own curriculum on the basis of the national curriculum. The lowest permissible weekly study load of pupils at the upper secondary school level is 32 lessons.

Secondary vocational education

Organisation of vocational education is based on the precondition that the state has to define only general purposes and principles of vocational education, economic and legal levers that guarantee its development, and scheme of education. In the first years of the current reform of vocational education in Estonia, in 1996–2000, a consensus was reached in the ways of reorganisation of vocational education, a constructive dialogue started between educators and social partners, a legislative basis and conditions were created for addressing the development of the system according to the changes in Estonia, for more effective usage of the existing resources, for elaborating new curricula and development of personnel for vocational schools.

The concept of vocational education comprises vocational, professional and occupational training in all forms of education. Types of vocational education in the formal education system are as follows: vocational pre-schooling, vocational secondary education, applied higher education (see also section "Higher education"). Education outside formal education includes various training and courses. Students obtaining basic education, including those beyond the age of school obligation, who are obtaining basic education as extramural students, may get vocational pre-schooling. Gymnasium also can offer its students vocational pre-schooling in the amount of optional courses – also in co-operation with vocational education institutions. Acquiring of vocational secondary education can commence both after finishing basic school and after finishing gymnasium. Attainment of vocational education on the basis of basic education lasts at least 3 years. Vocational studies after gymnasium lasts 1-2.5 years. Those who finish vocational education and want to continue in higher education, must, as a rule, pass state examinations. All people with secondary education have equal rights to compete for admittance to higher education institutions.

The structure of the Ministry comprises departments of vocational and adult education, the main tasks of which are to organise education policy activity in vocational secondary and adult education and advising the leadership and other departments of the Ministry in these spheres. The vocational and adult education department also co-ordinates the participation of the Ministry in elaborating, awarding and certifying of professional qualifications.

The School Network Bureau of the Ministry of Education and Research (www.hm.ee/kvb/) is a government institution under the Ministry, which services the Ministry in the management issues of basic schools and gymnasiums, of vocational schools and applied higher schools. In its everyday work, the Bureau must pursue the education policy elaborated by the Ministry on the level of state educational institutions, provide the Ministry with relevant analyses and opinions for effective and expedient operation of state educational institutions, and provide relevant supporting services to schools to have an optimal environment for operation.

The State Examination and Qualification Centre (www.ekk.edu.ee) is a subordinate office of the Ministry. A mission of the Centre is to provide pupils, teachers, schools, education managers and the public information about learning and teaching level in schools and help to implement curricula and develop schooling systems for teachers. The Centre is dealing with the content of education via preparing national curricula, advising schools in elaborating curricula, performing evaluations of the progress in learning and developing the teacher training systems.

The Foundation Estonian Vocational Education Reform (www.sekr.ee) is a non-profit legal person with the task to co-ordinate and apply European Union co-operation programs in the sphere of vocational education and labour market to support development of human resources in Estonia and preparation for integration into the European Union.

The Foundation for Professional Qualifications (www.kutsekoda.ee) was established in August 2001 to continue the establishment of the professional qualifications system started by the Estonian Chamber of Commerce and Industry in 1997. The activity of the Chamber of Professions is targeted at the establishment and development of a well-organised system of professional qualifications and creation of preconditions for comparability of Estonian qualifications and their recognition by other countries.

Higher and higher professional education

1. GENERAL FRAMEWORK

Higher education is primarily regulated by the Universities Act, the Institutions of Applied Higher Education Act, and the Private Schools Act. The Estonian higher education system is binary and consists of universities (ülikool) and applied higher education institutions (rakenduskõrgkool). Some vocational schools also have a right to offer professional higher education programmes. Based on the form of ownership, institutions of higher education can be divided into state, public and private institutions.

Since the academic year of 2002/2003, the general structure of the higher education system is based on two main cycles, following the undergraduate-graduate model. The first cycle is the bachelor level; the second cycle is the master level. For some specialities, the study programs have been integrated into a single long cycle, leading to a master level qualification. The highest stage at universities is doctor's studies. Applied higher education programs constitute the first stage of higher education and correspond to the bachelor level programs.

Universities are institutions that provide academic higher education and can also offer professional higher education programs. Institutions of applied higher education provide professional higher education and may offer master level programs in the field of theology and defence or in other fields in co-operation with universities.

2. ACCREDITATION AND RECOGNITION OF QUALIFICATIONS

Accreditation is a process in the course of which an institution of higher education or its study program is evaluated. The Higher Education Quality Assessment Council, in co-operation with foreign experts, carries out accreditation. The term of validity of a positive accreditation decision is seven years. A conditional accreditation decision is also a positive decision the term of validity of which is three years.

Qualifications awarded to students who have completed a study program that has been accredited positively as well as the qualifications that have been awarded up to two years before a positive accreditation decision are deemed to be recognised by the state. Diplomas of public universities awarded upon the completion of study programs that were registered before 1 June 2002, as well as diplomas awarded upon the completion of professional higher education programs that were registered before 30 June 2003 enjoy state recognition even without being accredited.

3. ADMISSION REQUIREMENTS

3.1. General requirements

The general admission requirement to an institute of higher education is secondary education evidenced by a respective certificate – secondary school leaving certificate, certificate on acquiring secondary vocational education, other respective certificates and diplomas from previous systems and foreign qualifications giving access to higher education. The secondary school leaving certificate (Gümnaasiumi lõputunnistus) is awarded after 12 years of studies (9 years of basic education and 3 years of secondary education). Since 1997, secondary school students must pass state examinations (as of 1998 there are three examinations). The secondary school-leaving certificate is valid with the state examination certificate – Riigieksamitunnistus.

3.2. Specific requirements

In addition to the general requirements an institution of higher education may impose specific

admission requirements such as entrance examinations, results of state examinations, speciality tests or interviews, etc.

4. ORGANISATION OF THE STUDIES

The Standard of Higher Education establishes general requirements for studies, curricula and academic staff. The nominal duration of studies is measured in academic years, the scope of the curriculum in credit points (ainepunkt, or AP). One credit point corresponds to forty hours (one study week) of studies performed by a student. One academic year consists of 40 credit points, which corresponds to 60 credits of the European Credit Transfer System (ECTS).

5. HIGHER EDUCATION QUALIFICATIONS

5.1. Professional higher education qualifications

Professional higher education is the first stage of higher education, established since the admission of the academic year of 2002/2003, which aims at attaining the competencies necessary for work in a certain profession or further study on the master level. The nominal length of study is 3 to 4.5 years, 120 to 180 AP (180 to 240 ECTS credits). Graduates who have completed their studies are awarded a diploma (on a bluish-gray form, marked with E) certifying the completion of the professional higher education program – rakenduskõrgharidusõppe diplom.

Professional higher education studies have developed from higher vocational education studies and diploma studies applied until the academic year of 2002/2003. The aim of higher vocational education studies was to attain general education as well as professional and occupational knowledge and skills. Diploma studies were of applied content, the purpose of which was to acquire practical knowledge and skills. The nominal length of both studies was 3 to 4 years. Higher vocational education and diploma studies differ in their requirements for teaching staff and the scope of practical training. Graduates who have completed their study are awarded a diploma on completing the respective study program. The qualifications are called kutsekõrgharidusõppe diplom (higher vocational education diploma, on yellow form, marked with K) and diplomiõppe diplom (diploma study diploma, on green form, marked with A), respectively.

5.2. Bachelor degree

Bachelor-study is the first stage of bachelor level higher education study with the aim of increasing students' level of general education, acquiring basic knowledge and skills in the speciality necessary to pursue further studies at the master level and for commencing work. The nominal length of studies is generally 3 years, 120 AP (180 ECTS credits), and in a few disciplines up to 4 years, 160 AP (240 ECTS credits).

The main aim of the bachelor-study programs registered before 1 June 2002 was to develop theoretical knowledge and skills in the selected work area and completion of the program granted the right to work in a position requiring high-level specialist qualifications. The nominal length of studies was predominantly 4 years, along with teacher training that could be extended up to 5 years. Under the conditions and in the manner established by the university, the completion of a program registered before 1 June 2002 can be regarded as a part of studies at master level.

Graduates who have completed their studies are awarded a degree – bachelor degree – which is certified by a diploma (on a greenish yellow form, marked with L; programs registered before 1 June 2002 are on a blue form, marked with B).

5.3. Master's degree

Master-study constitutes the second stage of master level higher education during which speciality knowledge and skills are developed further and knowledge and skills necessary for independent work and pursuing studies at a doctorate level are attained. The main purpose of the master-studies is to train a specialist with deep theoretical knowledge. The admission requirement is the bachelor's degree or an equivalent level of qualification. The nominal length of the studies is 1 to 2 years, 40 to 80 AP (60 to 120 ECTS credits), but along with the first stage at least 5 years, 200 AP (300 ECTS credits).

Upon completing master-study programs registered before 1 June 2002, a master's degree is awarded as a research or professional degree. Research constitutes at least 50 percent of the studies in a research master program and a novel scientific treatment of a speciality problem is presented in the final thesis. Research, development or creative work constitutes at least 25 percent of the scope of studies in the professional master program and the studies are aimed at finding a novel solution to a professional, creative problem. Under the conditions and in the manner established by the university the completion of a master-study program registered before 1 June 2002 can be regarded as a part of doctorate studies.

Graduates who have completed their studies are awarded a degree – master's degree – which is certified by a diploma (on a silver form, marked with M; programs registered before 1 June 2002, on a brown form, marked with C).

5.4. Qualification of integrated long-cycle programs

The integrated long-cycle studies contain both bachelor and master level studies. Completion of the study program provides a qualification corresponding to the master's degree. The studies are characteristic of medicine, veterinary medicine, pharmacy, dentistry, architecture, civil engineering and class teacher training. The nominal length of medical studies, and since the admission of the 2002/2003 academic year also veterinarian studies, is 6 years, 240 AP (360 ECTS credits), and in other fields 5 years, 200 AP (300 ECTS credits).

Graduates who have completed their studies are awarded a diploma (on a silver form, marked with M; programs registered before 1 June 2002, on a brown form, marked with C) certifying the completion of the respective integrated program. By a decision of the university the master's degree may be awarded.

5.5. Doctor's degree

Doctor-studies constitute the highest stage of higher education aimed at attaining knowledge and skills necessary for independent research, development or professional creative work. The general admission requirement for doctor-studies is a master's degree or a corresponding qualification. The nominal length of studies is 3 to 4 years, 120 to 160 AP (180 to 240 ECTS credits).

Graduates who have completed their studies are awarded a degree – doctor's degree, which is certified by a diploma (on a golden form, marked with O; programs registered before 1 June 2002, on a white form, marked with D). The degree is a research degree for which the candidate has to compose and defend a doctorate thesis – independent scientific research or creative work.

Adult education

Perceiving the increasing need for adult education and life-long learning opportunities in Estonia, the Ministry of Education and Research established in 2001 an expert work group to elaborate a life-long learning strategy for Estonia. The members of the work group were employees from different sectors and levels of education, from large and small enterprises and from the public sector, as well as people representing different activities, which enabled to analyse possibilities and needs of life-long learning from different aspects. The draft of life-long learning strategy for Estonia was prepared as a result of many collective discussions of the work group, smaller groups and individual efforts of its members and was meant to be an introduction to wider discussions. The main focus in the strategy was laid on adult training and the authors were focused on creating opportunities to attain further education after attaining primary education. In 2002, the document was sent for public discussions and opinions to more than 40 organisations. On the basis of the comments and opinions received from them, the work group started amendment and improvement of the strategy already later this year.

Starting from 1993, the performance of the adult training system is regulated by the Adult Training Act. The Act regulates:

- Formal education acquired in evening courses, in distance from of learning or as an external student,
- Adult occupational training,
- Non-formal education.

General co-ordination of adult training is the task of the Ministry of Education and Research.

National development priorities are co-ordinated by the Adult Education Council

On the state level, the operation of the adult education system is co-ordinated by the Adult Education Council, established by the Estonian Government at the end of 1998. The council is headed by the minister of education. The Adult Education Council is advising the Estonian Government in the issues of adult education and co-ordinates co-operation between various institutions related with the adult education system.

Training of job-seekers and unemployed

Employment training for job-seekers and the unemployed is organised by regional employment offices of the Labour Market Board. Unemployed persons and those who have received notification of terminating the employment contract have the right after registering themselves in their local employment office to apply for employment training. The employment office compensates for the participation fee in training for up to six months. In addition to compensation for employment training costs, the unemployed who attended employment training for at least 80 hours receive a training allowance.

Adult training in adult gymnasiums, vocational education institutions and open universities

The Adult Education Act provides the right to apply for a vacation with retained wages to people who are acquiring basic, secondary or higher education in evening courses, distance form of study or as an external student and those participating in occupational training. There are 32 general education institutions in Estonia where one can obtain basic and general secondary education in evening courses, in distance form of study or as an external student. Acquiring of basic education in evening courses, in distance form of study or as an external student is permitted to people who have passed the minimum permitted school-leaving age and who have no basic education. Attainment of general secondary education in evening courses and in distance form of study, and finishing of school as an external student is

permitted to people who have obtained basic education. Obtaining of basic and secondary education for the adults is free of charge in state and municipal education institutions. Vocational education institutions offer besides the first stage education also occupational education to the adults. Also, the adults can obtain in vocational education institutions vocational secondary education both on the basis of basic education and secondary education, and applied higher education. In universities there are in addition to traditional studies also so-called open studies in the form of virtual, distance learning or open university. In the open form of learning, one can obtain both advanced and formal education. Non-formal education enables development of a personality, his creativity, talents, initiative and social sense of responsibility and addition of knowledge, skills and abilities needed in life. The studies are in the form of courses, circles or other form suitable for the students. The umbrella organisation of non-formal education providers is the Estonian Non-Formal Adult Education Association. The funds allocated to non-formal education from the budget of the Ministry of Education are also distributed through the Non-Formal Adult Education Association.

Source: Estonian Ministry of Education and Research[47]

[47] http://www.hm.ee

Table G4.: Achievements in secondary and tertiary education, number of students by area of training, 1000 persons, at the beginning of academic year

	1995	1996	1997	1998	1999	2000	2001
SECONDARY EDUCATION[48]							
General secondary education	36.847	37.845	38.319	37.105	37.511	38.016	39.425
full-time general education[49]	31.848	32.402	33.015	32.179	32.390	32.954	34.552
part-time general education[35]	4.999	5.443	5.304	4.926	5.121	5.062	4.873
Vocational secondary education							
vocational and vocational secondary courses							
professional secondary courses	29.438	31.487	31.316	31.190	31.147	30.872	29.813
teachers training and education science	0.457	0.381	0.302	0.197	0.082	0.001	0.001
arts	1.128	1.311	1.318	1.247	1.233	0.823	0.753
humanities	-	0.052	0.059	0.07	0.067	0.043	0.015
business and administration	4.936	5.731	5.686	5.198	5.529	5.32	4.48
law	0.463	0.533	0.602	0.549	0.236	0.096	0.007
computing	0.483	0.573	0.69	0.857	1.472	2.099	2.265
engineering and engineering trades	6.388	6.556	6.774	6.949	7.002	6.84	6.864
manufacturing and processing	4.139	4.39	4.674	4.743	4.494	4.58	4.387
architecture and building	2.59	2.937	3.044	3.125	3.098	3.245	3.357
agriculture, forestry and fishery	2.129	1.791	1.481	1.28	1.124	1.075	1.112
veterinary	0.106	0.06	0.036	0.02	-	-	-
health	1.165	1.172	0.569	0.295	0.221	0.207	0.246
social services	0.608	0.45	0.483	0.539	0.474	0.409	0.267
personal services	3.496	4.01	4.551	4.796	5.003	5.008	4.96
transport services	0.831	0.716	0.613	0.644	0.676	0.72	0.695
environmental protection	0.076	0.058	0.057	0.056	0.051	0.058	0.073
security services	0.443	0.766	0.377	0.625	0.385	0.348	0.331
HIGHER and HIGHER PROFESSIONAL EDUCATION							
Higher professional courses	..	..	..	..	3.165	5.623	7.623
education		..	..	..	0.238	0.583	0.408
humanities and arts	..	..	..	..	0.016	0.066	0.202
social sciences, business and law	..	..	..	..	0.640	1.675	2.586
science	..	..	..	..	-	0.192	0.414
engineering, manufacturing and construction	..	..	..	..	0.217	0.390	0.598
health and welfare	..	..	..	..	2.054	2.674	3.039
services	..	..	..	..	-	0.043	0.376
Diploma courses	6.063	7.772	10.481	14.997	16.474	17.136	17.435
Teacher training and education science	1.180	1.342	1.804	2.288	2.637	3.019	3.463
Arts	0.112	0.224	0.166	0.341	0.587	0.952	1.059
Humanities	0.230	0.224	0.283	0.462	0.515	0.384	0.372
Social and behavioural science	0.767	0.830	0.848	0.935	0.748	0.836	0.845
Journalism and information	0.102	0.062	0.094	0.129	0.202	0.256	0.319
Business and administration	0.687	0.911	2.048	4.410	6.024	5.362	5.078
Law	1.235	1.732	1.634	1.755	1.595	1.474	1.009

[48] In the years 1995-2001 the number of students who studied simultaneously in the evening school of general education and in the vocational education institution was 381 , 342, 230, 255, 209, 69 and 25, respectively

[49] grades 10-12 (13)

	1995	1996	1997	1998	1999	2000	2001
Life science	-	-	0.030	0.060	0.082	0.122	0.141
Physical sciences	0.104	0.107	0.116	0.146	0.161	0.170	0.172
Mathematics and statistics	-	-	-	-	0.006	-	-
Computer sciences	-	-	0.108	0.175	0.387	0.677	0.828
Engineering and engineering trades	0.393	0.435	0.497	0.538	0.603	0.581	0.749
Manufacturing and processing	0.042	0.046	0.034	0.096	0.136	0.198	0.268
Architecture and building	0.240	0.273	0.330	0.390	0.458	0.519	0.562
Agriculture, forestry and fishery	0.041	0.056	0.063	0.047	0.047	0.037	0.027
Veterinary	-	-	-	-	-	-	-
Health	0.050	0.464	0.838	1.210	0.071	0.106	0.102
Social services	0.077	0.130	0.246	0.311	0.291	0.354	0.365
Personal services	0.026	0.078	0.246	0.438	0.449	0.509	0.503
Transport services	0.280	0.343	0.454	0.502	0.576	0.683	0.759
Environmental protection	-	-	-	0.013	0.040	0.068	0.092
Security services	0.497	0.515	0.642	0.751	0.859	0.829	0.722
Bachelor courses	17.959	18.770	20.489	21.731	25.246	27.892	28.703
Teacher training and education science	1.715	1.648	1.679	1.459	1.521	1.645	1.810
Arts	0.897	0.915	0.986	1.078	1.161	1.173	1.200
Humanities	2.082	2.123	2.310	2.486	2.905	3.072	3.194
Social and behavioural science	1.350	1.310	1.122	1.126	1.524	1.674	1.734
Journalism and information	0.218	0.219	0.228	0.229	0.329	0.324	0.335
Business and administration	3.161	3.685	4.301	4.641	4.888	5.778	5.797
Law	0.656	0.839	1.376	1.814	2.778	2.856	3.040
Life science	0.249	0.219	0.246	0.321	0.421	0.559	0.636
Physical sciences	0.489	0.483	0.517	0.543	0.606	0.706	0.652
Mathematics and statistics	0.370	0.361	0.309	0.354	0.286	0.225	0.199
Computer sciences	0.472	0.465	0.904	0.946	1.084	1.401	1.539
Engineering and engineering trades	2.626	2.762	2.401	2.458	2.651	2.805	2.547
Manufacturing and processing	0.367	0.305	0.341	0.297	0.247	0.229	0.199
Architecture and building	0.932	1.160	1.343	1.454	1.609	1.574	1.471
Agriculture, forestry and fishery	0.664	0.600	0.575	0.571	0.734	0.850	0.939
Veterinary	0.179	0.163	0.168	0.176	0.188	0.210	0.213
Health	1.018	0.955	0.960	0.965	1.139	1.297	1.383
Social services	0.138	0.138	0.177	0.247	0.377	0.420	0.488
Personal services	0.332	0.351	0.348	0.312	0.380	0.467	0.553
Transport services	0.043	0.033	0.018	0.004	0.000	0.061	0.117
Environmental protection	0.001	0.036	0.180	0.250	0.418	0.566	0.657
Security services	-	-	-	-	-	-	-
Master courses*	2.588	2.803	2.673	2.822	3.438	4.339	5.140
Teacher training and education science	0.147	0.226	0.234	0.307	0.396	0.529	0.666
Arts	0.158	0.179	0.187	0.173	0.179	0.201	0.248
Humanities	0.248	0.316	0.320	0.324	0.343	0.442	0.494
Social and behavioural science	0.152	0.147	0.170	0.192	0.297	0.407	0.477
Journalism and information	0.053	0.051	0.042	0.042	0.047	0.043	0.039
Business and administration	0.424	0.399	0.441	0.630	0.975	1.263	1.429
Law	0.053	0.058	0.051	0.050	0.081	0.130	0.170
Life science	0.092	0.096	0.087	0.095	0.105	0.131	0.160
Physical sciences	0.139	0.145	0.143	0.144	0.148	0.153	0.169
Mathematics and statistics	0.029	0.042	0.045	0.041	0.044	0.050	0.056
Computer sciences	0.138	0.127	0.121	0.104	0.119	0.142	0.195
Engineering and engineering trades	0.221	0.233	0.247	0.215	0.224	0.258	0.304

	1995	1996	1997	1998	1999	2000	2001
Manufacturing and processing	0.036	0.028	0.038	0.029	0.023	0.053	0.061
Architecture and building	0.089	0.101	0.082	0.075	0.076	0.110	0.141
Agriculture, forestry and fishery	0.107	0.134	0.105	0.100	0.107	0.124	0.154
Veterinary	0.016	0.016	0.016	0.017	0.028	0.002	0.000
Health	0.392	0.425	0.275	0.208	0.136	0.165	0.183
Social services	0.040	0.016	0.021	0.024	0.056	0.074	0.109
Personal services	0.047	0.058	0.040	0.045	0.039	0.041	0.040
Transport services	0.001	-	-	-	-	-	-
Environmental protection	0.006	0.006	0.008	0.007	0.015	0.021	0.045
Security services	-	-	-	-	-	-	-
Doctor courses**	0.624	0.727	0.899	1.071	1.251	1.447	1.508
Teacher training and education science	0.010	0.009	0.009	0.015	0.023	0.033	0.042
Arts	0.001	0.003	0.005	0.008	0.008	0.014	0.018
Humanities	0.060	0.073	0.084	0.110	0.134	0.141	0.162
Social and behavioural science	0.012	0.019	0.028	0.036	0.062	0.074	0.104
Journalism and information	0.006	0.008	0.012	0.012	0.011	0.013	0.012
Business and administration	0.006	0.010	0.013	0.026	0.038	0.051	0.067
Law	0.001	0.006	0.007	0.012	0.015	0.018	0.021
Life science	0.080	0.097	0.107	0.110	0.120	0.144	0.158
Physical sciences	0.084	0.107	0.120	0.125	0.128	0.140	0.140
Mathematics and statistics	0.012	0.014	0.021	0.025	0.024	0.027	0.028
Computer sciences	0.031	0.040	0.046	0.052	0.053	0.044	0.050
Engineering and engineering trades	0.041	0.039	0.055	0.063	0.083	0.113	0.134
Manufacturing and processing	0.004	0.001	0.001	0.003	0.005	0.005	0.005
Architecture and building	0.004	0.006	0.006	0.008	0.014	0.023	0.028
Agriculture, forestry and fishery	0.028	0.025	0.030	0.035	0.045	0.054	0.060
Veterinary	0.005	0.003	0.002	0.005	0.006	0.017	0.019
Health	0.223	0.252	0.334	0.403	0.457	0.505	0.415
Social services	0.004	0.002	0.003	0.005	0.005	0.008	0.011
Personal services	0.009	0.010	0.011	0.010	0.010	0.011	0.013
Transport services	-	-	-	-	-	-	-
Environmental protection	0.003	0.003	0.005	0.008	0.010	0.012	0.021
Security services	-	-	-	-	-	-	-

Source. Statistical Office of Estonia, 2002

Table G5.: Achievements in secondary and tertiary education, number of admitted students by field of study, 1000 persons, at the beginning of academic year

	1995	1996	1997	1998	1999	2000	2001
SECONDARY EDUCATION							
Total vocational and vocational secondary							
professional secondary education	12.518	13.683	12.704	12.638	12.728	12.571	12.496
Teacher training	0.127	0.176	0.081	0.043	-	-	-
Fine and applied arts	0.291	0.527	0.444	0.396	0.307	0.252	0.217
Humanities	-	0.044	0.029	0.026	0.018	-	-
Commercial and business administration	2.691	2.948	2.367	2.366	2.699	2.250	2.052
Law and jurisprudence	0.240	0.235	0.213	0.208	0.007	-	-
Mathematics and computer sciences	0.287	0.239	0.309	0.363	0.883	1.369	1.453
Engineering and engineering trades	2.297	2.646	2.680	2.639	2.584	2.613	2.691
Manufacturing and processing	1.717	1.634	1.892	1.714	1.623	1.726	1.632
Architecture and building	1.233	1.268	1.212	1.241	1.175	1.162	1.153
Agriculture, forestry and fishery	0.602	0.535	0.430	0.411	0.393	0.354	0.442
Veterinary	0.029	-	-	-	-	-	-
Health	0.432	0.461	0.068	0.142	0.052	0.149	0.102
Social services	0.286	0.196	0.282	0.287	0.190	0.172	0.122
Personal services	1.480	1.827	2.063	2.161	2.099	2.013	1.952
Transport services	0.356	0.286	0.215	0.275	0.263	0.296	0.297
Environmental protection	0.033	0.032	0.030	0.030	0.030	0.030	0.048
Security services	0.417	0.629	0.389	0.336	0.405	0.185	0.335
HIGHER EDUCATION							
Higher professional courses					1.830	2.637	3.019
Teacher training and education science	..	..	..	..	0.237	0.307	0.098
Arts	..	..	..	..	0.016	0.050	0.085
Humanities	..	..	..	..	-	-	0.012
Social and behavioural sciences	..	..	..	..	-	-	0.033
Business and administration	..	..	..	..	0.249	0.721	1.103
Law	..	..	..	..	0.124	0.186	0.122
Computer sciences	..	..	..	..	-	0.188	0.220
Engineering and engineering trades	..	..	..	..	0.070	0.075	0.060
Manufacturing and processing	..	..	..	..	0.099	0.122	0.123
Architecture and building	..	..	..	..	0.046	0.026	0.049
Health	..	..	..	..	0.599	0.576	0.673
Social services	..	..	..	..	0.390	0.343	0.330
Personal services	..	..	..	..	-	-	0.079
Environmental protection	..	..	..	..	-	0.043	0.032
Diploma courses	2.081	2.912	4.733	5.624	5.060	5.152	4.528
Teacher training and education science	0.343	0.430	0.761	0.863	0.898	0.933	0.887
Arts	0.028	0.068	0.044	0.201	0.239	0.310	0.299
Humanities	0.065	0.039	0.096	0.127	0.106	0.099	0.093
Social and behavioural science	0.245	0.225	0.250	0.356	0.222	0.273	0.167
Journalism and information	0.012	0.012	0.057	0.054	0.047	0.091	0.126
Business and administration	0.308	0.339	1.154	1.484	1.492	1.250	1.173
Law	0.510	0.737	0.601	0.635	0.556	0.340	0.225
Life science	-	-	0.030	0.030	0.026	0.068	0.058
Physical sciences	0.031	0.030	0.040	0.060	0.058	0.057	0.062
Computer sciences	-	-	0.108	0.082	0.221	0.374	0.265
Engineering and engineering trades	0.164	0.153	0.202	0.212	0.245	0.286	0.258

	1995	1996	1997	1998	1999	2000	2001
Manufacturing and processing	0.015	0.014	-	0.073	0.052	0.087	0.099
Architecture and building	0.080	0.075	0.117	0.130	0.140	0.171	0.169
Agriculture, forestry and fishery	0.013	0.016	0.020	-	0.018	-	-
Veterinary	-	-	-	-	-	-	-
Health	0.010	0.420	0.483	0.508	-	0.036	-
Social services	0.042	0.050	0.116	0.109	0.078	0.104	0.120
Personal services	-	0.057	0.183	0.211	0.118	0.162	0.128
Transport services	0.070	0.100	0.120	0.157	0.198	0.194	0.216
Environmental protection	-	-	-	0.012	0.025	0.030	0.034
Security services	0.145	0.147	0.351	0.320	0.321	0.287	0.149
Bachelor courses	3.934	4.223	4.635	4.920	6.165	6.960	6.463
Teacher training and education science	0.314	0.351	0.376	0.146	0.294	0.477	0.557
Arts	0.205	0.202	0.262	0.312	0.313	0.293	0.262
Humanities	0.402	0.427	0.503	0.629	0.663	0.748	0.691
Social and behavioural science	0.343	0.408	0.246	0.238	0.371	0.426	0.392
Journalism and information	0.035	0.045	0.046	0.047	0.071	0.110	0.070
Business and administration	0.715	0.764	0.922	1.018	1.037	1.263	1.221
Law	0.150	0.277	0.383	0.432	0.501	0.603	0.508
Life science	0.040	0.040	0.060	0.095	0.159	0.214	0.181
Physical sciences	0.113	0.113	0.130	0.143	0.168	0.222	0.113
Mathematics and statistics	0.090	0.091	0.090	0.113	0.055	0.067	0.044
Computer sciences	-	-	0.160	0.165	0.266	0.357	0.434
Engineering and engineering trades	0.802	0.819	0.592	0.605	0.796	0.596	0.592
Manufacturing and processing	0.022	0.021	0.043	0.045	0.053	0.050	0.044
Architecture and building	0.283	0.285	0.322	0.332	0.422	0.293	0.273
Agriculture, forestry and fishery	0.116	0.113	0.141	0.186	0.278	0.273	0.246
Veterinary	0.028	0.024	0.031	0.038	0.041	0.051	0.045
Health	0.125	0.128	0.163	0.175	0.244	0.350	0.288
Social services	0.085	0.040	0.051	0.065	0.107	0.137	0.099
Personal services	0.066	0.064	0.036	0.043	0.126	0.174	0.152
Transport services	-	-	-	-	-	0.060	0.064
Environmental protection	-	0.011	0.078	0.093	0.200	0.196	0.187
Security services	-	-	-	-	-	-	-
Master courses*	1.027	0.443	1.025	1.135	1.462	2.074	2.150
Teacher training and education science	0.044	0.026	0.087	0.205	0.207	0.319	0.272
Arts	0.057	0.017	0.047	0.034	0.049	0.081	0.086
Humanities	0.111	0.037	0.093	0.072	0.105	0.182	0.192
Social and behavioural science	0.056	0.021	0.070	0.077	0.171	0.176	0.181
Journalism and information	0.018	0.005	0.011	0.009	0.010	0.016	0.014
Business and administration	0.141	0.100	0.198	0.289	0.354	0.544	0.570
Law	0.021	0.011	0.015	0.013	0.050	0.066	0.073
Life science	0.040	0.016	0.033	0.032	0.044	0.064	0.067
Physical sciences	0.049	0.044	0.048	0.044	0.048	0.058	0.057
Mathematics and statistics	0.011	0.003	0.016	0.013	0.021	0.022	0.017
Computer sciences	0.031	0.020	0.034	0.029	0.040	0.078	0.101
Engineering and engineering trades	0.078	0.037	0.065	0.045	0.095	0.118	0.141
Manufacturing and processing	0.015	-	0.019	0.009	0.024	0.021	0.023
Architecture and building	0.039	0.019	0.022	0.024	0.036	0.060	0.064
Agriculture, forestry and fishery	0.044	0.028	0.032	0.039	0.040	0.050	0.063
Veterinary	0.005	0.002	0.006	0.005	-	-	-
Health	0.230	0.051	0.207	0.166	0.112	0.144	0.144

	1995	1996	1997	1998	1999	2000	2001
Social services	0.009	-	0.008	0.007	0.021	0.031	0.045
Personal services	0.023	0.006	0.011	0.019	0.024	0.024	0.019
Transport services	-	-	-	-	-	-	-
Environmental protection	0.005	-	0.003	0.004	0.011	0.020	0.021
Security services	-	-	-	-	-	-	-
Doctor courses*	0.250	0.093	0.298	0.324	0.386	0.370	0.281
Teacher training and education science	0.001	0.001	0.002	0.006	0.009	0.015	0.013
Arts	0.001	0.001	0.002	0.003	0.001	0.007	0.006
Humanities	0.020	0.006	0.023	0.035	0.038	0.026	0.036
Social and behavioural science	0.005	0.004	0.012	0.012	0.027	0.021	0.035
Journalism and information	0.001	-	0.004	0.002	0.001	0.002	0.002
Business and administration	0.003	0.003	0.004	0.010	0.019	0.016	0.017
Law	-	0.003	0.001	0.005	0.004	0.004	0.007
Life science	0.026	0.009	0.023	0.024	0.031	0.038	0.031
Physical sciences	0.030	0.024	0.023	0.027	0.024	0.034	0.026
Mathematics and statistics	0.006	-	0.008	0.006	0.007	0.007	0.005
Computer sciences	0.011	0.004	0.009	0.010	0.012	0.006	0.007
Engineering and engineering trades	0.013	0.004	0.023	0.014	0.025	0.032	0.039
Manufacturing and processing	-	-	-	0.003	0.002	-	-
Architecture and building	0.001	0.001	0.003	0.002	0.006	0.010	0.007
Agriculture, forestry and fishery	0.010	0.007	0.008	0.011	0.019	0.015	0.014
Veterinary	0.001	0.001	-	0.003	0.003	0.012	0.002
Health	0.116	0.025	0.147	0.145	0.149	0.117	0.020
Social services	0.004	-	0.001	0.002	0.002	0.003	0.003
Personal services	0.001	-	0.002	0.002	0.002	0.002	0.002
Transport services	-	-	-	-	-	-	-
Environmental protection	-	-	0.003	0.002	0.005	0.003	0.009
Security services	-	-	-	-	-	-	-

Source: Statistical Office of Estonia, 2002.

Table G6.: Achievements in secondary and tertiary education, number of graduated, 1000 persons, during the academic year

	1995	1996	1997	1998	1999	2000	2001
SECONDARY EDUCATION							
General secondary education	12.139	12.851	12.793	12.333	13.699	13.635	12.516
full-time gen. education	8.787	9.435	9.551	9.216	10.074	9.807	8.921
part-time gen. education	1.139	1.143	1.202	1.224	1.228	1.256	1.237
together with profession at voc. ed. courses	2.213	2.273	2.040	1.893	2.397	2.572	2.358
Vocational secondary education							
vocational and vocational secondary courses,							
professional secondary courses	7.345	8.229	8.240	8.537	8.542	8.566	8.953
Teacher training and education science	0.131	0.192	-	0.106	0.093	0.074	-
Fine and applied arts	0.215	0.292	0.226	0.239	0.206	0.292	0.177
Humanities	-	-	-	0.008	0.019	0.023	0.008
Journalism and information	0.021	-	-	-	-	-	-
Business and administration	1.215	1.450	1.614	1.605	1.491	1.761	1.763
Law	0.036	0.103	0.099	0.166	0.148	0.130	0.075
Computer sciences	0.042	0.025	0.042	0.065	0.134	0.455	0.900
Engineering and engineering trades	1.239	1.594	1.713	1.648	1.669	1.692	1.753
Manufacturing and processing	1.242	1.067	1.100	1.083	1.353	1.110	1.236
Architecture and building	0.625	0.681	0.750	0.848	0.813	0.694	0.596
Agriculture, forestry and fishery	0.424	0.533	0.467	0.378	0.312	0.207	0.205
Veterinary	-	0.018	0.020	0.014	0.018	-	-
Health	0.360	0.353	0.302	0.374	0.111	0.102	0.075
Social services	0.101	0.205	0.070	0.163	0.171	0.167	0.198
Personal services	1.062	0.995	1.115	1.325	1.446	1.397	1.387
Transport services	0.307	0.248	0.218	0.179	0.180	0.188	0.238
Environmental protection	-	0.034	0.021	0.018	0.022	0.016	0.023
Security services	0.325	0.439	0.483	0.318	0.356	0.258	0.319
HIGHER AND HIGHER PROFESSIONAL EDUCATION							
Higher professional courses	..	..	..	..	..	0.285	0.941
Diploma courses by speciality	0.455	0.752	1.061	1.066	1.586	1.823	2.272
Teacher training and education science	0.281	0.217	0.226	0.193	0.330	0.269	0.315
Arts	0.026	0.011	0.042	0.035	0.041	0.029	0.124
Humanities	0.014	0.005	0.015	0.070	0.045	0.044	0.038
Social and behavioural science	0.050	0.084	0.189	0.151	0.068	0.087	0.087
Journalism and information	0.024	0.047	0.025	0.015	0.002	0.017	0.023
Business and administration	-	0.039	0.150	0.130	0.552	0.772	0.911
Law	-	0.060	0.172	0.170	0.157	0.157	0.221
Life science	-	-	-	-	-	0.023	0.017
Physical sciences	-	0.023	0.022	0.025	0.024	0.021	0.020
Computer sciences	-	-	-	-	-	0.003	0.021
Engineering and engineering trades	0.020	0.044	0.020	0.043	0.051	0.047	0.070
Manufacturing and processing	0.011	0.005	0.007	0.006	0.010	0.011	0.001
Architecture and building	-	0.033	0.026	0.026	0.047	0.056	0.064
Agriculture, forestry and fishery	-	-	0.005	0.007	0.014	0.009	0.009
Health	0.017	0.014	0.012	0.013	0.017	-	-
Social services	-	0.038	0.003	0.020	0.033	0.020	0.048
Personal services	0.006	0.003	0.009	0.002	0.003	0.057	0.070
Transport services	-	0.025	0.030	0.065	0.079	0.075	0.089

	1995	1996	1997	1998	1999	2000	2001
Environmental protection	0.006	-	-	-	-	-	-
Security services	-	0.104	0.108	0.095	0.113	0.126	0.144
Bachelor courses by speciality	2.546	2.101	2.094	2.281	2.639	3.065	3.402
Teacher training and education science	0.248	0.235	0.214	0.195	0.182	0.283	0.259
Arts	0.255	0.177	0.153	0.178	0.146	0.210	0.203
Humanities	0.207	0.208	0.196	0.179	0.219	0.287	0.301
Social and behavioural science	0.129	0.156	0.166	0.184	0.207	0.181	0.200
Journalism and information	0.033	0.035	0.038	0.033	0.031	0.047	0.047
Business and administration	0.358	0.347	0.348	0.450	0.729	0.729	0.817
Law	0.106	0.074	0.103	0.127	0.225	0.262	0.364
Life science	0.051	0.051	0.038	0.030	0.033	0.055	0.071
Physical sciences	0.071	0.061	0.047	0.059	0.050	0.072	0.096
Mathematics and statistics	0.064	0.054	0.025	0.020	0.034	0.038	0.022
Computer sciences	0.051	0.025	0.041	0.090	0.098	0.123	0.129
Engineering and engineering trades	0.196	0.144	0.165	0.211	0.244	0.242	0.264
Manufacturing and processing	0.085	0.073	0.059	0.035	0.062	0.043	0.031
Architecture and building	0.127	0.067	0.100	0.080	0.085	0.152	0.199
Agriculture, forestry and fishery	0.124	0.091	0.111	0.117	0.057	0.081	0.070
Veterinary	0.056	0.020	0.024	0.022	0.010	0.009	0.021
Health	0.234	0.195	0.187	0.170	0.110	0.127	0.163
Social services	0.020	0.022	0.036	0.023	0.043	0.049	0.048
Personal services	0.101	0.051	0.029	0.068	0.064	0.054	0.054
Transport services	0.030	0.012	0.014	0.010	0.002	0.002	0.000
Environmental protection	-	0.003	-	-	0.008	0.019	0.043
Master course by speciality*	0.325	0.410	0.618	0.586	0.672	0.698	0.831
Teacher training and education science	0.004	0.031	0.034	0.069	0.081	0.121	0.186
Arts	0.011	0.009	0.014	0.018	0.017	0.033	0.020
Humanities	0.018	0.020	0.029	0.045	0.050	0.044	0.088
Social and behavioural science	0.002	0.009	0.011	0.023	0.030	0.047	0.050
Journalism and information	0.005	0.004	0.006	0.002	0.009	0.008	0.006
Business and administration	0.024	0.057	0.046	0.055	0.148	0.123	0.102
Law	-	0.005	0.004	0.002	0.007	0.002	0.014
Life science	0.023	0.023	0.030	0.035	0.023	0.032	0.033
Physical sciences	0.022	0.030	0.027	0.030	0.025	0.030	0.031
Mathematics and statistics	0.012	0.005	0.010	0.005	0.011	0.010	0.011
Computer sciences	0.009	0.008	0.009	0.024	0.015	0.018	0.025
Engineering and engineering trades	0.010	0.008	0.016	0.027	0.045	0.048	0.063
Manufacturing and processing	0.001	0.002	0.004	0.006	0.005	0.002	0.008
Architecture and building	0.005	0.005	0.005	0.010	0.012	0.010	0.015
Agriculture, forestry and fishery	0.007	0.015	0.018	0.021	0.011	0.016	0.013
Veterinary	0.002	0.003	0.004	0.001	0.003	0.003	0.000
Health	0.165	0.172	0.337	0.204	0.164	0.120	0.127
Social services	0.003	0.003	0.002	0.005	0.004	0.007	0.012
Personal services	0.002	0.001	0.011	0.004	0.009	0.023	0.019
Environmental protection	-	-	0.001	-	0.003	0.001	0.008
Doctor courses by speciality*	0.029	0.038	0.048	0.106	0.135	0.117	0.149
Arts	-	0.002	-	0.001	-	-	-
Humanities	0.001	0.002	0.005	0.004	0.005	0.010	0.014
Social and behavioural science	-	-	0.001	-	0.001	0.004	0.004
Journalism and information	-	-	-	-	0.001	-	0.001
Business and administration	-	-	-	-	0.001	0.003	0.005

	1995	1996	1997	1998	1999	2000	2001
Law	-	-	-	-	-	-	0.004
Life science	-	0.003	0.005	0.009	0.013	0.014	0.004
Physical sciences	-	3.000	4.000	8.000	0.013	0.016	0.015
Mathematics and statistics	-	-	-	-	0.005	0.001	0.002
Computer sciences	-	-	-	-	0.005	0.005	0.001
Engineering and engineering trades	0.003	0.006	0.001	0.004	0.005	0.006	0.008
Manufacturing and processing	0.001	-	-	-	-	-	-
Architecture and building	-	-	-	0.001	-	-	0.001
Agriculture, forestry and fishery	0.007	0.005	0.002	0.004	0.006	0.005	0.002
Veterinary	0.001	0.002	-	0.002	0.001	0.001	-
Health	0.016	0.015	0.029	0.073	0.078	0.052	0.088
Personal services	-	-	0.001	-	-	-	-
Environmental protection	-	-	-	-	0.001	-	-

Source: Statistical Office of Estonia, 2002

Table G7.: Participants in continuing vocational training (CVT) courses by economic activity of enterprise in 1999

	Number of employees in enterprises with CVT courses	Number of participants in CVT courses	Share of participants in CVT courses, %
Economic activities total	205637	56855	27.6
Mining and quarrying	6909	632	9.1
Manufacture of food products, beverages and tobacco	17427	3259	18.7
Manufacture of textiles and textile products. Manufacture of leather ...*	16688	1520	9.1
Manufacture of pulp, paper and paper products; publishing and printing	4629	1411	30.5
Manufacture of coke, refined petroleum products ...*	6233	1988	31.9
Manufacture of basic metals and fabricated metal products	3862	667	17.3
Manufacture of machinery and equipment ...*	7088	1923	27.1
Manufacture of transport equipment	2885	1345	46.6
Manufacture of wood and wood products. Manufacturing n.e.c.	13384	2707	20.2
Electricity, gas and water supply	14085	4718	33.5
Construction	17188	4566	26.6
Sale, maintenance and repair of motor vehicles ...*	4329	1417	32.7
Wholesale trade and communication trade, except of vehicles and motorcycles	10619	4382	41.3
Retail trade; except of motor vehicles and motorcycles ...*	17660	5263	29.8
Hotels and restaurants	4935	1580	32.0
Transport, storage and communication, except post and telecommunications	24348	5938	24.4
Post and telecommunications	9730	5534	56.9
Financial intermediation, except activities auxiliary to financial intermediation	6533	4425	67.7
Activities auxiliary to financial intermediation	492	366	74.4
Real estate, renting and business activities. Other community ...*	16613	3214	19.3

Source: Statistical Office of Estonia, 2002.

H. NATIONAL AND REGIONAL DEMOGRAPHIC DATA AND PROSPECTIVE

Table H1.: Mean annual population (persons) and age distribution (% of total population by age group)

	1990	1994	1995	1996	1997	1998	1999	2000	2001	2002
Mean annual population	1569174	1462514	1436634	1415594	1399535	1386156	1375654	1369515	1364101	1358644
Age distribution										
Until 14	22.25	21.06	20.69	20.25	19.75	19.19	18.58	18.00	17.46	16.89
15-24	13.73	13.78	13.79	13.83	13.90	14.08	14.31	14.53	14.74	14.98
25-59	46.82	46.41	46.44	46.46	46.44	46.40	46.36	46.36	46.36	46.45
60+	17.20	18.75	19.08	19.46	19.91	20.34	20.75	21.11	21.44	21.68
Population dynamics	-2.61	-2.16	-1.80	-1.49	-1.15	-0.97	-0.76	-0.45	-0.40	-0.40

Source: Statistical Office of Estonia, 2003

Table H2.: Migration (net), persons

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Migration	-4022	-8034	-33827	-13779	-7631	-8170	-5683	-2496	-1131	-616
international migration, arrivals	8381	5203	3548	2390	1575	1616	1552	1585	1414	1418
international migration, departures	12403	13237	37375	16169	9206	9786	7235	4081	2545	2034
internal migration	33955	29413	33293	28619	24012	30264	33191	32370	24170	24280

Source: Statistical Office of Estonia, 2002

I. CULTURAL AND SOCIOLOGICAL ASPECTS

Table I1.: Structure of employment, % (employees aged 15-69 by economic activity, annual average)[50]

	1993	1994	1995	1996	1997	1998	1999	2000	2001
Economic activities total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Agriculture, hunting and forestry	10.8	9.1	7.0	6.5	5.9	5.9	5.7	5.0	4.4
..agriculture and hunting	9.4	7.5	5.9	5.4	4.8	4.7	4.4	3.5	3.2
..forestry	1.3	1.7	1.1	1.0	1.1	1.2	1.3	1.4	1.1
Fishing	2.3	2.0	0.9	0.7	1.1	0.7	0.4	0.4	0.3
Mining and quarrying	1.8	1.8	1.6	1.5	1.3	1.4	1.5	1.4	1.1
Manufacturing	23.1	22.3	25.9	24.9	23.2	22.9	22.5	24.1	24.8
..manufacture of food, beverages	3.8	4.0	5.1	5.0	4.8	4.6	4.1	4.1	3.8
and tobacco products									
..manufacture of textiles	2.4	2.1	2.0	1.9	1.4	1.4	1.4	1.7	1.9
..manufacture of wearing apparel	2.1	2.5	2.6	2.6	2.6	2.5	2.6	2.8	2.7
..tanning and dressing of leather,	0.9	0.7	0.6	0.5	0.7	0.7	0.6	0.5	0.5
manufacture of leather products									
..manufacture of wood and of products of wood	1.2	1.6	2.8	2.7	3.2	3.5	3.3	3.7	3.4
..manufacture of pulp, paper and	1.0	1.0	1.0	1.0	0.8	0.9	0.8	1.0	1.3
paper products; publishing and printing									
..manufacture of coke, refined	1.8	1.7	1.5	1.4	1.4	1.0	0.8	0.7	0.9
petroleum products ...[51]									
..manufacture of rubber and plastic products	0.5	0.4	0.5	0.4	0.4	0.5	0.6	0.4	0.4
..manufacture of other non-metallic	1.4	1.2	1.3	1.3	0.7	0.7	0.9	1.0	1.0
mineral products									
..manufacture of basic metals and	1.0	0.9	1.0	1.0	1.0	1.2	1.5	1.6	2.8
fabricated metal products									
..manufacture of machinery and equipment	2.3	2.0	1.7	1.6	1.4	1.2	0.8	1.0	0.9
not elsewhere classified									
..manufacture of electrical machinery	1.9	1.3	1.3	1.3	1.1	1.3	1.5	2.0	2.0
and apparatus									
..manufacture of transport equipment	0.7	0.7	1.4	1.3	0.6	0.9	1.3	1.2	1.0
..manufacture not elsewhere classified	2.2	2.1	3.1	3.1	2.9	2.6	2.3	2.4	2.2
Electricity, gas and water supply	2.8	3.1	2.6	2.7	2.9	3.1	3.1	2.8	2.2
Construction	7.7	7.4	5.5	5.7	7.5	7.3	6.7	6.9	6.6
Wholesale and retail trade ...[52]	10.9	12.1	12.1	12.8	13.1	13.3	13.4	12.7	13.8
..sale, maintenance and repair	1.2	1.4	2.0	2.0	2.1	1.9	2.1	2.2	2.6
of motor vehicles ...[53]									
..wholesale trade	2.1	2.6	2.7	3.0	3.0	3.3	3.1	2.5	2.1
..retail trade	7.6	8.1	7.4	7.8	7.9	8.0	8.2	8.0	9.1
Hotels and restaurants	2.5	2.8	2.7	2.7	2.3	2.3	2.2	3.6	3.0
Transport, storage and communication	8.9	9.0	10.4	10.4	9.6	9.5	10.4	10.1	9.6
..transport and supporting transport activities	7.4	7.3	8.5	8.4	7.7	7.6	8.4	8.0	7.8

[50] 1989-1996 persons aged 15-69; 1997-2002 persons aged 15-74

[51] - ..manufacture of coke, refined petroleum products, nuclear fuel, chemicals and chemical products

[52] Wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods

[53] ..sale, maintenance and repair of motor vehicles and motorcycles; retail sale of automotive fuel

	1993	1994	1995	1996	1997	1998	1999	2000	2001
..post and telecommunications	1.5	1.6	1.9	2.0	1.9	1.8	1.9	2.1	1.8
Financial intermediation	1.0	1.3	1.2	1.1	1.2	1.5	1.6	1.5	1.3
Real estate, renting and business activities	4.1	4.4	4.8	4.9	5.4	5.9	6.0	6.5	6.2
Public administration and defence;	5.4	5.7	5.8	5.8	5.7	6.3	6.6	6.6	6.5
compulsory social security									
Education	7.6	7.6	9.1	9.4	9.8	9.5	9.4	8.5	9.5
Health and social work	7.3	7.4	5.9	6.0	6.1	5.9	5.7	5.3	5.7
Other	3.9	4.0	4.7	4.9	5.0	4.6	4.9	4.7	5.0

Source: Labour Force 1989-2002 (2002). Statistical Office of Estonia

Table I2.: Employees aged 15-69 by economic activity, annual average, thousands[54]

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Economic activities total	817.8	799.7	771.9	714.5	641.2	614.2	589.7	572.9	564.1	550.9	525.9	517.1	525.1	532.9
Agriculture, hunting and forestry	137.8	125.2	114.5	95.1	69.1	56.1	41.2	37.1	33.3	32.6	30	25.6	22.9	22.9
..agriculture and hunting	125.9	114.3	103.8	86	60.4	45.9	35	31.2	26.9	25.8	23.4	18.3	16.9	17
..forestry	11.9	10.9	10.7	9.2	8.6	10.2	6.2	5.9	6.4	6.8	6.6	7.3	5.9	5.9
Fishing	26.5	24.3	23	19.8	15	12.1	5.1	4.2	6	4	2.1	2	1.7	1.4
Mining and quarrying	12.3	12.3	12.1	12.5	11.4	11.1	9.2	8.8	7.1	7.5	7.9	7.2	5.8	5.7
Manufacturing	213.9	210.6	200	180.4	148.2	136.8	152.7	142.8	130.6	126.3	118.2	124.5	130	122.2
..manufacture of food, beverages and tobacco products	31.8	31.5	30.8	28.7	24.6	24.7	30.1	28.9	27.3	25.4	21.8	21.3	19.7	19.9
..manufacture of textiles	23.4	22.9	21.8	19.7	15.2	13	11.6	11	8.1	7.6	7.2	8.8	9.9	8.1
..manufacture of wearing apparel	12.1	12.5	12.4	11.8	13.5	15.4	15.6	14.7	14.8	13.5	13.5	14.4	14.4	14.9
..tanning and dressing of leather, manufacture of leather products	7.5	7.7	7.6	7.7	5.7	4	3.3	2.9	4.1	3.8	3.2	2.4	2.6	2.9
..manufacture of wood and of products of wood	5.8	5.6	5.4	6.5	7.5	10.1	16.5	15.3	18.3	19.2	17.5	19	18.1	18.8
..manufacture of pulp, paper and paper products; publishing and printing	9.1	9.4	8.7	7.8	6.5	6	6	5.7	4.7	4.8	4.4	5.1	6.7	6.5

[54] 1989-1996 persons aged 15-69; 1997-2002 persons aged 15-74

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
..manufacture of coke, refined petroleum products ...[55]	17.4	16.7	15	14	11.6	10.5	8.8	8.2	8	5.7	4.2	3.4	4.7	2.8
..manufacture of rubber and plastic products	5.4	5.4	5	4.3	3.5	2.3	2.7	2.1	2.1	2.6	3	2.3	1.9	1.2
..manufacture of other non-metallic mineral products	15.1	15.1	13.6	12.2	8.9	7.6	7.6	7.2	3.7	4.1	4.7	5.1	5.1	5.2
..manufacture of basic metals and fabricated metal products	8.4	8.9	8.6	7.4	6.2	5.7	6.1	5.8	5.4	6.7	7.7	8.2	14.6	13.8
..manufacture of machinery and equipment not elsewhere classified	32.1	30.2	28	21.6	15	12.4	10.2	8.9	8	6.5	4	5.2	4.6	3.7
..manufacture of electrical machinery and apparatus	20.5	20.3	19	16.6	11.9	8.2	7.8	7.2	6.3	7.3	8.1	10.6	10.5	9.2
..manufacture of transport equipment	6	6.3	6.6	5.4	4.2	4.2	8.4	7.5	3.2	4.7	6.6	6.2	5.5	5
..manufacture not elsewhere classified	19.1	18.1	17.6	16.6	13.9	12.7	18.1	17.5	16.6	14.3	12.3	12.4	11.8	10
Electricity, gas and water supply	18.5	18.9	18.5	18	18	18.9	15.3	15.7	16.3	17	16.3	14.7	11.4	10.5
Construction	64	64.7	63.5	57.9	49.2	45.7	32.3	32.7	42.2	40.3	35.3	35.7	34.9	35.5
Wholesale and retail trade ...[56]	60.3	61	61.6	64.1	69.9	74.5	71.2	73.3	73.7	73.1	70.4	65.8	72.6	75.3
..sale, maintenance and repair of motor vehicles ...[57]	4.9	5.3	6.2	7.1	7.7	8.9	11.5	11.6	11.9	10.4	11.1	11.6	13.7	13.3
..wholesale trade	11	11.8	12.1	13.2	13.6	16.1	16	17.3	17	18.4	16.3	12.8	11.2	10.9

[55] ..manufacture of coke, refined petroleum products, nuclear fuel, chemicals and chemical products
[56] Wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods
[57] ..sale, maintenance and repair of motor vehicles and motorcycles; retail sale of automotive fuel

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
..retail trade	44.4	43.8	43.3	43.8	48.6	49.5	43.7	44.4	44.8	44.3	42.9	41.4	47.6	51
Hotels and restaurants	18.1	17.4	18.4	17.3	16.2	16.9	15.7	15.5	13.2	12.6	11.7	18.7	15.8	16.6
Transport, storage and communication	65.2	67.8	67	60.4	56.8	55	61.3	59.7	54.3	52.1	54.6	52.1	50.2	50.4
..transport and supporting transport activities	56.7	58.9	57.7	51.2	47.3	44.8	50.1	48	43.5	42.1	44.4	41.4	40.9	42.7
..post and telecommunications	8.5	8.9	9.3	9.2	9.6	10.1	11.2	11.7	10.7	10.1	10.2	10.7	9.3	7.7
Financial intermediation	3.9	4.2	4.8	5.8	6.5	7.7	6.9	6.3	7	8	8.5	7.7	6.9	7.8
Real estate, renting and business activities	33.5	33.5	30.9	27.5	26.1	27.1	28.6	28	30.7	32.4	31.3	33.8	32.4	39.6
Public administration and defence; compulsory social security	32.8	32	31.5	32.4	34.4	35.2	34.1	33.2	32.3	34.7	34.6	33.9	34.2	33.1
Education	51	48.7	47.6	48.3	48.6	46.9	53.6	53.7	55	52.3	49.2	43.9	50.1	54.5
Health and social work	50.5	49.5	50.4	48.2	46.7	45.7	34.8	34.1	34.4	32.6	30	27.3	30	30.4
Other	29.5	29.6	28.2	26.8	25.3	24.4	27.8	27.8	28	25.3	25.6	24.3	26.4	27.1

Source: Labour Force 1989-2002 (2002). Statistical Office of Estonia

Table I3.: Changes in income distribution (Gini coefficients by expenditures, by year and equivalence scales)

	1996	1997	1998	1999	2000	2001	2002
Scale 1,0:1,0:1,0	0.34	0.37	0.38	0.38	0.37	0.37	0.37
Estonian scale 1,0:0,8:0,8	0.34	0.36	0.37	0.37	0.36	0.37	0.36
OECD scale 1,0:0,7:0,5	0.33	0.36	0.37	0.37	0.36	0.36	0.36
OECD modified scale 1,0:0,5:0,3[58]	0.33	0.36	0.37	0.37	0.36	0.36	0.36

[58] Scale which is used in most EU countries

Table I4.: Changes in income distribution, EUR

Income deciles	1996	1997	1998	1999	2000	2001	2002
I	22	32	38	39	32	39	42
II	46	55	63	66	65	71	76
III	58	66	74	82	84	89	97
IV	67	74	83	94	96	100	110
V	75	81	92	104	106	111	121
VI	85	91	104	116	120	126	136
VII	100	105	123	133	142	148	159
VIII	120	126	149	159	175	183	196
IX	153	162	189	207	228	244	262
X	278	305	348	374	433	429	466
Average	94	104	120	128	140	146	160
Difference between incomes of lowest and highest income quintiles	6.3	6.3	6.3	6.3	6.7	6.1	6.0

Source: Statistical Office of Estonia, Ministry of Social Affairs of Estonia.

Table I5.: Consumption pattern (expenditure per household member in a year), EUR[59]

	1996	1997	1998	1999	2000	2001	2002
Expenditure total	1139.1	1272.7	1430.1	1468.7	1713.7	1779.8	1890.5
Food and non-alcoholic beverages	469.0	470.5	485.2	484.4	549.4	564.1	577.1
..bought food and non-alcoholic beverages	371.5	380.1	395.5	404.3	459.3	474.8	490.5
..self-produced or received free of charge food and non-alcoholic beverages	97.5	90.4	89.7	80.1	90.1	89.3	86.5
Alcoholic beverages	21.8	24.4	27.1	28.7	36.7	34.3	39.6
Tobacco	16.3	17.5	19.5	23.4	28.6	27.9	30.3
Clothing and footwear	78.0	90.4	106.1	104.9	115.9	112.7	116.4
Housing	202.6	238.7	259.3	259.6	262.2	265.4	297.7
Household equipment and operation	53.3	67.6	73.0	78.0	91.8	99.4	115.6
Health	15.6	18.3	22.4	29.7	44.5	44.5	50.1
Transport	70.4	78.6	92.5	90.8	140.9	151.1	144.1
Communication services	18.6	26.2	38.8	51.9	75.1	85.8	103.5
Recreation, leisure and entertainment	59.0	75.0	103.9	107.6	108.6	119.3	126.6
..newspapers, magazines and books	11.2	13.5	16.1	15.8	16.6	16.2	16.0
Education	14.4	18.1	16.4	14.6	22.4	28.9	35.0
Hotels, cafés, restaurants	35.0	36.2	49.0	44.2	65.1	61.9	64.4
..eating out	34.7	35.9	48.4	43.3	63.1	60.5	63.8
Miscellaneous goods and services	54.1	65.6	77.9	82.3	104.0	110.2	115.3
Non-monetary consumption	6.3	19.6	33.5	40.6	34.6	44.5	39.4
Consumption expenditure	1114.4	1246.6	1404.7	1440.6	1680.0	1749.9	1854.8
Other expenditure	24.7	26.1	25.4	28.1	33.7	29.9	35.7

Source: Household Income and Expenditure Survey. Statistical Office of Estonia, 2002

[59] In calculations, revised population numbers for the years between 1989 and 2000 population censuses have been used