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Information and Communications Technology in Croatia: Hope Carrier for More Growth?

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Abstract

In times of growing integration of global economic structures it is inevitable that Croatia together with other European countries faces a number of necessary and difficult adjusting measures. Enterprises in inefficient and not competitive business sectors have to be substituted by new, promising ones. One business sector which is considered to be a great hope carrier for more growth among Western European countries is the Information and Communications Technology (ICT) sector. While in some European countries the role of ICT has grown considerable during the last years, others are just beginning to feel the changes. The impacts of ICT are manifold. On the one hand there is no doubt about the productivity enhancing effects of ICT in the long run. These positive impacts, however, come at the expense of short run adjustment costs. In this paper we constitute input into the discussion on the role ICT should play in Croatia to enhance their competitiveness among other European countries. Our central goal is to analyse comparative advantages and – disadvantages of Croatia in comparison to other European countries in the field of ICT in order to conclude economic policy measures to improve the economic situation in Croatia.

1. Introduction: Information and Communications Technologies as Potential Growth- and Employment Engines

The aim of this paper is to evaluate the impact of information and communication technology (ICT) in Croatia as a transition economy. To be more precise we try to answer three questions. The first question is concerned about the impact of ICT on the economy's productivity, specifically whether increasing investment in ICT will increase or decrease employment opportunities. We will try to give an answer to this question by briefly sketching empirical evidences for advanced economies that will serve as a comparison base. The second question is devoted to the situation of the ICT sector in Croatia as compared to other European countries. In this context we will present figures and stylized facts that might help the reader to get a first impression about the situation in Croatia. Finally, we will analyse Croatia and its' developments in the field of ICT in order to conclude with economic policy measures and make recommendations on how possible negative developments could be mitigated.

The debate about the impact of Information and Communication Technology (ICT) on the economy has been dominated for a long time by the paradox named by Solow (1987) who claimed that "you can see the computer age everywhere these days, except in the productivity statistics". Taking into consideration other input factors of the production function like labour and capital, Solow was able to show that the remaining residual, which captures the impact of ICT, has declined since the mid-seventies, nearly at the same time when investment in ICT began to spread. This puzzling finding has initiated a large number of contributions, which try to resolve this paradoxon. Examples for this include issues about appropriate measurement concepts of factors like price and quality of ICT-capital and ICT-services and furthermore, about the lag structure of such investment.

It is beyond the scope of this paper to review the whole literature on this subject and to discuss the methodological problems associated with them. The interested reader may refer to Dedrick et. al. (2002). However, the majority of empirical literature which has emerged in this field points out that ICT has a significant and positive impact on labor productivity and economic growth. Mainly two channels were identified to transmit investment into growth: The structural change- and the productivity growth channel. According to the structural change argument, new establishments have emerged in the ICT sector characterized by higher growth rates of output and employment. Taking into consideration these establishments, which are getting more and more important, growth rates will have an increasing influence on the overall economy, too.

The second channel is, however, even more important. Innovations made in the ICT-sector serve as input factors to other sectors and will therefore increase their productivity, too. Employees using computers at their workplace and modern communication technologies are able to cover a wider scope of tasks and thus will become more productive. Beyond this direct productivity effect there is, however, an even more important indirect impact. ICT offers establishments opportunities to introduce complementary organizational changes regarding workplace and Human Resource Management-practices. Examples in this context include the introduction of group-workplaces, job-rotation and workplaces with more responsibility and decision authority. Empirical studies have shown that such complementary strategies have a productivity enhancing effect. We will address these issues later on.

Although there is a widespread agreement that ICT has a positive and significant impact on the productivity, the theoretical impacts on the labor market are less clear and ambiguous. On the one hand, an increasing labor productivity means that the same output can be produced with less human capital thus leading to a decreasing demand for labor. On the other hand, an increasing productivity implies decreasing costs and thus prices.

Depending on the market structure and the prevailing price elasticity, decreasing prices could increase the demand for the produced goods and thus counteract the negative impact. Empirical studies conducted in this field show mixed evidence but point to the view that these two effects are similar in their magnitude thus leaving the total net effect on the employment level unchanged.

Table 1: Studies on the Skill-Biased-Technological-Change Hypothesis

Study	Data	Results
Berman, E. et. al. (1994)	Annual Survey of Manufacturers, Census of Manufacturers, NBEW trade data set 1959-1987	Upskilling in the workforce in the USA is caused by increasing IT-investment and expenditures for R&D
Black, S. E. and Lynch, L. M. (1996)	Telephon Survey of the US-Bureau of Census among American establishments with at least 20 employees in 1994	Education and Computer-skills raise the productivity of employees significantly
Doms, M. et. al. (1997)	Survey of Manufacturing Technology 1988	US-Establishments using modern equipment and which invest more in ICT have an higher share of high skilled employees
Autor, D. H. et. al. (1998)	Current Population Survey 1984, 1989 and 1993	US-Industries which invest more in ICT have an higher labour demand for high skilled employees
Berman, E. et. al. (1998)	Data from the United Nations General Industrial Statistics Database 1980-1990	Responsible for a decreasing labour demand for low skilled employees in most of the OECD-countries is a skill biased technological change, especially industries with high ICT investment are responsible for this upgrading
Hujer, R. and Radić, D. (2002)	Data from the IAB-establishment Panel Dataset collected by the German Federal Employment Office for 1998	Technological progress as measured by introduced product innovations is skill biased, i.e. increases the labour demand for high- and reduces it for low skilled employees

Whereas the effects of ICT on the total level of employment are unclear, the impact on the qualitative labor demand has proven to be fairly robust. It is a stylized fact that technological progress as captured by investment in ICT discriminates between different qualification groups. In this sense technological change is skill-biased, i.e. it increases the labor demand for high skilled and reduces it for low skilled employees. Table 1 contains a

synoptical overview of some selected empirical studies in this field. Simple and monotonic tasks vanish whereas modern computer equipment raises the demand for more flexible and qualified employees. In the short run, especially in the case of a rigid wage structure, mismatches on the labor market are to be expected which will imply rising unemployment rates especially among the group of less qualified employees. It should be clear that these issues are not only of intellectual interest but have also several important policy implications.

Besides these negative short run impacts which can be characterized as a substitution of unskilled to more highly-skilled labour, ICT will have an even more important and far reaching influence on the economy due to its potential to change the fundamentals of how we will work and live in the future. The ICT development is not only related to strong falling prices and a rapid substitution with other production factors. ICT plays a key role in a web of strongly complementary technical relationships¹. Recently, more and more establishments have realized that in order to fully exploit the advantages of ICT, these investments have to be complemented by the organizational changes that were already mentioned. These changes can be characterized as a move away from the traditional 'tayloristic' organization of work with its strong centralization and strict division of different tasks. Instead, more and more establishments began to flatten hierarchical levels and to implement flexible workplace practices like e.g. workplaces with more responsibility and decision authority. It can be expected that ICT in combination with such changes will have a significant impact on the productivity of the whole economy.²

After this short overview we will proceed as follows. Section two gives an overview of the ICT market in Europe and some South Eastern European countries as a benchmark for Croatia. Section three focuses on the ICT market in Croatia while section four concludes with economic policy implications.

2. Overview of the ICT Market in Europe and in Some Central and Eastern European Countries

Western Europe includes the 15 EU and 2 non-EU countries Switzerland and Norway. Germany is the largest economy in Europe but was the country (followed by Austria and Switzerland) most hit by the global crisis. Mediterranean countries such as Spain (followed by France and to a less extend Italy) performed slightly better while the Nordic countries and Finland in particular outperformed the market. Although expansion slowed in most Western European markets, Central and Eastern European Countries seem to cope much better with the ongoing downturn.

2.1 Developments of the ICT Market in Europe

The global economic crisis has led the Western European Information and Communications Technology (ICT) sector to a severe slowdown and stagnation. 6,7% of GDP (Euro 592 billion) in 2002³ was the result of the global slowdown and economic uncertainty. In contrast to that, the ICT sector has been a major source of employment growth over the 1995-2000 period. At that time employment in the ICT sector grew by almost 3 million persons, i.e. an average annual growth rate of over 4% a year, almost 3

¹ Cf. Triplett 1999

² See e.g. Hujer, Caliendo and Radić (2002) and the literature cited there

³ Cf. EITO 2003, p. 51-53

times that of overall business sector employment.⁴ However, the decade of strong growth has been interrupted by a marginal increase of 0,2% for 2002 over 2001. Total GDP is anticipated to grow by 1.9% in 2003 to 2.7% in 2004. Forecasts for the IT sector expect up to 1.3% and telecommunications 3.8% growth as shown in the following figure:

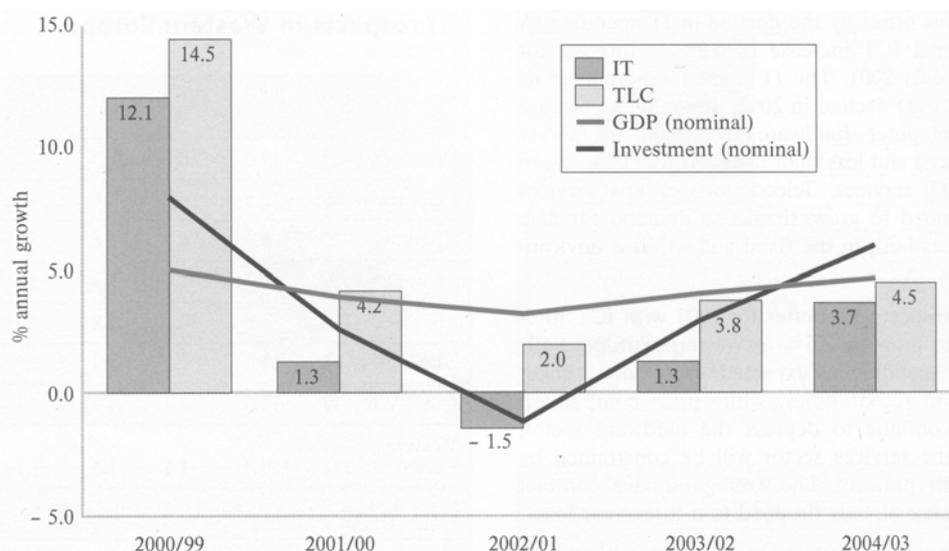


Figure 1: Western European GDP, Investment, IT and TLC Market Actual Growth and Forecasts, 2000-2004⁵

The IT market which includes *office equipment*,⁶ *electronic data processing and datacommunication (hardware) equipment*,⁷ *software*⁸ and *services*⁹ has experienced its worst slowdown because of the severe computer hardware decline, and was some Euro 294 billion.

Compared to the decrease in computer hardware (especially in server systems) and less than usual growth in software and IT services the telecommunications market continued to grow and accounted for around Euro 298 billion. Despite these global negative trends, the overall ICT market in Western Europe maintained its share of 29,4% of the worldwide ICT market in 2002.¹⁰

2.2 Skills Issues in Germany as the Largest Economy in Western Europe

The basic resource for every Net Economy is human capital. Three years ago the ICT sector was characterized by a large shortage of qualified ICT professionals in Europe, especially in Germany.¹¹ Consequently, the German government was actively seeking ICT professionals from outside of the European Union by liberalising its' immigration policy in a way that they were supposed to encourage skilled professionals to work in

⁴ Cf. OECD: Measuring the information economy 2002, p. 23-25

⁵ Cf. EITO 2003, p. 54

⁶ E.g. copiers, calculators and other hardware

⁷ E.g. LAN hardware

⁸ E.g. systems software, application software etc.

⁹ E.g. consulting, implementation etc.

¹⁰ 30,9% of the worldwide IT market and 28.0% of the worldwide telecommunications market, Cf. EITO 2003, p. 53

¹¹ Cf. ZEW 2001, pp. 7-9

Germany (e.g. green-card initiative).¹² The shortage of qualified ICT human resources was generally recognized as a serious handicap for the European economy. Roots of the skill gap were the growth in the take-up of ICT, the rapid rate of technological evolution, and the changes in activities and markets engendered by the diffusion of E-business. It was a major challenge for businesses and local economies across Western Europe to ensure that ICT and E-business skills are available to satisfy a huge growth in the demand. Regional differences in the levels and dynamics within Western Europe that still exist were additional barriers.

Germany has (still) the largest economy in Western Europe but was the country most hit by the crisis. For the first time there was evidence of a contraction in demand and even declining employment rates in the ICT sector in Germany.¹³ GDP in Germany grew only by 0,4% in 2002 (compared to 3% in 2000) and recovery is expected to take longer. The IT market declined by 3,7% in the same year and positive growth is not expected before 2004.¹⁴

The computer hardware market was characterized by a decline with the exception of portable PCs. Vendor competition and aggressive pricing resulted in further erosion of the value of the German PC market.

A few years ago the software market which seemed to be heading towards more sophisticated applications (e.g. Customer Relationship Management (CRM), Supply Chain Management (SCM)) but is now shifting towards faster and easier solutions. The difficult situation of the German financial sector, which used to be a heavy adopter of IT, had a negative impact on the software market. The IT service spending slightly decreased in 2002.

Compared to the negative developments in the IT market there is little growth of a 1.3% in 2002 and further 3.6% is expected in 2003 in the telecommunication market. Main drivers were the increasing numbers of DSL accesses by residential households, new Internet access services and ISDN connections and continued growth (at a moderate rate) of mobile services.

Germany's Universal Mobile Telecommunications System (*UMTS*) which will support higher data transmission rates and allow for video and other multimedia applications is expected to strengthen through investments in 2003 in order to reach a mass market in 2004.

As a consequence there was a decline of 1.3% in the ICT spending which is expected to result in a slight growth of 0.8% this year.¹⁵ A comparison of the German ICT market in 2000 with a 10.4% growth rate shows the negative development in this sector.¹⁶

2.3 The Mediterranean Market of Spain

Spanish GDP increased by 1.8% in 2002 and compared to other countries (e.g. Germany with 0.4% or Italy with a growth rate of 0.3% in the same year) confirms Spain as one of the fastest-growing countries in Western Europe.¹⁷ Spain together with Italy are characterised by a relatively high proportion of small and medium enterprises (SMEs), which tend to be less ICT-dependent than larger organisations. For this reason demand

¹² 110.000 additional jobs were created in the German ICT sector from 1999-2000, Cf. BITKOM 2002a, p.19

¹³ A ICT employment decline of 3,4% was estimated for Germany for the year 2002, Cf. BITKOM 2002b

¹⁴ Cf. EITO 2003, p. 56

¹⁵ Cf. EITO 2003, pp. 56-57

¹⁶ Cf. EITO 2001, p. 114-116

¹⁷ Cf. EITO 2003, pp. 57-59

for skills has been lower than in other European regions. Even though IT spending declined by 0.4% in 2002 an integration of IT solutions within SME is expected to follow soon and will enhance growth in the IT sector. The telecommunications market in Spain reached 4.0% in 2002 and the continued growth in the mobile sector with a strong increase in the mobile customer base compared to other European countries and further investments in UMTS networks reflects positive developments for this year (3.6% in 2003).¹⁸

2.4 Finland - a Nordic Country which are Known as the Early Adopters

The Nordic economies have been early adopters of new technologies for some time now since there were all quick to embrace the benefits of Internet technology. As such they witnessed significant skills shortages at an earlier stage than other European economies. Given that many organisations in the Nordic region have faced skills shortages for some time, they have been quick to seek ways of reducing their need for skilled ICT employees. From the supply-side perspective, the Nordic governments for an instance have been quick to work with educational institutions and also with the ICT vendor community to respond to changing needs within their economies.

Despite the global shortfall and negative economic climate, Nordic countries and especially Finland (with GDP growth rate of 1.6% in 2002), saw an early reaction to the economic uncertainties and was the only country showing positive IT growth. Despite negative trends in the hard- and software market the IT services market and Outsourcing continues to be in demand. The telecommunications sector shows also positive growth rates with strong penetration of broadband - and other high speed Internet accesses (e.g. Fibre-LAN) as well as further replacements, enhanced by the launch of new multimedia services (based on GSM/GPRS networks).

2.5 ICT Market Developments in Central and Eastern Europe

Central and Eastern European Countries (CEE) displayed relatively high growth rates which were driven by improvements in the business environments, ongoing structural reforms and net Foreign Direct Investment (FDI). The following figure shows a comparison of growth rates from 2001 and 2002 in the transformation countries listed beneath:

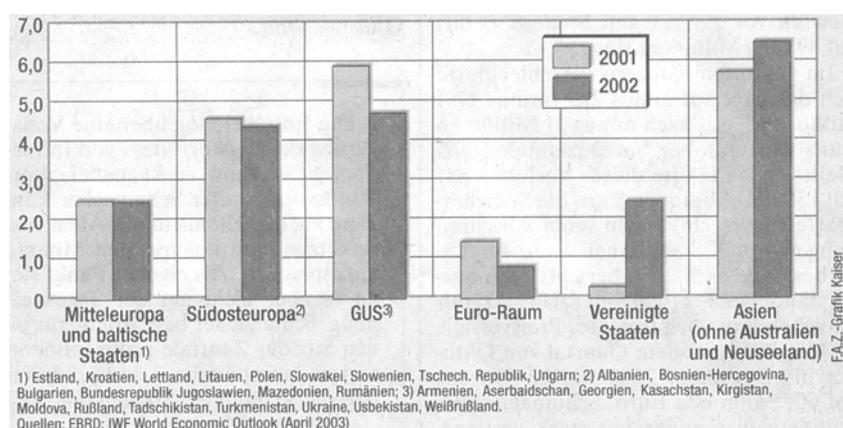


Figure 2: Growth within Transformation Countries from 2001 and 2002¹⁹

¹⁸ Cf. EITO 2003, p. 59

¹⁹ Cf. FAZ 23.04.2003, p. 15

However, the negative developments in Western Europe had also a negative impact on those CEE countries that highly rely on the export market, especially to Germany. These countries, namely Czech Republic, Hungary, Poland and Slovakia together with the Baltic States were most affected by the slowdown in the European Union (EU).

However, short-term ICT market growth projections for many CEE countries remain positive due to a number of factors driving investment, such as upcoming EU membership in 2004, infrastructure development, liberalisation of the communication market, privatisation of key sectors and rising levels of FDI.

ICT spending reached € 40 billion²⁰ to establish basic information technology (e.g. infrastructure) representing a year-on-year growth of 9.4%. Personal computers represent the driving force of demand which shows a number of factors including the relatively low installed base of machines, notable investment in IT by SMEs, rising real wages which are influencing demand among home users, major IT investment projects in sectors such as public administration, insurance, banking/financial services and manufacturing, general economic growth and rising Internet usage.

Even though the expansion was slower than in the previous year, CEE's ICT market which is still largely hardware-oriented continued to outpace that of Western Europe, led by a higher demand. Despite a slowdown in the beginning in the face of short-term economic problems, Poland continued to account for the largest share of regional ICT spending in 2002, followed by the Czech Republic and Hungary.

Overall, the CEE region's ICT market is expected to reach € 43.7 billion in 2003 to more than € 47 billion in 2004.²¹

Investment in information and communication technology in the region of CEE reflects efforts to establish the necessary ICT infrastructure to assure stability and economic growth. Countries are restructuring their regulatory and legislative environments to encourage investment in key sectors (public administration, banking/financial services and telecommunications).

Given the varied economic performance of various countries, key differences remain in terms of development and the demand for specific ICT technologies.

Russia has the greatest spending potential and despite that fact the user demand is largely confined to telecommunications and basic IT technologies such as personal computers, printers, office equipment and related items. In contrast to this example, countries of Central Europe (Czech Republic, Hungary, Slovenia) offer more sophisticated markets in terms of the type of systems, communications and services required.

3. Overview of the Information and Telecommunications Sectors in Croatia

Croatia's economy has enjoyed strong growth since the beginning of 2000. This growth did not only result from the growing domestic demand, but also from high foreign direct investment (FDI). After €1,202 million in 2000, the supply of foreign capital rose to €1,206 million in 2001 and €1,120 million are expected for 2002.²² A considerable part of this FDI flowed into the telecommunications sector. Deutsche Telekom (Germany's

²⁰ Across the ten countries reviewed (Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia)

²¹ Cf. EITO 2003, p.83

²² Cf. Bank Austria, CEE Report 2-2002, p. 6

leading telecommunications company) invested €1,295 million between 1999 and 2001 to acquire a 51% share of Croatian Telecom. Mobilkom Austria bought the Croatian mobile operator VIPnet for €100 million.²³

While relatively large amounts of FDI were invested in the telecommunications sector (TS), initial FDI in the Croatian information sector (IS) was comparatively small. This is probably a result of three main factors: the IS market is relatively small; it was isolated until the beginning of 2000; and is relatively intransparent for external market players and investors.

3.1 Development in the Information Sector (IS)

While the TS is mainly dominated by companies in foreign hands, the IS is, to a large extent, in domestic hands. Internationally operating IT companies had little involvement in the Croatian IS market. IBM is the only major IT company that has been present in Croatia since its independence. Other major companies, such as Oracle and Microsoft, only established branches by the end of the 90's, in order to develop contacts to the local economy and to activate marketing for their own products. Considerable investments in the Croatian IS were, however, not made. There are numerous reasons for this. Firstly, as already stated, the market was small and isolated at the beginning of 2000, it also had little purchasing power and bad payment morale. Secondly, there was no or only little demand for information technology in the Croatian market. In a poor economic environment and with constantly changing legal and institutional conditions, the Croatian IS only developed behind the scenes. Small Croatian IT companies had the pleasure of a few competition-free years with concomitant high margins and good profits. They were able to dominate the market and sell their products to individuals, domestic companies and the Croatian state, as the biggest customer.²⁴

Table 1: Number of IS Companies Active in Croatia 1996 – 2000²⁵

	1996	1997	1998	1999	2000
Number of companies	1,711	1,772	1,746	1,713	1,704
Employees	6,594	7,114	7,178	7,413	7,693
Total revenue*	402,556,813	573,732,287	507,291,186	555,377,977	662,302,399
Total profit*	20,851,667	25,929,836	24,934,738	28,824,906	44,044,305

* In m Kn (€1 = Kn7,342175)

Since the end of 2000 only a small amount of FDI has flowed into the Internet Service Provider (ISP) market.²⁶ Small IT companies (mainly producers of hard- and software) have also been bought up by foreign investors. And a number of Eastern European computer assemblers have build branches in Croatia, and/or begun co-operations with locally operating companies. Competition increased, much to no-name manufacturer's regret.²⁷ The sale of computers rose from 80,626 units sold in 2000 to 124,282 units sold

²³ Cf. OST-WEST CONTACT (2002), p. 55

²⁴ Cf. Mreža, travanj 2002, p. 19

²⁵ Cf. Infotrend 97/12/2001, 100 Najvećih, p. 6

²⁶ Internet Service Providers e.g. Iskon Internet, Globalnet and EuroPronet were bought by foreign companies. Cf. Mreža, travanj 2002, p. 19

²⁷ Cf. Mreža, travanj 2002, p. 18-19

in 2001 and thus exceeded the record year of 1997, when 85,635 computers were sold. The total value of all computers sold in 2001 was more than US \$137 million.

Table 2: PC Sales in Croatia 1996-2001

	1996	1997	1998	1999	2000	2001
Computers	54,250	85,635	71,450	74,600	80,626	124,282
Person/computer ratio	86.6	54.9	65.78	63	58.3	37.8

Source: IDC Croatia (2002) and author's own calculations.

The increase in information technology products imports is a further indicator of increasing internationalisation and further growth of the IS. Imports increased from US \$ 141,82 millions (2000) to US \$ 190,65 millions (2001).

Table 3: Import of Information Technology Products 2000 and 2001 in US \$

	2000	2001	Growth (%)
Personal Computers	46,650,000	59,260,000	27.0
Notebooks	8,040,000	15,320,000	90.5
Printers	17,950,000	20,960,000	16.8
Monitors	15,830,000	25,220,000	59.3
Keyboards	1,070,000	1,620,000	51.4
Scanners	4,100,000	4,550,000	11.0
Input-Output Devices	2,440,000	3,010,000	23.4
Memory (RAM)	26,430,000	38,950,000	47.4
Other Devices	19,310,000	21,760,000	12.7
Total	141,820,000	190,650,000	34.4

Source: Republic of Croatia Central Bureau of Statistics (2002).

The market will, according to estimations by IDC Croatia, continue to grow over the next years. This estimate is further supported by the current relatively low PC density, a growing number of persons gaining Internet access, the rising purchasing power of private households and increasing private demand.²⁸

²⁸ Cf. Večernji list, 20. veljače 2002, p. 42

Table 4: Development of the IS Market 1997 - 2004 in US \$ Million

	1997	1998	1999	2000	2001	2002	2003	2004
Systems	190.5	149.2	145.4	148.8	156.9	166.6	182.4	196.6
Datacom Equipment	19	15.9	16.4	17.6	19.9	22	24.6	26.8
Software	57.8	54.8	61.9	68.9	76.8	85	96.1	103.1
IT Services	60.8	53.8	75.5	89.1	106.5	122.3	138.2	154
Total	328.1	273.7	299.2	324.4	360.1	395.9	441.3	480.5

Source: IDC Croatia (2001).

3.2 Development of the Telecommunications Sector

Although over the past two years considerable amounts of money have been invested in the telecommunications sector, the development of the sector compared with other sectors in the economy has been rather slow, as the necessary investments were undertaken relatively late. This can be one of the reasons why the market is dominated by four companies. Two offer telecommunication technologies and the other two offer telecommunication services so that each company only has one direct competitor.

3.3 Suppliers of Telecommunication Technologies (STT)

As one of the first, the established German company Siemens opened a branch in Croatia in 1992 and set up a joint venture company for the production of electric transformers with the Croatian company Rade Končar in 1994. In 1995 Siemens took over complete control of the company and, at the beginning of 1997, established the Siemens Croatia AG. Until 2001 Siemens Croatia undertook numerous large-scale projects, e.g. the development of the Croatian GSM net and of Ecommerce and mobile Internet services.²⁹ The number of employees increased from 537 (1999) to 669 (2000) persons. Profit before taxes rose by around 64% from Kn 8,138 million (1999) to Kn 13,382,443 million (2000).

Besides Siemens, the Scandinavian company Ericsson is present in the Croatian telecommunication market since 1995. Ericsson bought the Croatian company Nikola Tesla, a traditional producer of telecommunications technologies known well beyond the borders of the former Socialist Federal Republic of Yugoslavia (SFRJ), in May 1995. Ericsson Nikola Tesla produces for markets of the former SFRJ, as well as for some countries of central and Eastern Europe. Despite a remarkably positive development the number of employees decreased from 1,533 (1999) to 1,356 (2000) persons. Profits after taxes fell from Kn 94,174,000 million (1999), to Kn 61,069,327 million (2000). This clear fall in profits resulted from the overall poor development of the STT and is also related to cost cutting restructuring measures within Tesla. Profits started to rise again in 2001, market share of the Croatian market increased by 20% and exports increased by 100%.³⁰

²⁹ Cf. <http://www.siemens.hr/suh1.htm>

³⁰ Cf. http://www.ericsson.hr/etk/report_2000/hr/odjeci.htm

Table 5: Development of Telecommunications Technologies 1999-2000 in Kn

	Siemens			Ericsson Nikola Tesla		
	1999*	2000**	%	1999*	2000**	%
Employees	537	669	24.58	1,533	1,356	-11.55
Total Earnings (TE)	613,380,000	895,412,721	45.98	1,089,843,000	1,268,720,897	16.41
Balance Sheet Total	419,905,000	657,914,022	56.68	975,810,000	1,063,361,947	8.97
Capital and Reserves (CR)	68,896,000	79,755,470	15.76	744,292,000	791,564,154	6.35
Profit before Taxes	8,138,000	13,382,443	64.44	107,517,000	62,375,596	-41.99
Profit after Taxes	8,138,000	10,875,388	33.64	94,174,000	61,069,327	-35.15
Profit vs. TE	1.33%	1.21%		8.64%	4.81%	
Profit vs. CR	11.81%	13.64%		12.65%	7.72%	

*Source: *Privredni Vijesnik specijalno izdanje, 400 najvećih Hrvatskih tvrtki, 12. lipanj 2000, god. XLVII, no. 3155.*

**Source: *Privredni Vijesnik specijalno izdanje, 400 najvećih Hrvatskih tvrtki, 2. srpnja 2001, god. XLVIII, no. 3209.*

Construction of the ISDN/DSL infrastructure was completed by the beginning of 2000. Croatia Telecom, which still has a monopoly in this field, has been selling ISDN and DSL in the Croatian domestic market since the beginning of 2001. UMTS has yet to play a role in the Croatian telecommunications market.

3.4 Suppliers of Telecommunication Services

Croatian Telecom was established on January 1st, 1999. It emerged from the division of the Croatian Post Office and Telecommunications Company, which was split up during privatisation and restructured into two independent companies, the Croatian Post Office and Croatia Telecom. Croatia Telecom had a gross income of Kn 67,611,728 million in 2001 and ranks among the largest telecommunications companies in the region. It owns a highly modern and almost fully digital net. According to company data, they had over 1,721,139 fixed telephone network connections at the end of 2000. Income from the fixed network business rose by around 23% from Kn 3,529 million (1999) to Kn 4,346 million (2000). That is over 74.5% of total earnings.³¹ In April 2000 ISDN technology was introduced to the telecommunication market. By the end of 2000 more than 39,100 ISDN channels were in use. ADSL technology has been on offer since the beginning of 2002. Data concerning the number of users is not yet available. Croatia Telecom profits increased by around 37% from Kn 802,928,000 million (1999), to Kn 1,102,466,400 million (2000). The number of employees also increased slightly by 1.8%, from 10,523 (1999) to 10,712 employees (2000). The high company profits result in particular from the fixed telephone network business, over which the company has a monopoly until 1.1.2003. One can assume that the end of this monopoly and the ensuing entrance of competitors into the market will have a negative effect on Croatia Telecom earnings.³² This effect could be already observed in the mobile net and Internet business at the end of 2001. Croatia Telecom still had market leadership in 2001, but is losing further market shares to the new competitors.

³¹ Author's calculations on the basis of the annual reports from 1999 and 2000.

³² Cf. Croatia Telekom Annual Report 2000, p. 40 und p. 61 and <http://www.ht.hr>

Table 6: Development of Telecommunication Services 2000-2001 in Kn

	Croatian Telecom			VIP-Net GSM		
	1999*	2001**	%	1999*	2000**	%
Employees	10,523	10,712	1.80	476	718	50.84
Total Earnings (TE)	5,505,636,000	6,761,172,800	22.80	240,066,000	1,220,218,630	408.28
Balance Sheet Total	9,323,037,000	9,979,396,800	7.04	1,089,727,000	1,850,044,340	69.77
Capital and Reserves (CR)	7,738,757,000	8,486,054,100	9.66	224,583,000	250,034,364	11.33
Profit before Taxes	802,928,000	1,102,466,400	37.31	0	25,450,880	
Profit after Taxes	561,768,000	919,800,910	63.73	0	25,450,880	
Profit vs. TE	10.20%	13.60%		0.00%	2.09%	
Profit vs. CR	7.26%	10.84%		0.00%	10.18%	

*Source: *Privredni Vijesnik specijalno izdanje, 400 najvećih Hrvatskih tvrtki, 12. lipanj 2000, god. XLVII, no. 3155.*

**Source: *Privredni Vijesnik specijalno izdanje, 400 najvećih Hrvatskih tvrtki, 2. srpnja 2001, god. XLVIII, no. 3209.*

Croatian Telecom's largest competitor is the company VIP Net GSM. The company was created on July 1st, 1999. More than 71% was sold to Mobilkom Austria, a 100% subsidiary of Telecom Austria, in June 2002. Initially established as a GSM operator, the company now offers a wide range of telecommunication services. Its current strategy is to enter the fixed telephone network in 2003, after the abolition of the Croatian Telecom monopoly. Since its establishment VIP Net GSM has exhibited unbroken strong growth. The number of VIP Net GSM employees increased from an initial 450 (1999) to 718 (2000) and had risen to 918 persons by June 28th, 2002. Total earnings increased by 408% from Kn 240,066,000 million (1999) to Kn 1,220,218,630 million (2000), profit before taxes was Kn 25,450,880 million in 2000. At the end of 2001 the company had around 855,700 mobile customers and wants to pass the million-mark by the end of 2002.³³

With the entrance of VIP Net GSM into the Croatian telecommunications market prices for services not only sank, but the quality and number of associated services on offer also changed for the better. Roughly 5000 new jobs have been created, mostly in the field of technology suppliers and business partners.

3.5 Internet Market in Croatia

The Internet is spreading ever more pervasively in Croatia. The number of Internet connections has risen continuously - from 200,600 users (1999) to 681,000 users (2001). This strong growth is expected to continue in the coming years. IDC prognosticated that more than 1,000,000 users will be online at the end of 2003.³⁴ Just as in the development

³³ Cf. VIP-Net GSM press release from June 28, 2002 at <http://www.vipnet.hr>

³⁴ Cf. IDC, 2001

of the IS, the development of the Internet market can be explained through increasing private demand and decreasing entrance barriers (e.g. costs, know-how, etc).

Table 7: Internet Users 1999 – 2003

		1999	2000	2001	2002	2003
A	Private Use	102,600	268,750	347,000	394,000	420,000
B	Exclusively Private	61,560	142,437	173,500	242,000	295,000
C	At Work	48,000	88,900	140,000	220,000	285,000
D	Education	50,000	68,043	194,000	355,000	450,000
Total (A+C+D)		200,600	425,693	681,000	969,000	1,155,000
Total (B+C+D)		159,560	299,380	507,500	817,000	1,030,000

Source: IDC Croatia (2001).

The positive development of the Internet market will not only further boost the job market, but is, at the same time, the engine for an already increasing Ecommerce market. According to IDC Croatia estimations, the Ecommerce market will grow from US \$12 million (2001) to US \$40 million (2003).³⁵

Table 8: Development of the Ecommerce Market 2000 – 2003 US \$

		2000	2001	2002	2003
B2C		224,000	480,000	1,320,000	12,700,000
Growth		---	114.3%	175.0%	862.1%
B2B		25,000	60,000	380,000	4,500,000
Growth		---	140.0%	533.3%	1084.2%
B2B Processes		8,075,000	12,000,000	15,000,000	40,000,000
Growth		---	48.60%	25.00%	166.70%
Total		8,324,000	12,540,000	16,700,000	57,200,000
Growth		---	50.6%	33.2%	242.5%

Source: IDC Croatia (2001).

4. Information and Communications Technologies as Potential Growth- and Employment Engines: Lessons for Croatia

After all, Croatia has experienced an extraordinary acceleration in the development of ICT within the last three years even though developments were slowed down by the general global economic crisis. The main factors for the development are among others reduced telecommunications tariffs and less expensive Internet access, an increased E-business awareness to promote diffusion in ICT. These factors contribute to growth and

³⁵ Despite the current gloom in the global Ecommerce sector, Croatia still has to catch up, so that such optimism is not out of place.

employment, as analysed within this paper. However no empirical evidence could be found, to prove a significant correlation between increasing investment in ICT and impact on employment development.³⁶

Given the various economic performances of the Western European and CEE countries, key differences remain in terms of development, socio-political environments and therefore demand for specific ICT-technologies. In order to mitigate possible short term problems, namely to avoid technical induced labour distortions and to fully exploit the potential benefits of ICT, Croatia together with other CEE countries have to restructure regulatory and legislative environments to encourage further investment in key sectors.

After difficulties in the first decade of the Croatian independency, information and telecommunications technology sector is developing positively by considerably contributing to economic growth and employment. It can be assumed that this positive development will continue, since the following factors speak for this assumption:

- To prepare for the desired EU membership, it will be necessary to put strong political economic weight on strategies for the promotion of the Net Economy and the use of appropriate technologies.
- In the context of the government program “Croatia in 21st Century” a strategy for the development of the information and telecommunications sector was decided.³⁷
- Since the end of 2000 the purchasing price of a computer and the costs of Internet use have decreased.
- One of the major drivers of IT spending is represented by the increasing number of internet users.
- The prognosis for overall economic growth for 2003 is between 3.5% and 4.4%.³⁸
- The rest of the former Yugoslav market has yet to be really opened up. As a regional player Croatia would have good opportunities here.

In order to foster this process the following factors which have proved to be useful in other Western and CEE-countries have to be considered in Croatia as well, to mitigate possible negative developments:

- Increase foreign direct investment (FDI) with the ongoing privatisation of key industries, e.g. shipbuilding - and oil industry.
- Integration of international organisations and the international lending community in providing finance, direction and support, e.g. the European Union (EU) by assisting to find standards and policies while allocating financial resources through EIB (European Investment Bank) and EBRD (European Bank for Reconstruction and Development).
- Support for private SME's (major source for investment in PC's, peripherals, networking and packaged software).
- Increase in the demand for internet-working hardware, servers, network consulting, implementation and communications management services. Higher penetration of LANs, combined with growth of Windows NT installations and

³⁶ Cf. Poslovni Tjednik, travanj 2003, p. 14-17

³⁷ Cf. Ured za strategiju razvitka Republike Hrvatske, Hrvatska u 21. stoljeću, Informacijska i komunikacijska tehnologija, Zagreb 2000, p. 25 and following pages.

³⁸ Cf. Republic Croatia Central Bureau of Statistic (<http://www.dzs.hr>); Bank Austria Creditanstalt (<http://www.ba-ca.com>); East West Information Service (<http://www.ewis.de/hrwirtschaft.html>).

upgrades of NetWare users to IntranetWare, are also driving notable demand for hardware and networking support services.

These issues that we have sketched are of crucial importance to all economies in transition. The transition and privatisation process is in most of the countries, especially in Croatia, still ongoing. Clearly ICT is the sector that supports this restructuring process and can be seen as a hope carrier for a positive economic growth in the long run. Nevertheless, negative short run impacts of ICT development in Croatia should be considered as well, which we were able to derive from the experience of selected European countries. Examples include labour market distortions like a widening of the education wage structure and decreasing labour market prospects for less skilled employees. It is a political question whether this process should be slowed down unless functioning market mechanisms have been established. Alternatively the government could support this adjustment with appropriate political measures like e.g. vocational and educational training.

The Net Economy diffusion could enlarge the so-called “digital divide” between those people, enterprises and countries that can manage the phase of change and those who are unable to do so. This division may grow within Europe, increasing regional unbalances and social exclusion and calls for appropriate economic policy responses, e.g. active labour market measures like educational and vocational training support schemes. Governments throughout Europe have started to favour active “immigration” policy to encourage skilled staff to relocate in their countries, what is known as a phenomenon called “brain drain”. This negative impact could be counteracted by the recent offshore-trends of IT-outsourcing (e.g. software development and IT services) in advanced economies.³⁹

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³⁹ Cf. COMPUTER ZEITUNG 15/2003, p. 6

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