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ICT in Serbia

At a Glance

January 2013

VOJVODINA ICT CLUSTER

ICT NETWORK

NiCAT
NIS CLUSTER OF ADVANCED TECHNOLOGIES

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Published by:

Vojvodina ICT Cluster – VOICT

ICT Network

Nis Cluster of Advanced Technologies - NiCAT

In cooperation with

Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

Program for Private Sector Development in Serbia ACCESS

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January 2013

CIP - Каталогизација у публикацији Библиотека Матице српске, Нови Сад

004(497.11)

MATIJEVIĆ, Milovan
ICT in Serbia - At a Galance : [authors Milovan Matijević, Milan Šolaja] ;
- Novi Sad : TV Studio "Bečkerek" , 2013 (Bački Petrovac : Neografia). - 70 str. : ilustr. ; 21 cm

Podatak o autorima preuzet iz kolofona. - Tiraž 500.
Bibliografija: str 65-66.

ISBN 978-86-6103-066-6

1. Šolaja, Milan [autor]
a) Informacione tehnologije - Srbija
COBISS.SR-ID 256035591

The **Vojvodina ICT Cluster** is a recognised partner in the development and application of new ICT products and services with high profit potential and an important partner in the development of individuals, companies and regional businesses.

The mission of the Vojvodina ICT Cluster is to create conditions for ICT development by coordinating ours and our partners' efforts in creating a strong positive influence on social and business environment. The cluster serves as a platform for cooperation and provides a portfolio of services, such as building capacities and competitiveness of our members through training and education at the Cluster Academy: building links with the education system; creation of new business opportunities; access to new markets; lobbying activities etc. The cluster also plays an important role in creating tighter bonds in the triple helix - Business–Education–Government.

For further information about the Vojvodina ICT Cluster, please visit www.vojvodinaictcluster.org

Working efficiently, effectively and in a spirit of partnership, we support people and societies in developing and industrialised countries, as well as countries in transition in shaping their own futures and improving living conditions. This is what the **Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)** is all about. Established on 1 January 2011, it brings together, under one roof, the long-standing expertise of the Deutscher Entwicklungsdienst (DED) gGmbH (German Development Service), the Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH (German Technical Cooperation) and Inwent – Capacity Building International, Germany. As a federally owned enterprise, we support the German Government in achieving its objectives in the field of international cooperation for sustainable development.

For further information on GIZ, please visit www.giz.de.

ACCESS is a Program implemented by GIZ on behalf of the German Ministry for Economic Cooperation and Development (BMZ). It aims to promote the Serbian economic development and to facilitate the future membership of Serbia in the European Union (EU) by supporting the implementation of the Serbian "National Strategy for Development of Small and Medium-sized Enterprises and Entrepreneurship" as well as the "National Strategy for EU Accession".

ACCESS assists Serbian intermediaries in their support to SMEs in selected sectors to make better use of their production, employment and growth potentials and to explore new markets in South Eastern Europe as well as in the EU. The overall objective of the project is the improvement of the competitiveness of small and medium-sized enterprises and start-up companies in selected sectors and regions.

The ACCESS project works with a diversified implementation structure (including public and private institutions). Consequently, the elements of the projects are (i) support to local and regional economies, (ii) support to industries, including associations and clusters, and (iii) creation of a climate favourable to business and investment. The support components include advising government and institutions, companies and groups of companies, as well as training of local labour by both international and national experts, and providing local subsidies for seminars, trainings and promotional activities.

For further information on GIZ/ACCESS, please contact tobias.stolz@giz.de.

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FOREWORD

Dear reader,

You are holding the updated and expanded version of ICT in Serbia – At a Glance. In the future, we are planning to create more publications that will deal with different topics in connection to Serbian IT. We are thankful to Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, one of our main partners since the inception of VOICT, for their generous help in making this publication possible.

Two years after the foundation of the Vojvodina ICT Cluster, one can see a different Serbian information technology landscape. There is a lot more awareness about the potentials of the sector in local business communities, among ordinary people, but most importantly among decision-makers in government structures. Those are good signs which encourage us to try even harder and create conditions for sustainable development of the sector.

And sustainability will come from our focus on high-end IT output as IT products and solutions made in Serbia yet sold globally. Even now we have companies which lead the way. Fostering such trends will, of course, be a benefit for the rest of the Serbian economy, which urgently needs IT solutions to increase competitiveness. However, there are plenty of ways to let other sectors ride on the IT success wave: focusing on sub-sectors which require non-IT expertise in the development of IT products and solutions is one of the avenues we need to explore further. Huge opportunities and niche markets are hiding there.

In the meantime, we are keeping in mind our long-term goal - Serbia as a place of choice for development of sophisticated software and the hotbed of regional IT. Also, we are joining forces with other players in IT and wider. As of 2012, a strategic partnership was formed among three leading IT clusters in Serbia – Vojvodina ICT Cluster, ICT NET and NiCAT, and a public dialog with decision-makers in the government and the German IT business community was initiated. That means uniting all the IT stakeholders and we are looking forward to seeing the fruits of that cooperation. One of the effects we have already detected is more visibility of Serbian IT on international markets. We welcome this trend and are ready to help you profit from cooperation with the Serbian IT. Our institutionalised support is here to assist you and help you become a part of the Serbian IT success.

Whether you are an investor or a scholar, a business person or a student – we hope that you will find this study interesting and useful. Please, feel free to contact us for more information and: if you have never visited Serbia – now is the time. Welcome!

Milan Šolaja

CEO @ Vojvodina ICT Cluster

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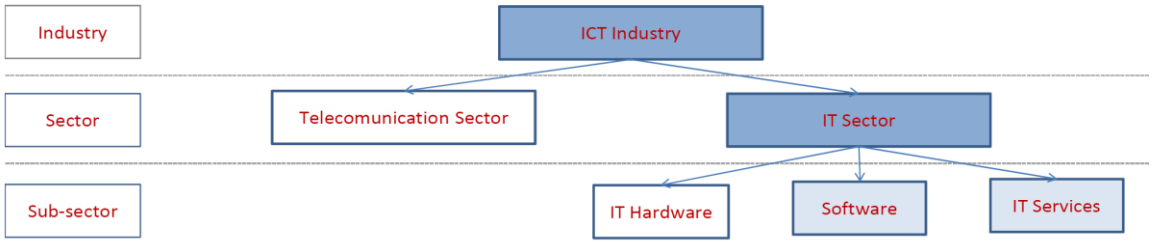
INTRODUCTION

Information and Communication Technologies (ICT) undoubtedly constitute one of the key innovations of the last century. ICT are composed of a wide range of product and service technologies including computer hardware, software and services and a host of telecommunication functions. ICT strongly influenced the fields of socio-economic development, international development and human rights. The basic hypothesis behind the approach is that more and better information and communication furthers the development of a society (be this to improve income, education, health, security, or any other aspect of human development).

Various studies define the ICT sector differently. OECD defines ICT sector as a combination of manufacturing and service industries, whose products capture, transmit or display data and information electronically. In addition, "The production (goods and services) of a candidate industry must primarily be intended to fulfil or enable the function of information processing and communication by electronic means, including transmission and display" (OECD, 2007). This also includes producing electronic components.

In this report, the traditional and simple definition of the ICT sector will be applied. According to this definition, the ICT sector is divided into two sub-sectors: telecommunications and information technologies (IT). Furthermore, the IT sub-sector is comprised of three segments, namely, hardware, software and services. The main reasons for choosing this definition are a clear and simple review of particular sub-sectors (IT and telecommunications) which have still not been significantly converged in Serbia, and making possible for a focused presentation of IT sub-sectors characteristics.

Table 1 ICT Sector Definition



With a two-digit annual growth in the years prior to the crisis, ICT is among the most vibrant and the fastest growing Serbian sectors, which illustrates the vitality and significance of this sector for the country. However, the economic crisis hit Serbia heavily, negatively affecting the ICT industry as well. The Serbian IT market value will most probably stay captured in the "tunnel" between 400 million and 450 million EUR, for almost 5 years (2009-2013). The suspension of the IT projects caused by the financial crisis created a barrier, which, in turn, led to the accumulation of a great potential. With the improvement of the present economic situation and removal of these barriers, this accumulated potential will be given the chance to express itself through double-digit growth, again. This study presents an overview of the ICT sector in Serbia. The analysis is structured into four thematic areas: General Business Environment; Assessment of the ICT Sector (Statistical overview of the Serbian ICT sector; Education and Human Recourses Development; Research and Development) and The IT industry Opportunities – Outsourcing (Current situation, Opportunities and Barriers). The study with its analysis and information was designed to serve primarily companies interested in business and investing related to ICT in Serbia.

1. GENERAL BUSINESS ENVIRONMENT

This chapter provides the following information: overview of the current business environment in Serbia and the legislation framework – in general and ICT related.

General Statistics

- Population: 7.12 million
- Capital: Belgrade
- Territory area: 88,361 km2
  GDP (absolute): €29.5 billion (per capita: €3,994)
- GDP - composition by sector: Manufacturing (18.3%); Real estate, renting and other business services (16.4%); Wholesale, retail and repairs (12.8%); Agriculture, hunting, forestry and water works supply (11.2%); ICT (6.1%) and Others (35.1%)
- 55.2% of households have personal computers
- 47.5% of households have Internet access
- 83.9% of households have mobile phones
- 143 Mobile telephone subscriptions/100 pop
- 42.6 Fixed telephone lines/100 pop; 98.5% digitalised network
- Per cent of GDP spent on R&D: less than 0.8% (government fund estimated on 0.5%)
- Per cent of GDP spent on Education: 2.4%

Current Business Environment in Serbia

Ten years after the democratic changes took place, **the Serbian economy is still in transition,** on a roller coaster ride between years of growth and recovery and economic stagnation. Although Serbian economy had a healthy growth during the 2004-2007 period, with an average GDP growth rate of 6.8% (with peaks of 8.4% in 2004 and 7.5% in 2007), it reached only 70% of the country's 1990 GDP. In the period of the still-lasting economic crisis (2008-2011) the Serbian economy is mostly stagnating. According to the World Bank estimates, even with solid annual GDP growth, it will be many years before the Serbian GDP reaches the previous solid level.

To overcome this situation, economic development policies in Serbia mainly focus on **the attracting FDI.** However, since achieving a maximum in 2005, with $5.47 billion USD, FDI inflows have dramatically diminished. The main reasons are decelerated process of joining the EU and the global financial crisis. Among key reasons for not having more FDI in Serbia are bureaucratic and insufficiently reformed public administration and a high level of corruption.

Serbia has a problem with macroeconomic stability. The inflation rate is above 10% and unemployment is above 18%. Based on the Global Competitiveness Index (GCI) for 2012-2013, Serbia is placed 95th (among the 144 economies), behind almost all European countries. This position of Serbia could discourage foreign investors. However, such a poor Serbian position should not be so worrying, as the reasons for it are mainly in presentation of the weak qualitative indicators, all significantly lower than average (source: Forum's executive opinion survey) instead of quantitative ones, all significantly higher than average (marked with * in Table 2, source: data from international organisation and national sources).

Significant discrepancies between qualitative and quantitative indicators point to the criticism of the surveyed, which could be positive as respondents wish for the situation to be improved, but could lead to wrong general conclusions.

Table 2 Discrepancies between Qualitative and Quantitative GCI Indicators selection 2012-2013

1st pillar: Institutions	Rank/144
1.01 Property rights	130
1.02 Intellectual property protection	116
1.22 Strength of investor protection*	65*
2nd pillar: Infrastructure	
2.01 Quality of overall infrastructure	120
2.08 Mobile telephone subscriptions/100 pop*	38*
2.09 Fixed telephone lines/100 pop*	31*
5th pillar: Higher education and training	
5.02 Tertiary education enrolment rate*	52*
5.08 Extent of staff training	138
6th pillar: Goods market efficiency	
6.02 Extent of market dominance	142
6.04 Extent and effect of taxation	122
6.05 Total tax rate, % profits*	50*
6.07 No. days to start a business*	59*

7th pillar: Labour market efficiency	Rank/144
7.01 Cooperation in labour-employer relations	139
7.04 Redundancy costs*	21*
7.06 Reliance on professional management	135
7.09 Women in labour force, ratio to men*	77*
8th pillar: Financial market development	
8.01 Availability of financial services	97
8.06 Soundness of banks	119
8.08 Legal rights index*	24*
9th pillar: Technological readiness	
9.01 Availability of latest technologies	127
9.02 Firm-level technology absorption	142
9.04 Individuals using Internet*	67*
9.06 Internet bandwidth*	20*
9.07 Mobile broadband subscriptions*	32*

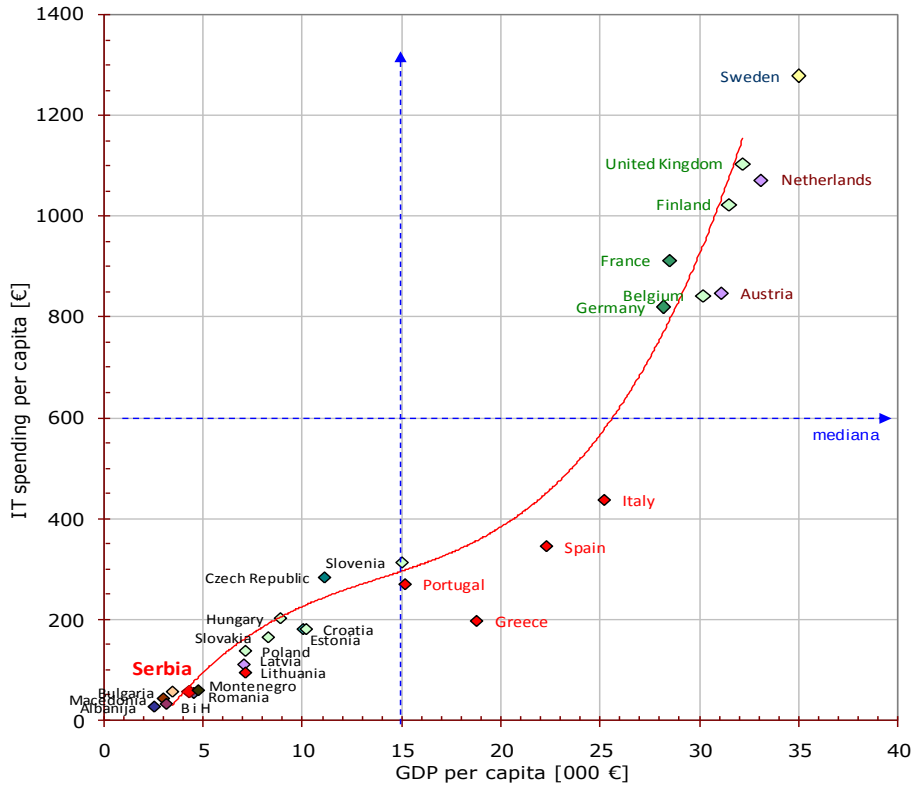
Source: WEF, Global Competitiveness Index (GCI) for 2012-2013

As a measure for reducing the negative impact of the current economic crisis, the Government has increased a package for foreign companies interested in setting-up their businesses in Serbia. Besides having one of the lowest corporate tax rates in Europe (10%), the Serbian Government is giving non-refundable grants that can be up to €10.000 per employee. Recently, these measures have also become available to Serbian companies willing to invest in new factories.

Where is Serbia on EU Technological Map?

Economic competitiveness as well as the society organisation and transparency are best illustrated with the diagram of IT investments according to the economic strength (GDP).

Figure 1 IT Investment according to Economic Strength (GDP).



Source: Eurostat, EITO 2007, Mineco 2010

Key observations for the diagram above:

- North and West European countries have a strong economy and high IT investments (all significantly above average) in visible correlation.
- Mediterranean countries are characterised by strong economy but low IT investments. Provocative, pejorative acronym PIGS for these countries (Portugal, Italy, Greece and Spain) indicate that they are the "second division" players.
- All the countries from EU 10 (10 new members, which joined the EU in 2004) are lagging behind: they are in the weak economy and low IT investments quadrant.
- Between Serbia and its Northwest neighbours, there is a few decades long technological gap. Serbia is positioned at the origin of coordinate system together with Albania, FYROM, Montenegro, Bosnia and Herzegovina, Romania and Bulgaria.

Taking into account the key observations above and treating the IT investments as the early indicator of economic and social trends, the following hypothesis can be formulated: "The Serbian economy and society will avoid further descend to an even deeper crisis if the IT investments from the present less than 1% GDP double to 2% GDP (which is close to EU standards), in the following period 2011-2015". To "catch up with the EU train" it is necessary to triple IT investments in Serbia within the same period."

IT Environment, Drivers and Barriers

Table 3 Key Parameters for the Serbian IT Market Forecast, in Q3-2012

Economic and Political Factors	**Factor Power**	**Factor Value (Intensity)**
GDP decline projected to round 2% in 2012.	3	25 50
Insufficient investment. The flow of foreign direct investment slowdown	2	25
Exchange rate. Oscillation accumulate exchange differences	2	25
Accession to EU. The accession process slowdown	1	25 50
IT economy - need for IT investment (annual growth of at least 20% until 2015).	1	25
Consumers		
Companies without a serious profit postpone their investments and IT investments	2	25 50
Government institutions dispose tenders - the year eaten by elections	2	25 50
IT replacement cycle. Annual delivery of more than 350,000 PC	1	25 50
IT Market		
Companies' competitiveness decreasing. SME IT players in growing problems	2	25 50 75
Financing options (loans, leasing...) for investments are becoming weaker	1	25 50

Source: Mineco. 2012

Legend: Factor Power 3 – very strong factor; 2 – strong factor; 1 – moderate factor

Examples for Factor Value:

25 50 75

Indicates a barrier for IT sales, which reached 75% of the maximum 100 % intensity

25 50

Indicates a driver for IT sales, which reached 50% of the maximum 100% intensity

From the perspective of local companies operating in ICT sector, FDI are seen more as a threat than as a benefit, due to the limited human resources available on the market. Namely, foreign companies tend to attract good ICT experts with higher salaries, often leaving national companies in the situation where they cannot compete.

Although the quality of Serbian **ICT infrastructure** is below the level of EU countries, it is

improving with every year, while past few years saw significant advancements. In addition, the quality of ICT infrastructure itself does not present significant obstacles for business in Serbia since the most of the ICT companies are concentrated in Belgrade, Novi Sad and to some extent Niš, where the quality of ICT infrastructure is significantly higher than in the other parts of Serbia.

Regarding **standardisation of Serbian companies,** it appears to be driven by demands of foreign partners who import from Serbia. Standardisation requirements are related to the nature of the produced goods, as well. For example, embedded industry, which produces innovative goods in the field of medical appliances, requires sector-related standards.

Legislation Framework

Doing business in the ICT field in Serbia is increasingly becoming easier and more accessible for (foreign) investors. Legislation and regulation on the state level has been impressively improved in recent years. Due to the awarding of EU candidate status in March 2012, the process of streamlining Serbian laws with EU legislation and global standards is speeding up. This is confirmed by the EU Serbia 2012 progress report despite differences in sub-sectors and the call for further improvements in the field of e-government and overall IT capacity.

In general, Serbia's tax regime is highly conductive to business. Corporate profit tax is the lowest in the region, while VAT, salary tax and social insurance contributions are among the most competitive in Central and Eastern Europe.

Doing business in telecommunications is better regulated than in the IT sector. In 2009, a new Law on Electronic Communication was harmonised with the EU Regulatory Framework from 2002. Due to its size, the telecommunications sector has attracted some of the major multinational companies in that field (such as Telenor and VIP as major mobile telecommunications service providers). By now, the state-owned Telekom Srbija, which remains the major provider of fixed public voice telephony services, faces competition by private providers such as Orion Telecom.

The telecommunication sector is regulated by the Republic Telecommunications Agency (RATEL), an autonomous national regulatory authority. RATEL has been become a strong agency with an excellent reputation among all the actors in the sector. Since 2006, RATEL has been publishing an annual overview of the telecom market in Serbia, which is a good source of information in this field.

Doing business in the IT sector has more difficulties: mostly due to low specialization, limited turnover and issues tied to regulations (export, VAT and customs). Export of software is treated as both product and service, and there are no legal obstacles in realization of any contract in this area. Problems, however, may appear in implementation of regulations (which are in line with EU best practice) due to wrong interpretation on the side of civil servants who implement them. It is expected that the new regulation[1] will solve some of these problems as of 2013.

Furthermore, the Serbian government has announced a radical change in its relations toward the IT sector and strong support to it in 2013 - especially to software exporters. This support includes a broad range of measures, covering areas from education to tax system. The ICT sector also faces common business difficulties in Serbia. Difficulties in obtaining necessary state licenses (especially construction licenses), long court trials and insufficiently transparent public procurement are only some of the numerous obstacles that affect the business sector in Serbia.

[1] The Rulebook on recognition of electronically delivered services according to the Law on VAT: http://www.paragraf.rs/dnevne-vesti/131112/131112-vest6.html (in Serbian)

Finance (Demand and Supply)

The expensive (conventional) capital market in Serbia, a typical transition country capital market, certainly still presents a general obstacle for Serbian companies in any sector. But there are clear and substantial signs for improvement.

Serbian ICT companies aiming to develop their own products are in constant need for seed, start-up, venture etc. capital to cover their specific financial needs in all stages of the business cycle: from patenting the product, through market entry and finally maintaining the stability of the company. Some highlighting observations in that regard:

- There is a growing ICT entrepreneur and start-up company scene development that creates a wealth of new business ideas on a daily basis.
- Once established, it takes about 5-7 years, sufficient funds provided, to prepare a company for IPO.
- Depending on the size and complexity of the products about 10 - 20 people/programmers (software developers and others) are needed to work on the development of a new product.
- Companies such as Schneider Electric DMS and Nordeus are already successful examples of Serbian companies developing and internationalising their own products

Increasingly recognizing the potentials of new products and services developed by Serbian companies and need for (smart) capital, the market and funding opportunities for ICT start-ups and SME is rapidly developing. The creation of public and private sector institutions and associations such as the Serbian Innovation Fund, BkVF, SBAN, SPEA etc. and the growing number of venture capital funds active in Serbia reflect this development. These institutions and players provide either funds for specific projects or support to companies and investors during the identification of suitable business ideas and the matchmaking and investment process, often with a clear-cut focus and expertise in ICT.

2. ASSESSMENT OF THE SERBIAN ICT SECTOR

2.1. STATISTICAL OVERVIEW OF THE ICT SECTOR

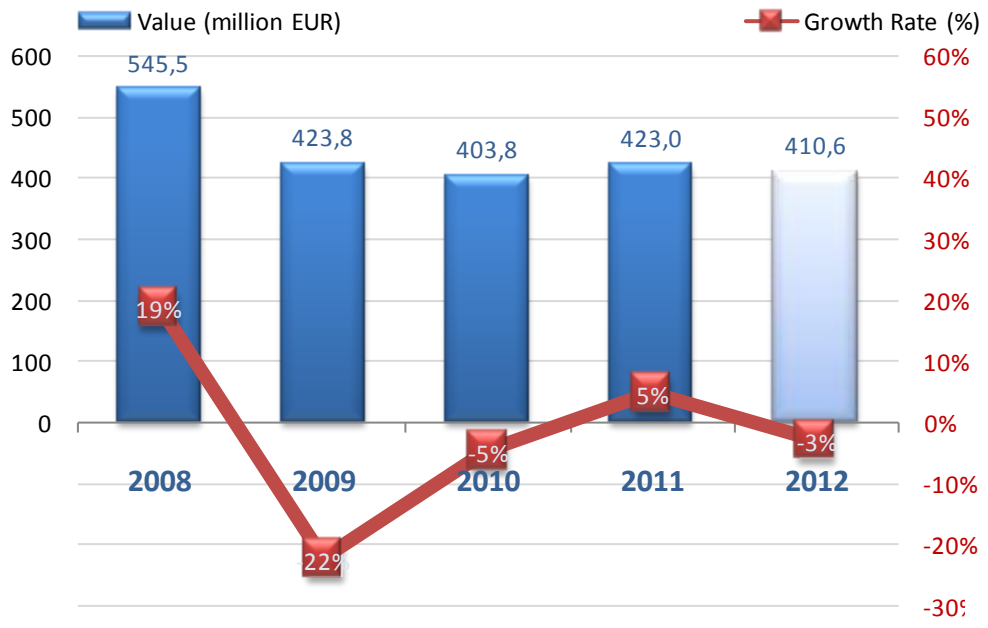
This chapter provides basic information needed for an insight into the Serbian ICT sector, such as:

- Market value and Market structure
- Geographical market dispersion
- Number of companies, employees, income/turnover in Serbian ICT industry
- IT spending and investment in Serbia
- Usage of IT by households and business in Serbia

2.1.1. IT Market Value and Structure

After two years of decrease, in 2011, the Serbian IT sector has stagnated. Results from 2010 show that market value was €405 million, which is a year-to-year drop of 5%. In comparison to the year 2008 where market value reached its record of €545 million, the IT sector shrank by one quarter! The Serbian IT market value will most probably stay captured in the "tunnel" between 400 million and 450 million EUR, for almost 5 years (2009-2013). A strong market decrease in Q3-2012 poses reasons for concern, because in the case of further weakening of the economy, the Serbian IT market value could have 10% further decline in 2013.

Figure 2 Serbian IT Market and Growth Rates for 2008-2012. (%)



Source: Mineco 2012

According to the current IT market projection for 2012 (-2.9%) the drop is certain, because the biggest IT segment, PC Hardware has experienced a significant decline of -8.2%. The only visible growth is recorded in the Application Software segment (5%-10%) which is the result of a few big tenders concluded in the past years, but still in realisation. Modest growth, but growth all the same, that was observed in IT Services, is based on the 1) expansion of the user base and (2) software services based on the application software mentioned above.

Although the consumer part of the IT market has declined (households), it is still more vital then infrastructural part (IT investments in business sector). It is a paradox that households, entrepreneurs and micro enterprises are the backbone of IT investments in Serbia, followed by

the Government and ending with financial sector. In re-composition of this order lies the big growth potential, but it will need time. From this point of view, this task is postponed for the years after 2015.

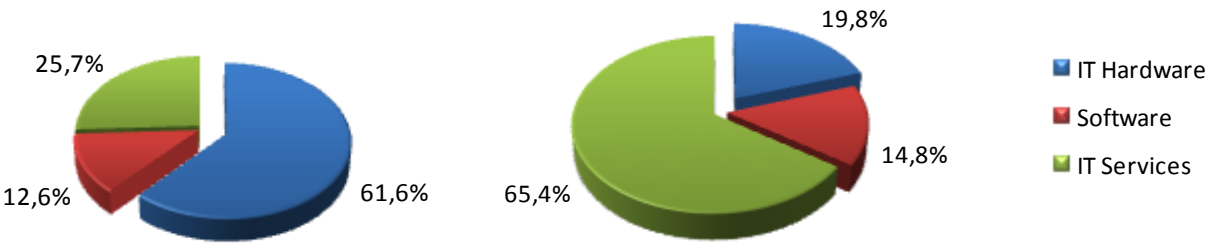
Table 4 Serbian IT Market Value in 2010-2011 and Trends for 2012 [€ million].

IT MARKET	2010	2011	2012
IT SERVICES - TOTAL	**99.4**	**108.9**	**113.5**
IT services	99.4	108.9	113.5
SOFTWARE – TOTAL	**48.7**	**53.5**	**55.6**
System software	22.3	22.7	22.4
Application software	26.4	30.8	33.2
IT HARDWARE - TOTAL	**255.7**	**260.6**	**241.5**
Server and Storage Systems	27.4	29.7	27.2
Personal computers	154.5	160.1	146.9
Peripherals	43.6	43.7	42.7
Networking equipment	30.2	27.3	24.7
TOTAL	**403.8**	**423.0**	**410.6**

Source: Mineco 2012

IT Market Structure

Figure 3 Serbian IT Market Structure in 2010. Revenue and Profit



Source: Mineco 2012

Key observations from the figure above:

- In the 2011 IT market structure, segment of the IT Hardware with 61.6% share is still dominating; following is IT Services segment with 25.7% and remaining 12.6% come from Software.
- Although IT Hardware drives the IT market in Serbia, profit margins of hardware companies are extremely small and consequently their profit is very low. The biggest available capital (net assets), almost 2/3 of the total IT industry net asset, is preserved by the companies from the IT Service segment.
- Such a market structure is, according to European standards, clearly illustrating the market that is still on the early stage of the IT maturity.

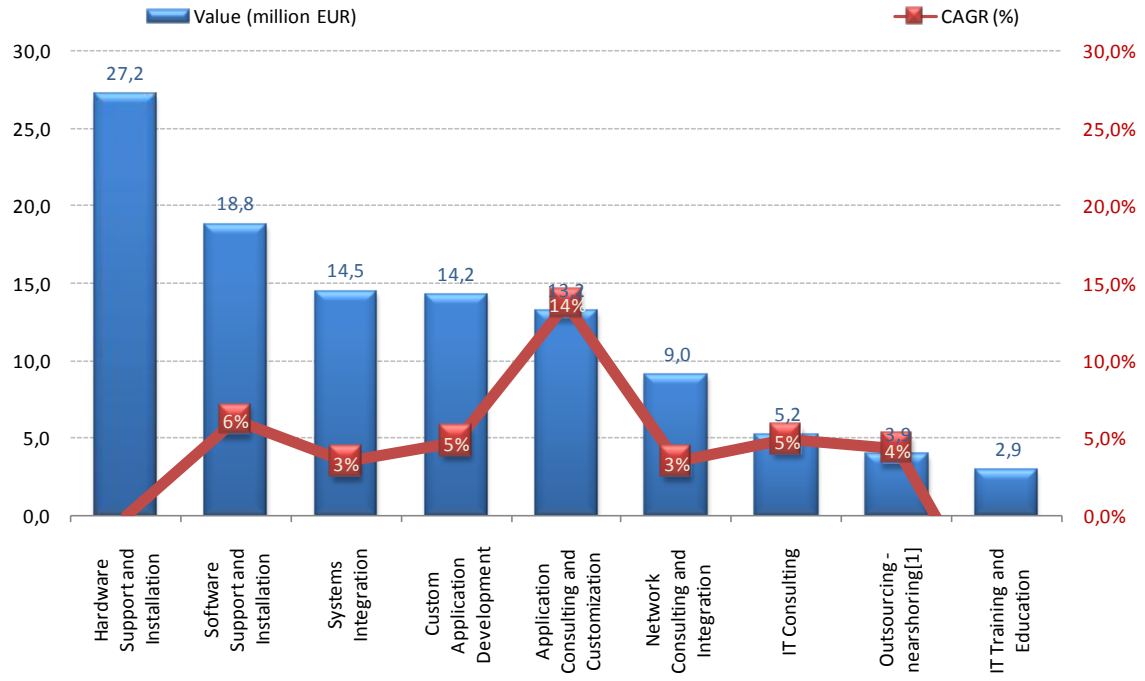
IT Services Structure

Table 5 IT service in Serbia. Market Value in 2010-2011 and Forecast 2012 [€ million].

IT Service	2010	2011	2012
Hardware Support and Installation	27.6	27.2	26.2
Software Support and Installation	16.0	18.8	19.7
IT Training and Education	3.3	2.9	2.7
Network Consulting and Integration	9.0	9.0	8.9
Systems Integration	13.3	14.5	15.1
Outsourcing – nearshoring	3.7	3.9	4.4
Application Consulting and Customisation	9.4	13.2	15.5
Custom Application Development	12.1	14.2	15.9
IT Consulting	5.0	5.2	5.1
Total	**99.4**	**108.9**	**113.5**

Source: Mineco 2012

Figure 4 Structure of IT Service in Serbia and Compound Annual Growth Rate (5 year period)



Source: Mineco 2012

CAGR – [%] Compound Annual Growth Rate for the five year period (2006-2011)

While the hardware support and installation market will see continued demand in the future, its share of the total services market is expected to contract.

The four major vertical markets – government, finance, manufacturing, and telecommunications – are likely to be the largest spenders on IT services in Serbia in the coming years. As the Serbia continues to stabilise both economically and politically, it has the potential to increase FDI. As in other developing countries in the region, these four sectors have been the prime beneficiaries of the inflow of FDI, which has fostered spending on IT services.

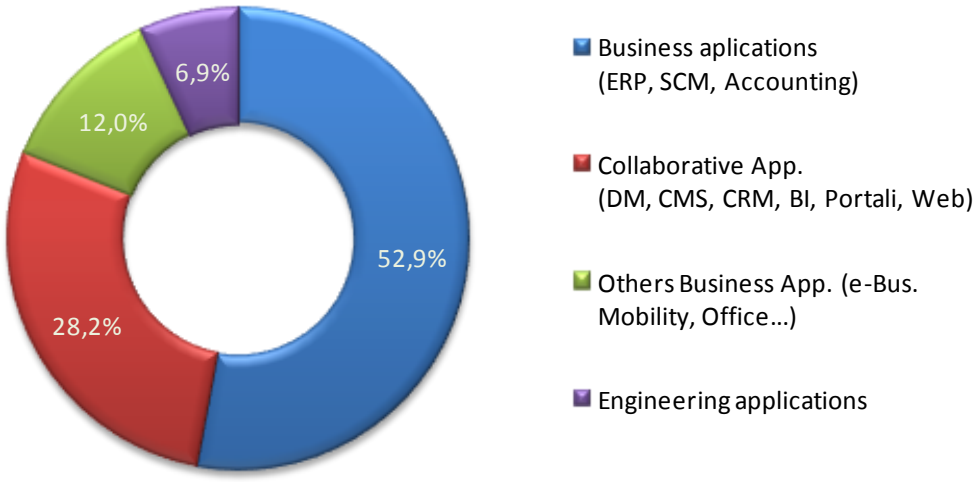
Significant part of IT services is internal (End-user companies rely on their own IT departments). These services are not included in the analysis.

Strength and number of international vendors operating in the region and Serbia will increase and will have the following implications:

- As service engagements require more intricate and specific solutions, local services firms will have to form strategic partnerships with traditional product vendors or with international service companies, to meet customer needs.
- A number of local IT services companies are staffed with highly skilled employees and the acquisition of these companies can be a useful tool for international vendor entry into one of the IT markets, as it is already seen all over the CEE region.

Application Software Structure

Figure 5 Products in Serbian Software Industry



Source: Mineco 2012

In 2011, the Serbian market for application software reached a value of €31 million. Business applications (ERP, SCM, and Accounting) hold the largest part, constituting 52.9%, followed by collaborative applications (DM, CMS, CRM, BI, Portals, Web) with 28.2% of market shares.

Local software producers dominate the Accounting and ERP market in the Serbia, given their flexibility in developing custom software applications. Custom application development represents an option for a large number of companies (particularly SME) seeking a software solution.

Increasing demand for software applications – both ready-made and custom developed packages – will drive growth in this foundation market in the period 2011-2015.

Table 6 Serbian IT Market Value and Structure, 2011 and Potentials 2011-2015 [€ million]

	IT Market [million €]			Share [%]			CAGR (%) Annual Growth Rate	
IT MARKET SEGMENT	**2011**	**2015 (v1)**	**2015 (v2)**	**2011**	**2015 (v1)**	**2015 (v2)**	**2015 (v1)**	**2015 (v2)**
IT Services	108.9	211.8	325.5	25.7%	29.5%	32.1%	18%	31%
System Software	24.3	42.0	60.5	5.7%	5.9%	6.0%	15%	26%
Applications	29.2	49.4	71.1	6.9%	6.9%	7.0%	14%	25%
Server systems and storage	29.7	41.8	53.9	7.0%	5.8%	5.3%	9%	16%
Personal computers	160.1	226.3	282.5	37.8%	31.5%	27.8%	9%	15%
Peripherals	43.7	86.8	132.4	10.3%	12.1%	13.1%	19%	32%
Networking equipment	27.3	59.8	88.7	6.4%	8.3%	8.7%	22%	34%
TOTAL	**423.0**	**717.9**	**1.014.5**	**100%**	**100%**	**100%**	**14%**	**24%**

Source: Mineco 2012

Key comments on the table above:

- It is necessity for the Serbian IT market, in the following five years period (2011-2015), to exceed growth rate of 14 % (**CAGR (14%) - C**ompound **A**nnual **G**rowth **R**ate under which Serbian economy will fall in even deeper crisis). The importance of avoiding further economic drop, push the catching up of EU countries into the background.
- The potential of the Serbian IT market is significantly higher than the realisation shows. The condition of all conditions for the progress required (a double-digit IT market growth of minimum 20%; CAGR (20%) **- C**ompound **A**nnual **G**rowth **R**ate with which Serbian economy could catch up with EU countries) is yearly GDP growth higher than 4%. In the present economic situation, a 4%GDP growth is practically impossible. Consequently, catching up with EU countries is the task which has to wait for better times.
- In their analysis for the period (2005-2010), MINECO projected required CAGR of 17%. Although the trend was positive up to 2008, the catastrophic year of 2009 for the IT sector influenced the average growth rate for the 2005-2009 period to drop to modest CAGR (8.5%). Stagnation in 2010 additionally reduced this rate up to 5.5% CAGR, which was three times lesser than was required in the MINECO projection.

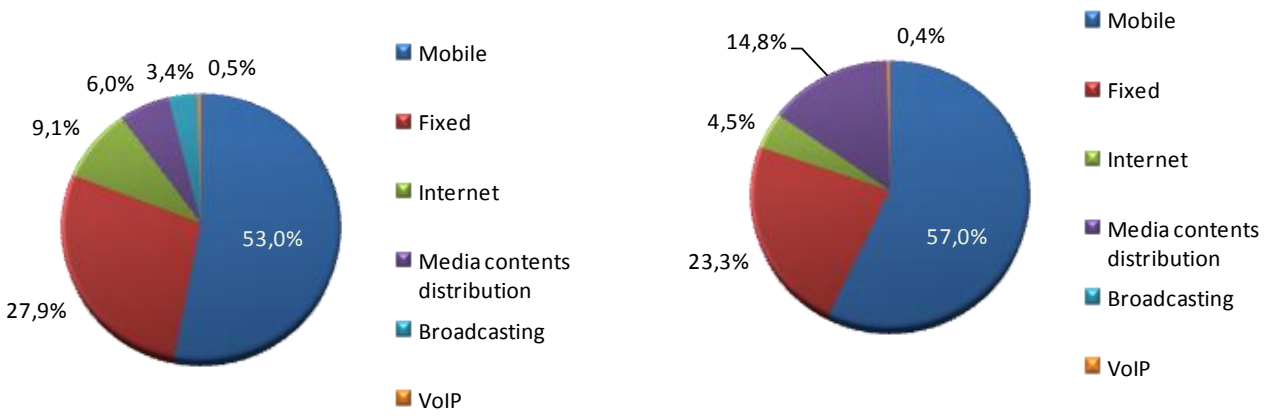
2.1.2. Overview of the Telecommunication Market

Informatics and Telecommunication in Serbia, as two separate segments of ICT Industry, have different performances and trends: while IT is characterised as a fragmented and liberal market with significant presence of SME segmentation, more mature telecommunications sector practically consists of three big mobile operators and one cable operator. Because this report is primarily aimed at potential investors in new ICT areas, the focus is set to the SME segment and IT service companies and the Telecommunication information is reduced to few key observations.

According to RATEL's data, the revenues from telecom services in 2011 amounted to €1.6 billion. The average annual growth rate (CAGR) of the telecom sector revenues in the period from 2005 to 2011 was 9.5%. The share of the telecom sector revenues in GDP was around 5.66% (cf. 5.29% in 2010). The total investments in the telecom sector in 2011 amounted to €243 million.

In terms of different services, in 2011, the largest share in the total revenues, approximately 53%, goes to the mobile market, whereas VoIP services with 0.5% represent the smallest share. Accordingly, investments in the mobile market have the largest share in the total revenues, 57.0% in 2011, whereas investments in VoIP only 0.4%. The structure of telecommunications sector revenues is given below (Figure 6).

Figure 6 Revenue and Investments by Telecommunication Services, in 2010



Source: RATEL

Telecom service baskets represent monthly expenditure per subscriber. The low usage basket shows the average monthly expenditure for basic telecom services, which include TV, fixed and mobile telephone services, whereas the high usage basket shows using the Internet and CATV in addition to the basic package. In 2011, the cost of the basic package equalled 4.0% of the average monthly salary, and that of the extended package amounted to approximately 11.6%.

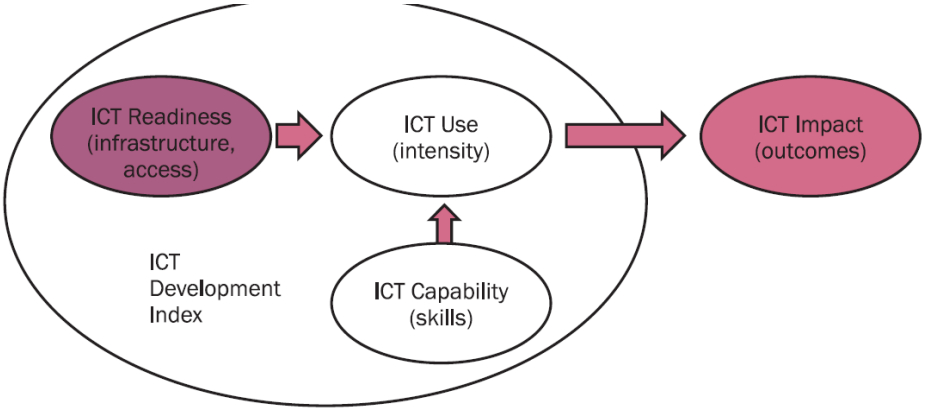
ICT Development Index

In 2007, the International Telecommunication Union (ITU) initiated the process of creating a single Index which can be utilised in measuring the development of the information society, the so called ICT Development Index (IDI). This single IDI Index serves as a benchmarking tool for measuring: the development of the ICT market in U N Member States; digital divide between the developed and developing countries; developmental potential of the ICT market.

This Index combines 11 indicators divided into three sub-groups: (1) ICT Readiness

(infrastructure and access); (2) ICT use (primarily by individuals, but also households and undertakings) and the intensity of use; (3) ICT Capability (skills necessary for the effective use of ICT).

Figure 7 ICT Development Index, IDI Structure



Source: RATEL

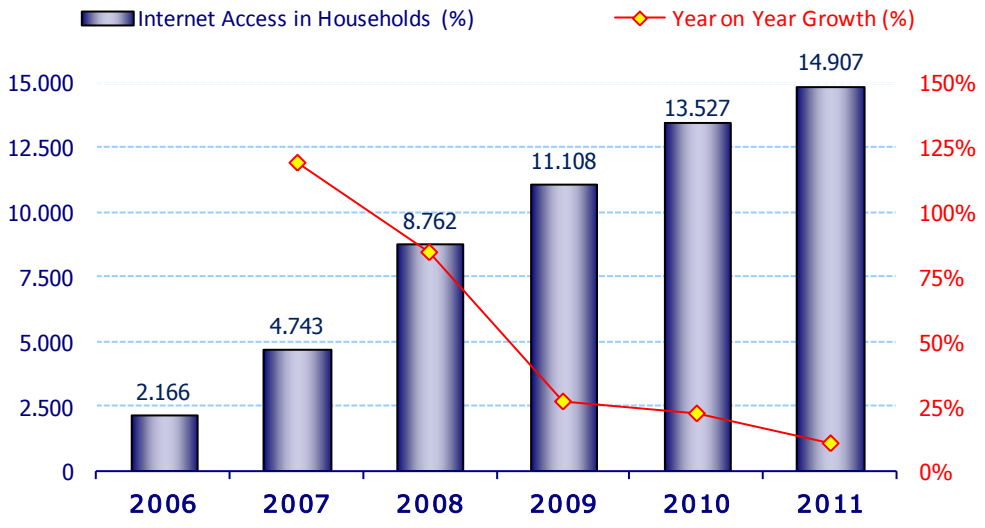
The value of IDI Index for the Republic of Serbia in 2011 amounts to 5.5 which is a significant growth compared with 4.2 in 2008, 4.8 in 2009, and 5.1 in 2010. Considering the previous ITU data, we may anticipate that, based on the IDI Index value, Serbia will secure a place among the first 50 countries on the list.

The fact that Serbian ICT access indicators have significantly higher values (0.68) than ICT use indicators (0.32) is quite apparent and serves as an illustration of the disparity between the existing telecommunications infrastructure capacity and the use of such capacity in terms of telecommunications services transmitted by such infrastructure in Serbia, as is the case with the use of broadband Internet services. ICT skills indicators (0.73) are of the appropriate value.

Serbian Internet Services Market in 2011

Total incomes earned from providing Internet services reached 14.9 billion RSD (around €146 million) in 2011, which is growth of 10% compared to 2010. Incomes were multiplied seven times in comparison with the year 2006 when this data was recorded for the first time. [See Terminology - no difference between income, revenue and turnover as used in this text]

Figure 8 Incomes Earned from Internet (in millions of RSD)



Source: RATEL [Republic Telecommunication Agency]

Internet Operators. A total of 232 Internet operators were registered in Serbia by December 2011, approximately 20% greater than it was in 2010.

Table 7 Total Number of Internet Operators in Serbia

Period	2006	2007	2008	2009	2010	2011
Number of operators	109	159	197	199	192	232

Source: RATEL [Republic Telecommunication Agency]

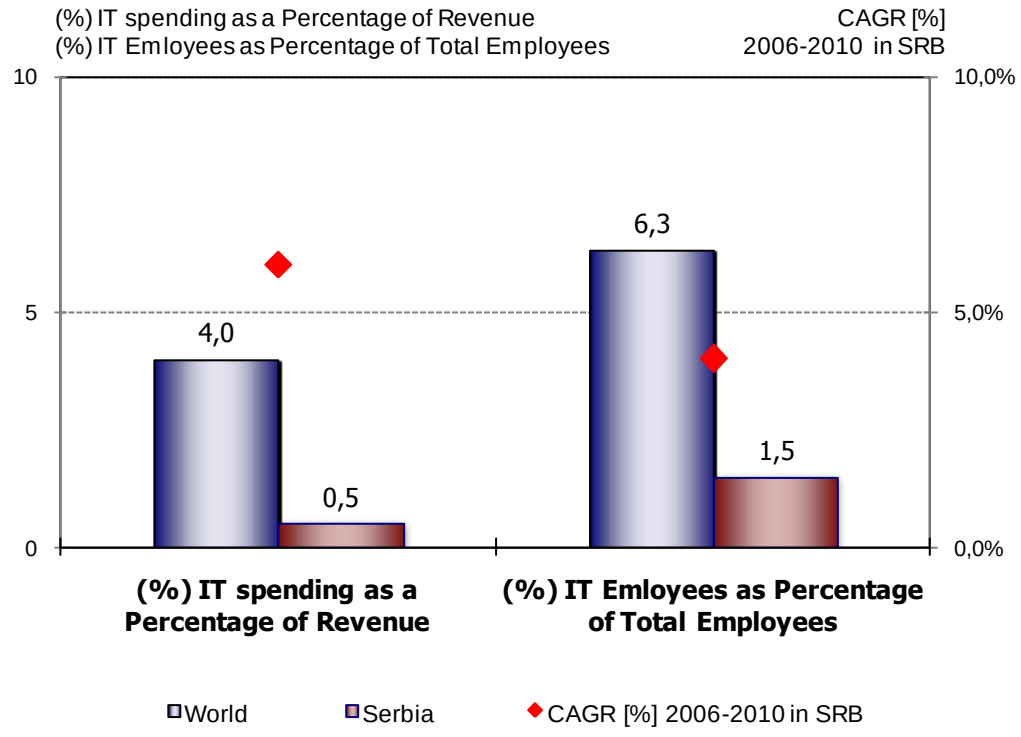
Internet Penetration: In 2011, the number of Internet connections per 100 citizens was approximately 53 and the number of broadband Internet connections per 100 citizens was approximately 51.

Broadband Internet Penetration: Unless 3G mobile network subscribers are taken into consideration, the penetration of fix broadband Internet access amounts to 13%, which is above the average in the SEE region (10.6%). However, the penetration of broadband Internet access in Serbia is significantly below the EU27 average (27%).

Taking into consideration all relevant parameters, the Serbian Internet market is projected for constant growth in the following few years. It is expected that number of broadband connections per 100 citizens will reach the present level in developed European countries by 2015.

2.1.3. IT Spending and Investments

Figure 9 IT Spending and Investments in Serbia



Source: Mineco 2010, Gartner – IT Spending and Stuffing Report 2008

- Serbian companies invest in IT round 0.5% of their revenue, which is significantly lower than the competitive international companies. Taking into consideration that revenues of Serbian

companies are low, the absolute amount of their IT spending looks even smaller.

- The situation is similar with IT employment. The diagram above shows that Serbian companies employ even 4 times less IT experts than their competition abroad.
- The growth rates of IT investments (6%), as well as the growth rate of IT employment (4%), are above the world average, so the detected gap could be overcome, but time will be needed.

It is a paradox that the backbone of the IT investments in Serbia comprises households, entrepreneurs and micro companies followed by the government and financial sector – when the *medium and large business sector* should lead! A huge potential for growth lies in the re-arangement of this order, although it will hardly be realised in 2012. The year of the elections favours spending and causes a slowdown of the investment in the short term, especially in the case of the coalition Government which has to stick to populist agenda.

Why Information Systems?

According to GDP, the IT investments in Serbia are below 1% GDP, while EU standards are 2-3% GDP. High unemployment and modest purchasing power make the Serbian long-awaited recovery more uncertain. While the companies, which are IT end-users, were ready to invest in technology before the economic crisis, nowadays they get into new information systems or similar infrastructure projects very carefully. Although there is a need for this type of investing, every ROI (Return on Investment) analysis, in conditions where companies work without profit, becomes a reason for cuts. Without serious profit, there will be no serious IT investments.

Due to the economic crisis IT, the purchasing power of Serbian companies drastically declined in 2009, though there were signs of a slight recovery in 2010. Doing business in Serbia has also been troubled by low payment of contractual obligations and depths, which keeps high demand for money. Besides, most companies have troubles with the cash flow and liquidity. The business sector is waiting for a 'miracle' to happen and recover the economy. Whenever that happens, the IT sector will surely continue with a two-digit annual growth.

However, it is certain that the recovery and transformation of the Serbian society are not possible without a transformation and huge development of information and communication technologies - in all segments/sectors.

Why Particularly IT Investments?

Investments are always important, especially in crises. Since the information technologies are at the base of every optimisation, a crisis is the right time for strategic investments. The main reasons are:

- IT infrastructure is the important condition for economy, society and government development;
- For taking part in global economy the IT industry requires significantly smaller resources than the other industries;
- IT industry is significantly cheaper but more profitable than other industries;
- ICT industry development prevents the "brain drain".

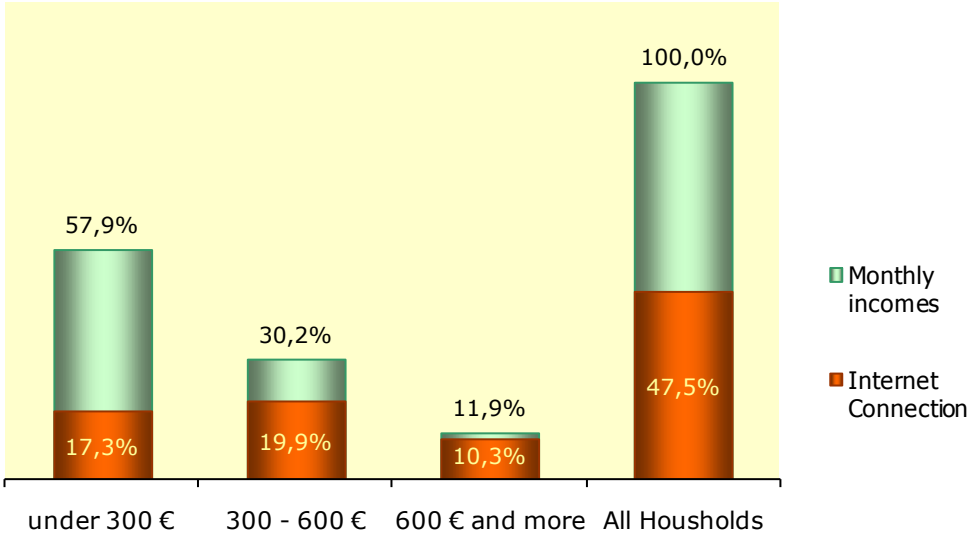
2.1.4. IT and Internet Usage

Since 2006, Statistical Office of the Republic of Serbia has published annual statistics on the usage of ICT in households and businesses. The report for 2012 showed that 98.2% of households had TV sets, 83.9% had mobile phones, 55.2% had personal computers and 21.4% had laptop computers. Owning ICT equipment is mostly concentrated amongst the urban population with a monthly income of more than €600 (89.8%).

The overall usage of computers in Serbia is still unsatisfactory, because 38.9% of the population has no access to computers. The number of users has increased by a solid 1.2% in 2012. Among different groups in the population, students are most active in using computers (99.5%), followed by employees (79.2%). In real figures, more than 2.5 million people in Serbia use computers every day.

In Serbia, 47.5% of households have access to the Internet, which is 6.3% more than in 2011. In Belgrade, 60.5% of households have the Internet, in Vojvodina 49.3% and in Central Serbia 40.6%. This digital divide (gap) is visible both economically and geographically.

Figure 10 Digital Divide. Households with Internet Connection, by Monthly Incomes Level



Source: Statistical Office of the Republic of Serbia

The Internet is mostly accessed by DSL (ADSL) connections (51.0%), followed by other Cable/LAN connections (31.0%) and WAP/GPRS (24.4%). In 2012, the Internet access through modem/dial-up connections has decreased to the present 1.4% as a direct result of recent investments in broadband infrastructure.

In Serbia, 2.1 million people use the Internet on a daily basis. Most of them use the Internet at home (86.4%). The survey estimates that more than 840.000 people use e-Government services in Serbia, which is an increase of 160.000, compared with the 2011data.

The use of ICT within companies is more widely spread than in households, with 98.7% of companies using computers in doing business. All large and medium-sized companies (100%) possess computers, while the percentage is a bit smaller within micro- and small-sized enterprises (98.0%). Among companies that use computers, 79.7% have Wire-based LAN, 57.3% Intranet, 46.9% Wireless LAN and 13.7% Extranet (RZS 2010).

The majority of companies (97.7%) in Serbia have access to the Internet, using mostly DSL (xDSL, ADSL) connection (77.2%). The majority of companies that have an Internet connection use e-Government services (87.4%). 73.8% of companies that have an Internet connection have

their own company website.

The survey has also showed rather poor results in e-Commerce. Only 40.1% of companies that have the Internet were engaged in purchasing goods/services online, and 20.7% of companies were approached via the Internet to deliver goods/services (0.1% more than in 2010).

Only 11.8% of Serbian companies use Enterprise Resource Planning (ERP), most of which are large companies (45.4%) then medium-sized companies (16.6%) and finally, small companies (8.5%). Use of Customer Relationship Management (CRM) systems is even weaker, only 9.4%.

The survey showed the usage of IT in Serbia is still in a developing phase. High penetration of the IT into Serbian households and companies was slowed down in the last two years, mostly due to the economic crisis. However, the main question is how much the ICT sector would be able to grow in the years of, and directly following, the recession. The Statistical Office data showed a great market potential in providing services in introducing IT solutions such as ERP and CRM. Website development also has market potential. Demand for delivery of hardware solutions continues to remain high.

In one of the analysis (SITO-2012, the scope and structure of the Serbian IT market) the necessity of the IT sector growth rate of 14% per year, for the 5-year period (2011-2015), was strongly suggested, otherwise, the Serbian economy is expected to fall into a deeper crisis. Concerning this problem, the role of the Government is very important. Last year the Serbian Government adopted a bylaw that subsidizes loans for purchasing locally produced hardware and software, in order to support the ICT sector. However, the realisation of this action has not begun so far.

Potential - IT Usage

One of the core potentials for Serbian IT companies remains to be the local market. The Serbian economy is still under transition, with outdated production lines that should be replaced with new technologies. IT solutions are also necessary for increasing efficiency in management. For instance, only 73.8% of Serbian companies with Internet connection have their own company website and only 11.8% of companies use Enterprise Resource Planning (ERP), they are mostly large companies (45.4%). Use of Customer Relationship Management (CRM) systems among Serbian companies is even weaker, only 8.5%. These figures clearly indicate low penetration of IT into Serbian companies.

IT companies in Serbia should invest more time in obtaining specific knowledge about the economy in Serbia, and with that to position themselves for future opportunities. Furthermore, IT companies should help the technologically outdated Serbian industry with solutions that might increase productivity, innovation and competitiveness on the international and domestic market.

2.1.5. IT Industry

For the needs of this report The 2007 OECD ICT sector definition (ISIC Rev. 4) is used.

Table 8 OECD ICT Sector Definition

ICT manufacturing industries	IT	IT industry Sector
2610 Manufacture of electronic components and boards	C	
2620 Manufacture of computers and peripheral equipment	Y	PC Hardware
2630 Manufacture of communication equipment	C	
2640 Manufacture of consumer electronics	C	
2680 Manufacture of magnetic and optical media	C	
ICT manufacturing industries		
4651 Wholesale of computers, computer peripheral equipment and software	Y	IT Channels - Wholesale and retail
4652 Wholesale of electronic and telecommunications equipment and parts	C	
5820 Software publishing	Y	Software
61 Telecommunications	C	
62 Computer programming, consultancy and related activities	Y	IT services Software
631 Data processing, hosting and related activities; Web portals	C	
951 Repair of computers and communication equipment	Y	IT services

Legend: Y – IT Industry C - IT Converged industry

The IT industry in this study form only those companies whose real activity is within the above presented NACE classes. This is not an easy thing to do in Serbia and the presented analysis is an excerpt from the study “Serbian IT Industry 2010”, which treats this issue in detail.

In order to have the precise insight of the Serbian IT industry structure, in “Serbian IT Industry 2011”, the IT companies have been grouped into four clearly defined categories, at the same time relying on new NACE classes. Those categories are: (1) IT Channels - Wholesale and retail; (2) IT services; (3) Software and (4) PC Hardware. All those companies which did not have a clear product portfolio and belong to micro companies have been placed in the category “Other - unclassified”. This report also includes companies dealing with information technologies but coming from the converging industries: telecommunication, office equipment and consumer/home electronic. These companies are in the category “Converged industry”.

The characteristics of the IT industry in this report are based on non-consolidated publicly available data of IT companies, taken from their financial reports for 2010. The data are obtained from the SBRA (Serbian Business Registers Agency) – Register of Financial Statements and Solvency, on Mineco’s demand. The following is the presentation of the Serbian IT industry through the number of IT companies, their size, structure and number of employees. The terms: revenue, added value and net asset in the Serbian IT sector are used for the whole IT sector where all active IT companies revenues, added values and net assets are summarised, respectively [see Terminology].

A total of 1,704 active enterprises, which created revenues higher than 1 million RSD, comprised the Serbian IT industry in 2011. A total number of employees is 14,876 and represents 10% of total workforce in Serbia. The average number of employees is 8.7 and the average revenue and added value - per employee, were €80,034 and €26,598, respectively.

Number of IT Companies in Serbia

Total number of 1,704 active enterprises, selected on the basis of generated revenue of more than 1 million RSD (€10.000) each, formed the Serbian IT industry in 2011. The number of IT companies increased by 5.6% in comparison to 2010.

With respect to company activity, Software sub-sector is dominating with 554 enterprises, which is 32% of the total IT industry enterprise number. According to a company size, SME segment with 283 enterprises represents 16.6% of all the IT enterprises. More than 1/3 of enterprise number from this segment is active in Software sub-sector (103 of 283). Investments and support to SME segment are observed as decisive factor for the IT industry fast develop. Enterprise distribution according to their size and IT sub-sector is presented in the table below.

Table 9 Number of IT companies in Serbia, 2011 according to the IT Sub-sector and Company size

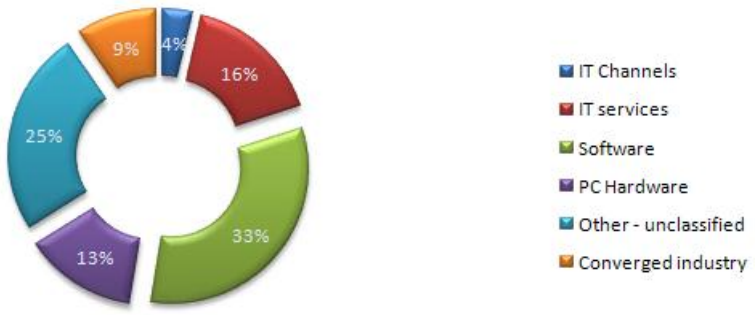
IT industry sub-sector	Micro enterprises	Small enterprises	Medium enterprises	Big enterprises	Total
IT Channels - Wholesale and retail	25	24	11	1	61
IT services	208	60	10	2	280
Software	450	85	18	1	554
PC Hardware	200	29			229
Other – unclassified	411	8			419
Converged industry	123	37	1		161
Total	1,417	243	40	4	1,704
Total [%]	83.2%	14.3%	2.3%	0.2%	100.0%

Source: Register of Financial Statement and Solvency, SBRA, prepared on Mineco's demand

Key comments for the table above:

- In the Serbian IT industry there are only four big IT enterprises (with more than 250 employees). Three of them have international owners and their corporative standards are defined. A total number of SME enterprises is 283, which is 16.6% of the total enterprise number in the IT sector. This number is considered to be an unfavourable indicator – the number of SME should be significantly higher.
- A huge number of micro companies (1,417), which have low financial capacities, insufficient technological and managing skills, visibly characterises the Serbian IT industry. This situation is further exacerbated due to the significant number of IT enterprises in categories "Others – unclassified" and "Converged industry" which together have 580 enterprises, 534 of which are micro enterprises.

Figure 11 Structure of IT Companies in Serbia, 2011



Source: Register of Financial Statement and Solvency, SBRA, prepared on Mineco's demand

Workforce in the Serbian IT Industry

The Serbian IT industry employed 14,876 workers in 2011. In comparison to 1.45 million, which is the amount of the total workforce (without entrepreneurs), this is a modest number. However, it is estimated that this number is a smaller part of a much bigger ICT work corpus of nearly 50.000 ICT specialists. The estimation is that, beside the IT industry, nearly 35,000 ICT specialists work in telecommunication sector, in end-user companies (companies which are IT users) and entrepreneur ICT sector. In comparison to 2007 (the year before crisis), all IT sub-sectors have increased the number of employees, which confirms a developing character of the sector.

Table 10 Workforce in IT industry in Serbia, according to the IT Sub-sector and Company Size

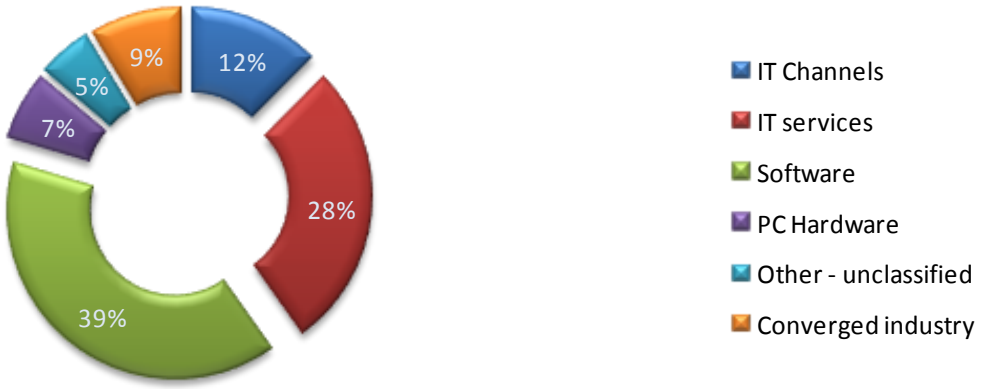
IT industry sub-sector	Micro enterprises	Small enterprises	Medium enterprises	Big enterprises	Total IT industry
IT Channels - Wholesale and retail	167	536	876	278	1.857
IT services	1,111	1,232	1,004	767	4,114
Software	2,571	1,491	1417	392	5,871
PC Hardware	678	306			984
Other – unclassified	741	16			757
Converged industry	621	597	75		1.293
Total	**5,889**	**4,178**	**3,372**	**1,437**	**14,876**
Total [%]	39.6%	28.1%	22.7%	9.7%	100.0%

Source: Register of Financial Statement and Solvency, SBRA, prepared on Mineco's demand

Key comments for the table above:

- The employment in the Software sub-sector increased significantly above the average in 2011 and reached 5,871 employees, which is 39.5% of total the IT sector workforce. Following is the IT Services sub-sector with 27.7% share in the total IT sector workforce.
- The largest number of employees (39.6%) has the sub-sector of microenterprises, followed by the small (28.1%) and medium enterprises (22.7%). The least employees can be found in the big enterprise sub-sector (9.7%). However, it is expected that this distribution is to be changed, due to the IT industry consolidation and growing importance of big and medium enterprises.
- SME segment in Software sub-sector records significant number of employees (2,908), while more than 38.5% employees from this segment work in the IT Service sub-sector. The average number of employees in SME segment is 26.7, which is almost 3 times bigger than the IT industry average (8.6).

Figure 12 Share of IT Industry Sub-sector (%) in Total Number of Employees in ICT Industry



Source: Register of Financial Statement and Solvency, SBRA, prepared on Mineco's demand

Revenue in the Serbian IT Industry

Revenue (or turnover) of the IT industry represents the revenue of the whole IT sector - all IT companies revenues summarised. Compared to the value of the IT market, the IT industry revenue is typically twice as big, due to selling multiplications in the distribution channel, export and non-IT revenues of companies' businesses.

The Serbian IT Industry generated total revenue of more than €1.3 billion in 2011. Based on previous researches, it is estimated that the revenue from the IT goods and services makes roughly 75% of the IT industry revenue (nearly €1.0 billion), while the remaining 25% came from converging and non-ICT products.

Table 11 Revenue in Serbian IT Industry [€ million], according to the Sub-sector and Company Size

IT industry sub-sector	Micro enterprises	Small enterprises	Medium enterprises	Big enterprises	Total IT industry
IT Channels - Wholesale and retail	40.1	106.5	331.5	34.4	512.6
IT services	122.6	106.1	84.2	81.8	394.7
Software	90.9	48.2	52.1	9.3	200.5
PC Hardware	46.7	19.4			66.2
Other – unclassified	27.9	0.8			28.7
Converged industry	39.6	54.8	6.4		100.8
Total	**367.9**	**335.8**	**474.2**	**125.6**	**1.303.5**
Total [%]	28.2%	25.8%	36.4%	9.6%	100.0%

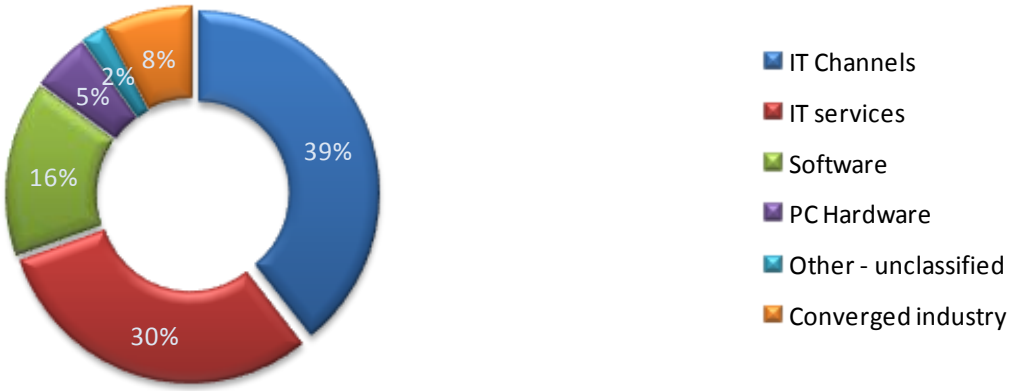
Source: Register of Financial Statement and Solvency, SBRA, prepared on Mineco's demand

Key comments for the table above:

- In comparison with the 2010, the total Serbian IT industry revenue in 2011 raised by 15%, which is 10% higher than the whole IT market growth. The reason lies in the growing non-IT revenue (cell phones, consumer electronics…)
- The highest revenue, 39% of the IT industry sector revenue, was accomplished in the Wholesale and Retail sub-sector (€512.6 million). What follows is the IT Service sub-sector with €394.7 million (30%).
- With revenue of almost €800 million, SME segment gathered 62.2% share in the total IT industry revenue. In the same segment, the biggest part also came from the wholesale and retail sub-

sector – more than a half of the total SME segment revenue.

Figure 13 Structure of IT Industry Sub-Sector (%) in Revenues



Source: Register of Financial Statement and Solvency, SBRA, prepared on Mineco's demand

Net Assets of the Serbian IT Industry

Despite the economic crisis, net assets of the Serbian IT industry continued to grow in 2011 and achieved around €318 million. Compared to year 2006, where the IT industry net assets were around €150 million, the impressive growth of more than 100% was accomplished. This trend is the "*spiritus movens*" for the private sector, which is dominating in the IT industry. The high return rates on net assets will certainly attract foreign investors willing to take the risk and seize the opportunity for a good profit. It is certain that IT sub-sectors: IT services and Software are seen to have solid perspective.

Table 12 Net Assets of Serbian IT Industry [€ million], 2011.

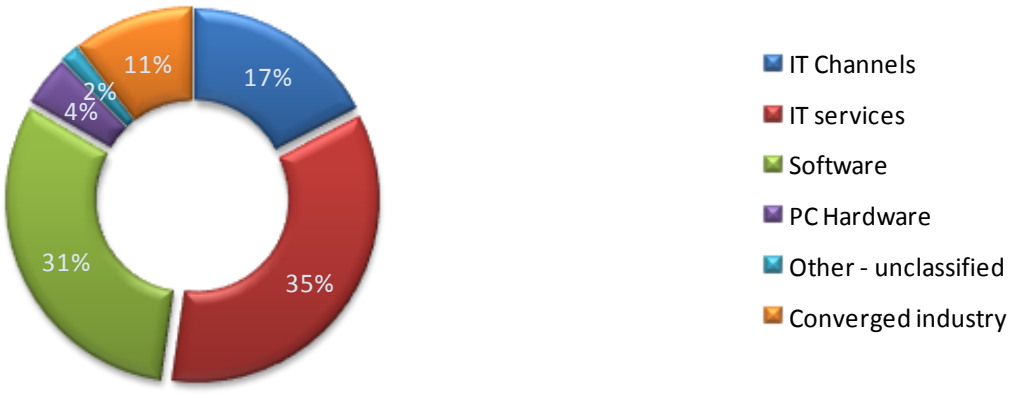
IT industry Sub-Sector	Micro enterprises	Small enterprises	Medium enterprises	Big enterprises	Total IT industry
IT Channels - Wholesale and retail	6.1	16.5	32.4	0.5	55.4
IT services	26.8	38.0	18.2	27.8	110.9
Software	40.7	20.3	20.1	18.0	99.0
PC Hardware	8.5	5.5			14.0
Other – unclassified	4.6	0.7			5.4
Converged industry	11.0	21.1	1.4		33.5
Total	**97.7**	**102.1**	**72.1**	**46.3**	**318.2**
Total [%]	30.7%	32.1%	22.6%	14.6%	100.0%

Source: Register of Financial Statement and Solvency, SBRA, prepared on Mineco's demand

Key comments for the table above:

- The biggest net assets, over €110 million, which is almost 35% of the total IT industry net assets, are in possession of companies in the IT service sub-sector
- With €174 million, the SME share in the IT industry net assets in 2011 was 55%.

Figure 14 Structure of IT Industry Sub-sector (%) in Net Assets



Source: Register of Financial Statement and Solvency, SBRA, prepared on Mineco's demand

In their study on the Belgrade Service Sector, FREN claimed that the productivity of ICT companies was 68% higher than any other business sector in Serbia and more than three times higher than the Serbian average (FREN 2007). They also found that ICT companies have the highest average gross salaries.

The market competition is tough, very often non-transparent, with unclear rules of the game. It is very difficult for small IT companies to compete on the local market. Public procurement procedures are set up in such a way to favour international and large local companies with strong references and significant lobbying capacities. Small and medium-sized companies have difficulties in obtaining good references thus their chances to get a job are slim. In order to win a contract, local companies create consortia and joint applications for tenders, which are quite recent phenomena; a few years ago, such cooperation between local companies would have been impossible to imagine.

When it comes to **geographic distribution** of ICT companies in Serbia most companies are located in Belgrade, Niš and Novi Sad. Vast majority of other municipalities have an insignificant concentration of ICT companies.

Science and Technology Park Zvezdara

The location is the Belgrade Forest Park of Zvezdara, situated in the southeast part of the city. The area designated for the park covers an area of 21 hectares. Phase I covers the southern area of 7 hectares. Gross building area: 16.000 square meters.

Science and Technology Park Zvezdara is designed to support small incubator companies involved in the development of ideas and their technological application. The park will offer shared services - financial, legal, building maintenance, as well as meeting rooms, reception and other common rooms. A small book of regulation of the Scientific and Technology Park will be developed along with the construction works.

IT Park Indjija

The building of the "IT Park" in Indjija has started in July of 2011. In the first phase, 25,000 m2 of office space, which will hire 2,500 workers is planned. This investment, worth €50 million is planned to be finished by the middle of 2013.

Project for building the "IT Park" in Indjija, worth 600 million USD, was announced in September 2007, but was stopped due to the world economic crisis. The investor, Indian company "Embassy Group", announced building 250,000 m2 of office space during the period

of five years, until 2013, making that space the Europe's largest. The Park should provide housing to IT services and technology providers employing up to 25,000 individuals (though not exclusively IT experts).

Other Science and Technology Parks

Scientific and Technological Park of the University of Novi Sad, Phase I (2,150m2) is scheduled to be completed before the end of 2013. The Technology Park will be an internationally recognised centre for dynamic regional development and promotion of innovative technology projects and companies. The laboratory of Department of Civil Engineering and Geodesy, Faculty of Technical Sciences (FTN) will be moved into the first building.

Project of **Scientific and Technological Park of Niš** was presented at the University of Niš (May 16th, 2012). According to the project, prepared by the Faculty of Civil Engineering, the Science and Technology Park will occupy an area of 11,000 square meters. Next steps include obtaining building permits and preparation of tender documents.

Potentials - Standardisation of Serbian IT companies

From the perspective of the year 2010, so far there has not been any significant interest for certification or standardisation as stated by many actors in the stakeholder interviews. The Serbian software industry therefore has been engaged in obtaining CMMI certifications yet only on a very limited scale. Over the last few years, GTZ/WBF has been engaged in providing support to Serbian companies in introducing the necessary standards. More recently, EBRD's Business Advisory Services (BAS) Programme47 in Serbia and SIEPA have been active in providing financial support to Serbian SME introducing the necessary standards.

Looking at the standardisation issue from an outsourcing perspective, we can say that quality management and standards/methodologies like CMMI, ISO 9001, ISO 27001, Six Sigma, ITIL etc. are becoming more and more important, as foreign partners´ and clients´ demand is likely to increase (as elaborated earlier – keywords: progressing "industrialisation" of IT services and "standardisation of technologies and processes"). The Serbian ICT clusters recognised this need by including trainings on quality and standardisation matters in their activity portfolio for the coming years.

The question of establishing an independent organisation (agency, laboratory etc.) for the certification of the Serbian origin of an IT product was therefore suggested as one possible topic in this context. This could be accomplished through a sector specific agency with a web-based platform where companies can register, login and upload source-code in order to receive 'Serbian SW' certification.

Summing up the anticipated increased demand coming from outsourcing clients and the cited example for an organisation evaluating software are just highlighting the assumed growing demand for quality infrastructure institutions, mechanisms and processes in the coming years.

2.1.6. ICT Clusters and Support Organisations

Serbian IT companies have managed to create a strong presence on foreign markets by marketing its own solutions, but also by being able to provide the highest quality outsourcing services and partnering with IT companies worldwide. Thus, Serbia has emerged as a very interesting alternative location for the development of sophisticated software. Setting up clusters helped companies to accelerate networking and reap benefits of joint activities. The emergence of these clusters as general points of reference for Serbian ICT provides institutional support to performances of the Serbian IT industry and makes these companies visible internationally in a more structured way than it was the case in the previous years.

Vojvodina ICT Cluster – VOICT

Field research has confirmed that ICT companies from Novi Sad have a much stronger networking and cooperation potential compared with companies from Belgrade. Their relations with the university and provincial government are more substantial and dynamic than in Belgrade. As a result of this cooperation, both private and public actors (including the university) from Novi Sad in a bottom-up initiative have founded the Vojvodina ICT Cluster, established as a business association. It is a fast growing organisation, the strongest in its field in Serbia.

VOICT is the single point of contact with the best ICT companies in Serbia. Most of the business is tied to foreign markets – over 90% of it – in EU, North America and Middle East. The companies from our cluster exhibited strong growth in recent years, even during the global recession. Serbian companies in general made a noticeable breakthrough on world markets, putting Serbia on the map as a very interesting location for the development of sophisticated software. Vojvodina ICT Cluster gives institutional support to this trend, mobilizing players from triple helix business–education–government.

Strategic objective of Vojvodina ICT Cluster is to increase visibility of the Serbian ICT and put Novi Sad on the regional and European map as the hotbed for ICT in this part of the world.

Activities toward this objective include further strengthening of the association, its positioning as a relevant Serbian ICT institution within the country and abroad, building a strong network of international contacts, creating new business opportunities for the members, compiling and delivering sets of services to members and third parties, lobbying for the improvement of the business environment in Serbia, and popularisation of ICT both in terms of generating more ICT professionals and enabling more penetration of these technologies throughout other sectors of Serbian economy.

ICT Network Serbia Cluster – ICT Net

ICT Network Serbia is an association of companies, individuals, academic and research institutions devoted to the development of ICT sector in Serbia. It was established in 2010 upon a merger of two former cluster initiatives, Serbian Software Cluster and Embedded.rs. As a unique information hub, ICT Network Serbia today provides its members with access to relevant and up-to-date information from ICT industry, thus enabling them to boost their competitiveness and grow. As an open organisation, it offers its members equality of opportunities and a transparent framework for efficient fulfilment of their interests. One of Cluster's main objectives is to encourage its members to suggest their own initiatives or projects which can be realised either through the Cluster's extensive network of strategic partnerships or in cooperation with other member companies. It provides its members with a variety of opportunities helping them to build greater visibility while keeping their business operations cost and time effective. Currently, the Cluster is focused on obtaining easier access to public and EU funds for its members, giving them possibility of internationalisation of business operations and actively supporting their innovative and enterprising initiatives and projects.

Niš Cluster of Advanced Technologies - Ni CAT

The Ni CAT is a cluster initiative that comprises 25 local companies, two scientific research institutions (Faculty of Electronic Engineering and Faculty of Mechanical Engineering-University of Niš) and three economic development support institutions (Regional Development Agency RRA JUG, Regional Chamber of Commerce and Business Incubator Nis). The Cluster represents companies from five different industries which are electro medicine, electronics and

automation, electronics and mechanical engineering, ICT and optoelectronics.

The Nis Cluster of Advanced Technologies was formally registered in March 2011 and started its full operational work in October 2011. Its members employ about 400 people and reached a combined annual turnover of 11 million Euros in 2010.

The Cluster's goals are to increase the turnover of the cluster members both on national and international markets; strengthen the capacities of the companies for technological development and innovations and to develop new technological products and services. Furthermore, the promotion of the City of Niš as a favourable location for business operations in the advanced technology field is also a strategic focus. In a relatively short period of time The Niš Cluster of Advanced Technologies realised significant number of things and has established partnerships with important national and international institutions.

South-Eastern Europe ICT - SEE ICT

SEE ICT is a non-profit organisation established 2010 in Belgrade with the aim of contributing to the development of the information society in Serbia, believing that new technologies can improve all aspects of social life – the economy, education, culture and health.

SEE ICT strategic objective is to create and develop a vibrant, encouraging environment for the growth of ICT start-ups and to build a start-up community, by providing relevant knowledge, skills and networking opportunities through conferences, trainings and websites about various IT related topics to interested teams and individuals and by doing so empowering them to become successful entrepreneurs.

The conferences and events organised by SEE ICT include How to Web Belgrade, Mobile Monday Serbia, hackathons, startup conferences and workshops. Websites published by SEE ICT are startit.rs on technology and entrepreneurship, designed to support young people in Serbia to create successful start-ups, and itdogadjaji.com, a site that provides relevant and up-to-date information about ICT conferences and events in Serbia and region.

In 2012, SEE ICT established the first start-up school in Serbia, the ICT startup Academy. The academy addresses the lack of entrepreneurial education and spirit among youth; high youth unemployment and lack of knowledge about key enabling technologies among the students of technology faculties. It provides an innovative education curriculum and program which is targeted at students of technical and business faculties, young IT professionals motivated to start their businesses.

In 2013, SEE ICT activities were related to events, conferences, and sites together with the academy will be integrated in the *Startit Hub*, the first Serbian innovation centre for the development of entrepreneurship and new technologies. The Hub aims at providing networking, education, information and motivation for young people with entrepreneurial potential in a creative, co-working space with attached legal, financial and administration support.

Serbian Investment and Export Promotion Agency – SIEPA

SIEPA is the governmental agency established in 2001 with the mission of assisting foreign investors and buyers to successfully establish their businesses in Serbia, as well as supporting the export of Serbian industries and services abroad.

SIEPA recognises ICT and electronics as key industries in Serbia and actively promotes investment and export opportunities in these fields. In that regard, SIEPA is very active in helping Serbian companies by promoting them at the most important ICT fairs, such as CeBIT and Embedded World. SIEPA is also active in organising B2B and B2C events, as well as in

providing financial support for the certification process of companies in Serbia.

Serbian Chamber of Commerce

The Chamber of Commerce and Industry of Serbia also serves as a good role model in mobilizing and networking ICT sector companies and professionals. The Chamber's Association of Information Technologies and its three groups: for hardware, software and e-commerce, gather all Serbian IT companies. Chamber has good communication lines and potential for policy advocacy, recognised by ICT companies. In cooperation with line ministries, SIEPA, clusters and business and professional organisations, the Chamber is active in organizing conferences, forums, international and domestic fairs, vocational training and other events that serve the purpose of development in the ICT sector. The Chamber is also active in organizing Business-to-Business (B2B) events, networking Serbian ICT companies with their peers from the Western Balkans region and other countries.

Joint Cluster Initiatives

In 2012 the three Serbian ICT cluster ICT Net, Ni CAT and VOICT concluded their strategic partnership. This partnership rapidly turned into a platform for the development of joint activities and coordinated efforts which include the *"ICT in Serbia – at a Glance"* publication and a number of joint events and conferences. This strategic alliance also forms the basis for advocacy initiatives on industry-specific issues on a broad range of issues like education and the improvement of business environment.

One of these joint activities is the *Serbian-German IT Business Dialogue* which was initiated in mid-2012 with the help of the Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH. The IT Business Dialogue provides an open framework which brings together major Serbian and German private and public sector stakeholders from the ICT industry such as clusters, associations, investment and export agencies, relevant ministries, chambers of commerce, NGOs, R&D etc. The objectives of this framework include the initiation of Serbian-German business relations by increasing market knowledge in both counties, provision of business opportunities, stakeholder coordination and cooperation, organisation of joint B2B events and development of joint (EU) projects.

In the first months after its initiation the IT Business Dialogue already generated not just a higher level of coordination among stakeholders but resulted in concrete events and concepts. Examples are Serbian delegation visits to major counterparts in Germany introducing the Serbian ICT market and the development of concepts for a Serbia IT brand, best practice brochures and mappings of Serbian IT companies and their respective potentials. The implementation of specialised B2B and matchmaking events directed at German companies interested in joint projects with Serbian companies remain a high priority on the dialogue´s agenda.

2.2. EDUCATION AND HUMAN RESOURCE DEVELOPMENT

This chapter provides the following information:

- An overview of ICT labour market in Serbia
- ICT and higher education in Serbia
- Cooperation between Universities and the Private Sector

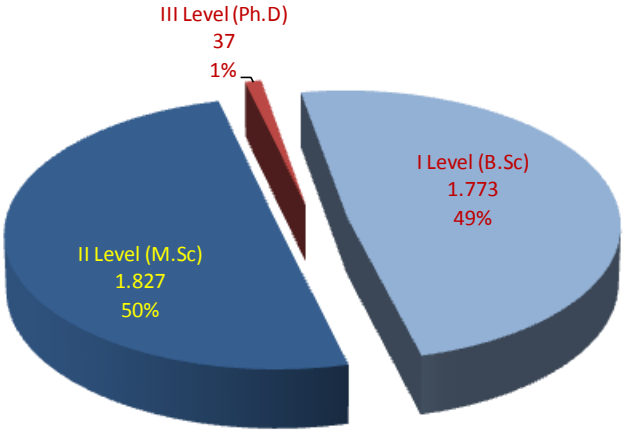
- ICT and vocational trainings
- Available skills and skills gaps

2.2.1. Overview of the ICT Labour Market

A total number of graduates in the technical areas relevant to ICT is 26.963 in 2005 (note that the number of graduates reflects technical studies in general).

The number of students associated with technical skills has been further growing in the few past years. In 2011, 3,637 ICT experts have graduated, from which 1,773 on the first level degree (B.Sc), 1,827 on the second level (M.Sc) and 37 on the third level degree (Ph.D). There is a certain amount of students who graduated in 2010, who had enrolled their studies before the Bologna reforms of the Serbian High Education. In addition, the quotes for new ICT related enrolees are rising from year to year.

Figure 15 Number of Students (vocational and academic) with ICT Titles, in 2011



Source: Mineco 2012

According to the Skills Gaps Study which undertaken by USAID in 2008, technical skills on the Serbian ICT labour market are strong and stable (software development, hardware design, IT services and system integration). The same study shows that in the surveyed IT companies, 63% employees are industry specific, while the remaining 37% are in managerial and administrative positions. Around 21% employees are in general management positions, or work as project managers and sales.

Figure 16 ICT, % of Employees in all Reported Accusations (sample 1122 employees)

Source: USAID

The study also acknowledged that the number of marketing and sales managers is very low (only 1 %, according to USAID), although these positions are recognised by experts and local companies as very important for future development and growth.

2.2.2. ICT and Higher Education

The tradition of training personnel in electrical engineering in Serbia is over one century long. The need for staff qualified in informatics was recognised in the 1980's within the Faculties of Electrical Engineering, Mathematics and Organisational Sciences, in Belgrade; Electronic Faculty in Niš; Faculty of Technical Science and Faculty for Natural and Mathematical Sciences in Novi Sad. With around 800 graduated IT experts annually, the Faculties mentioned above, make the backbone of the Serbian high education (Tertiary-type A) in the IT area, as well as the base for

research and development in this area. There is almost the same number of IT experts who have graduated from other departments, with skills related to informatics. Tertiary-type A education is of strategic importance for ICT industry developing capacities.

ICT education is taught at 35 High Education institutions 16 of which are state-owned, 6 are privately owned and 13 are state-owned Vocational Higher Schools. In addition, there are 18 cities with ICT high education institutions, which helps recruiting a wide base of ICT students for two studying programs (Tertiary-type A and type B) and six studying sub-programs.

The Serbian ICT sector absorbs a vast majority of ICT graduates. This was not always the case as for years Serbia had been challenged with a massive "brain drain" of ICT graduates and professionals. Considering today's growing demand for ICT products and services, which is a general trend not only in Serbia but throughout Europe, Serbian educational institutions face the challenge of attracting even more students and supplying more experts to the market.

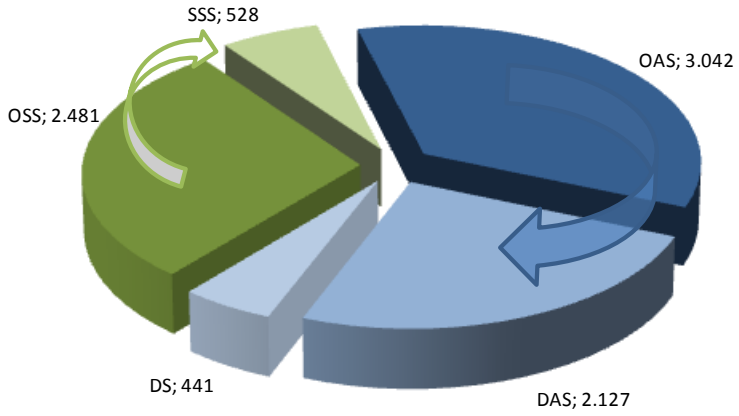
Table 13 Tertiary-type A and type B Education Programmes in Serbia

	Serbian notation	*Type*	*Level*	*Studying programmes - translation*	**Title**
OSS	Osnovne strukovne studije	B	I	Basic Vocational studies	B.Sc.
SSS	Specijalističke strukovne studije	B	II	Specialist Vocational studies	S.Sc
OAS	Osnovne akademske studije	A	I	Bachelor Academic studies	B.Sc
DAS	Diplomske akademske studije	A	II	Graduate Academic studies - Masters	M.Sc
SAS	Specijalističke akademske studije	A	II	Specialist Academic studies	S.Sc
DS	Doktorske studije	A	III	PhD studies	Ph.D.

Capacity of new ICT Enrolees according to Studying Programs

Total number of new ICT enrolees in school year 2011/2012 was 5,523, of which 3,042 students begun their ICT education with tertiary type A studying program (OAS) and the remaining 2,481 with tertiary type B (OSS).

Figure 17 Capacity of New Enrolees according to ICT Studying Programs, in 2012/2013



Source: Mineco 2012

Key messages on the table and figure above:

- The OAS (dark blue) is presenting the first-level degree of tertiary-type A education (B.Sc.) and many students (2,127 candidates or 70%) continue with further studies towards DAS and the second level degree (M.Sc), thus securing HR for ICT development
- For the most successful in tertiary type A education, the studies are completed with DS (Doctoral

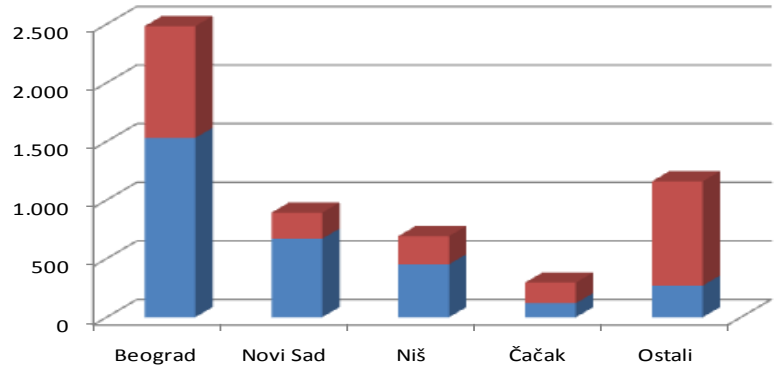
studies) and third level degree (Ph.D.), for which purpose 441 places are provided.

- The education that begins with the OSS (dark green) kept mostly B.Sc. ICT experts (2,481 candidates) of which only 528 candidates (21%) continued the (SSS) specialist studies, which shows the practical character of these studies.

Number of new ICT enrolees according to cities – geographical availability

In Serbia, there are 18 cities where ICT studies are held, which provides very good geographical availability. Education of personnel near industrial centres is Serbian historical (traditional) heritage and that happens to be a good practice. Unfortunately, in the past two decades, industry was almost completely suppressed, but these preserved education capacities give the hope that faster economic recovery is possible.

Figure 18 Number of New ICT Enrolees according to Cities, in 2012/2013

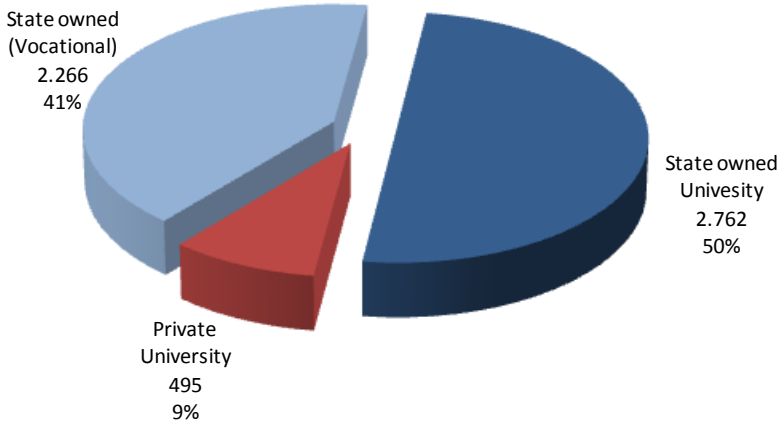


Number of New ICT Enrolees according to the Faculties' Founders

ICT program is held on 35 High Education institutions; 16 among them are state-owned, 6 are privately owned and 13 are state-owned (Vocational) High Schools.

Low number of students opt for private faculties, only 495 (9%). This is because tradition and studying expenses are on the side of the state-owned faculties. More than 80% ICT studies held on the state-owned faculties are covered from the budget.

Figure 19 Number of New ICT Enrolees according to Faculties' Founders, in 2012/2013



Source: Mineco 2012

Number of ICT Enrolees and Enrolment capacity – Estimations and Trends

More than 10% of the Serbian total of newly enrolled students in 2012 was ICT enrolees (5,523), which points to a noticeable interest of Serbian young people in studies related to informatics. The overall enrolment capacity of around 8,619 is still bigger, because all studying programs are split into three level degrees. After the first level degree (B.Sc. academic title), a student can continue studies towards second (M.Sc.) and third level degrees (Ph.D). Therefore, one student can achieve several academic titles during his studies. Consequently, the number of future ICT experts is limited to the number of new ICT students, but not the number of academic titles achieved in that year (which we call here "overall enrolment capacity").

Therefore, consolidated data show the structure in which mostly the first level degree graduates are expected (2,868 or 52.0%); following this are the second level degree graduates (2.,214 or 40.0%) and finally, as expected, the lowest number of third level degree (441 or 8.0%).

Realistic estimation is that Serbia can count on around 2,500 ICT experts from 3,637 ICT experts graduated in 2010, as the remaining number of them continued their studies towards the second and third level degrees.

The reform of the High education sector (after the Bologna reform) and raising the number of ICT-profiled experts are yet to show their positive results in years to come. It seems reasonable to expect that Serbia will have more than 3500 new ICT experts on an annual basis.

The present analysis covers only technical and technological professions and does not include around 800 IT graduated students from economical science and around 500 from mathematical. Additionally, the corpus of machine engineers of almost 1,500 graduated per year is interesting from the aspect of HR with ICT skills.

Cooperation between Universities and the Private Sector

Although cooperation between universities and the private sector in Serbia is still underdeveloped, successful cooperation between companies and universities has been reported by the Faculty of Technical Sciences at the Novi Sad University and at the group of faculties of technical sciences of the University of Belgrade. This trend continues with signing of the Strategic Cooperation Agreement between the University Novi Sad and the Vojvodina ICT Cluster in December 2012, promising a more intensive cooperation.

ICT and Vocational Trainings

According to the results of the Regional Capability Survey presented in the OECD report, only 13.3% of enterprises provided training to their IT experts, and 10.1% of these did so within their own firms (OECD 2009, p.197).

The most prominent institutions that provide informal trainings and certifications for technical skills are Microsoft and Cisco. More recently, the Vojvodina ICT Cluster joined the efforts in the field of informal education for ICT through establishment of its own *Cluster Academy*. Apart from facilitating trainings for the cluster members' employees, it facilitates informal courses to supply more entry-level programmers to the ICT sector.

Microsoft in Serbia has two major educational programs: (1) academic programs (MSDN Academic Alliance and IT academy) for the accredited educational institutions in Serbia and (2) partner in learning program for individuals and educational institutions providing trainings for teachers, instructional resources and e-learning for teachers. The program of the IT academy

prepares students for jobs such as: Network Administrators, Technical support, Programmers, designers and programmers for MS office, and also for receiving Microsoft certificates. Five faculties and one University are members of the Microsoft IT academy.

CISCO Entrepreneurship Institute (CEI) in Serbia and Southeast Europe has been established at the Faculty of Technical Sciences, University in Novi Sad, as a result of cooperation between CISCO, entrepreneurship education on a commercial basis to Serbian entrepreneurs, SME and public sector employees in the following areas: Starting a Business, Growing a Business, and Business and Public Service Improvement through ICT. The CEI also provides training and certificates in various programs such as: IP Communications, Routing and Switching, Security, as well as training for technical staff including Curriculum Planning Service and access to comprehensive technical knowledge library.

However, the need for project management trainings (SCRUM), standards/ maturity models (CMMI etc.) is still obvious.

Available Skills and Skills Gaps

The OECD study concludes that strong technical knowledge, coupled with the development of soft skills and a deeper understanding of business processes and verticals[23], would give Serbia a leading position for attracting IT operations from abroad.

Although limited in an overall number, the Serbian IT workforce consists of highly qualified IT graduates/engineers who require reasonable labour costs. More than 80% of the annual turnover of Serbian IT outsourcing companies is generated on foreign markets, which indicates that there is no technology gap. However, there is a limited number of success stories involving German partners.

Serbian companies carry high potential, but often have no clear specialisation and understanding of business processes. There is an obvious need for networking and linking of companies and market intelligence.

2.3. RESEARCH AND DEVELOPMENT

This chapter provides the following information:

- Current situation regarding R&D in Serbia, in general and ICT-related
- Government R&D policy
- EU support dimension

2.3.1. Current Situation Regarding R&D in Serbia - in General and ICT Related

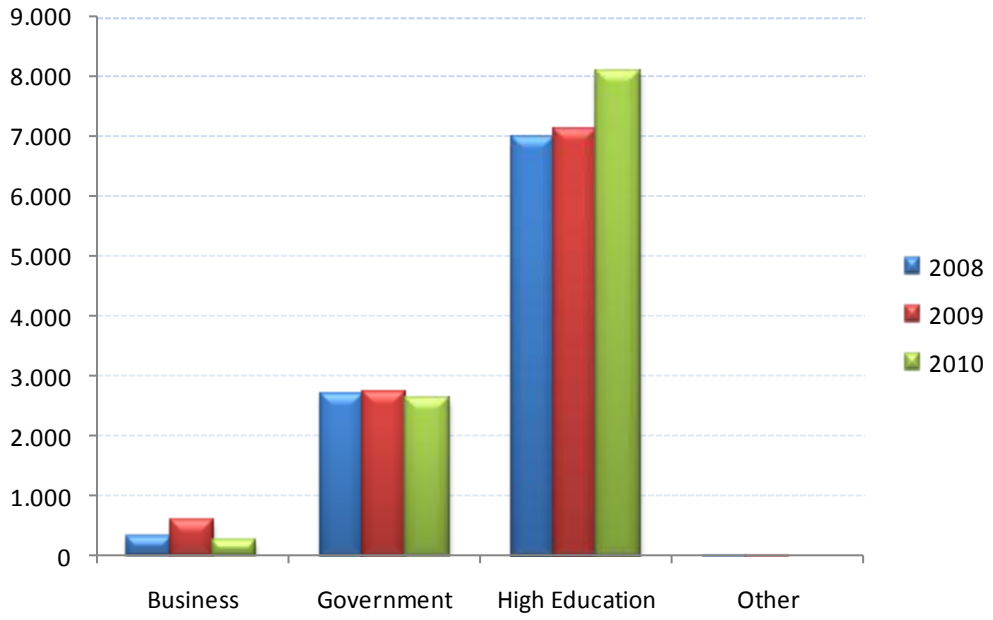
In Serbia, there are 12,637 scientists involved in research and development that is being carried out in 59 registered scientific and research institutes and 102 faculties. Most of them are State-founded as well as the largest research organisations from the business sector. To avoid misunderstanding about the business sector presence, one has to say that the official statistics only cover market-oriented institutes which are State-founded (e.g. IMP, IRITEL).

Table 14 Number of Researchers in Serbia, 2008-2010.

Sector	SRB			SRB FTE		
	2008	2009	2010	2008	2009	2010
Business	372	666	303	307	600	252
Government	2.738	2.782	2.666	2.676	2.718	2.635
High Education	8.412	8.546	9.668	6.990	7.120	8.098
Other	12	12		5	6	
Total	**11.534**	**12.006**	**12.637**	**9.978**	**10.444**	**10.985**
Growth y-o-y		4,1%	5,3%		4,7%	5,2%

Source: Statistical Office of the Republic Serbia

Figure 20 Number of Researchers in Serbia by Sector, 2008-2010.

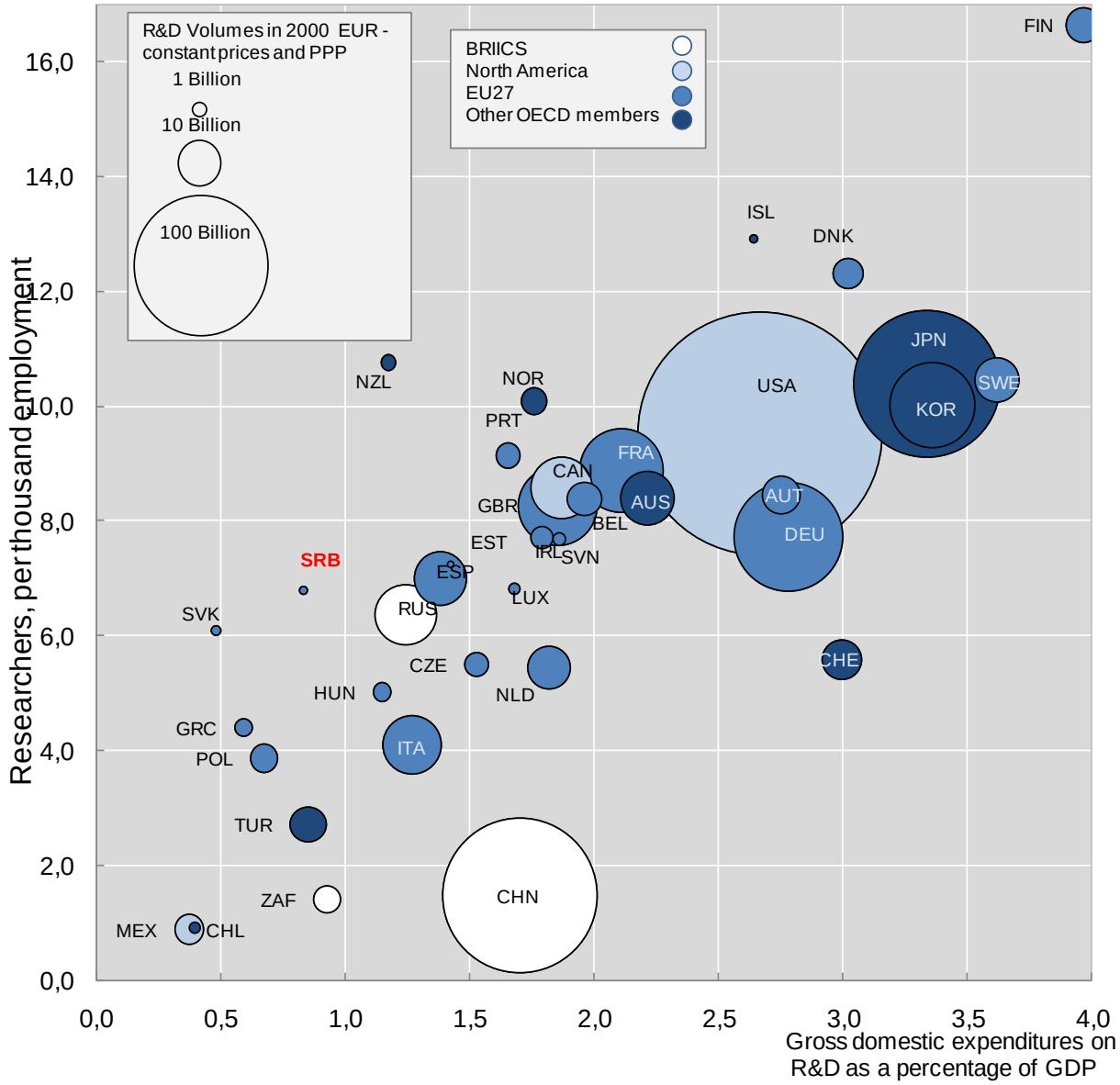


Key messages on the table and figure above:

- 12,637 – Number of researchers in Serbia, 2010
- 10,985 – Number of researchers according to FTE (Full time Equivalent) in Serbia, 2010.
- The Serbian business sub-sector counts only 252 researchers. This indicates that only state-owned companies are covered by official statistics.

- Of the total number of FTE researchers, in 2009, the business sector was involved with about 2% (252/10,985), the government sector with 24%, the higher (tertiary) education with 74%.
- The number of researchers employed in the R&D increased by 5.2% in 2010 compared to the previous year, and 20% more than in 2007.
- In the total expenses for the R&D (€221 million) in 2010, the share of gross investments (investments in infrastructure) was 9.4% while 90.6% were actually salaries for researchers (57.8), and the rest (32.8%), for the costs of experiments.

Figure 21 R&D in OECD and non-OECD Countries, 2010



Source: OECD Science, Technology and Industry: Scoreboard 2009

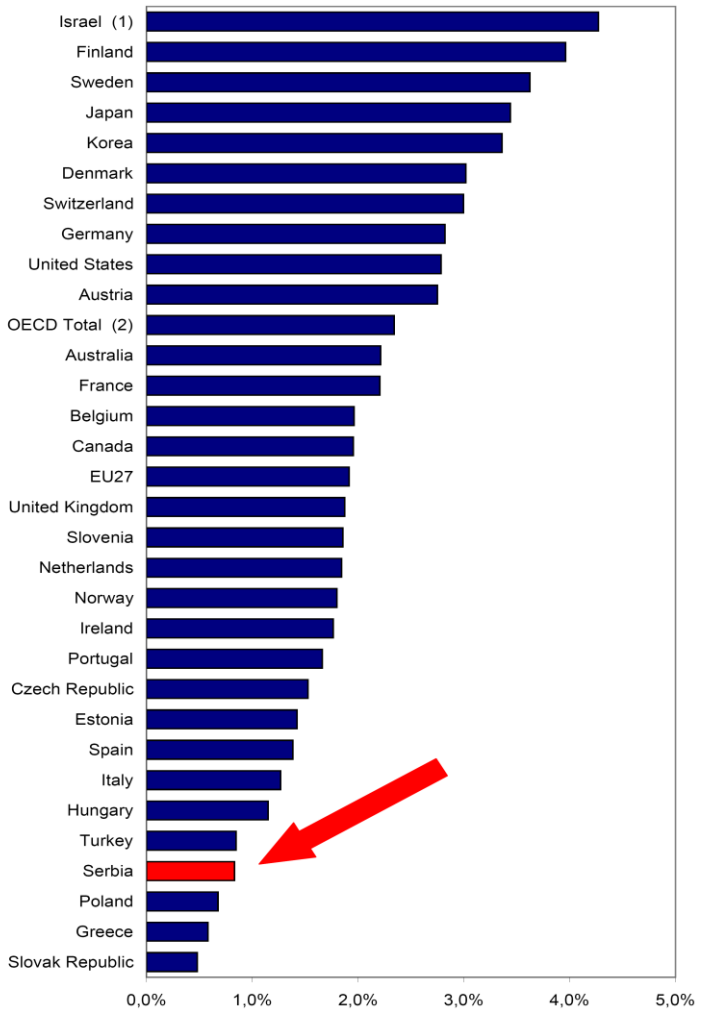
In the diagram above, three components are compared simultaneously: (1) gross domestic expenditure on R&D as a percentage of GDP; (2) Number of researchers, per thousand employment; (3) R&D volumes in Euros.

According to the level of investment in R&D (around 0.8% GDP) and the R&D volume in 2009 (around €250 million) Serbia is positioned low. On the other hand, with 12,637 researchers, which is about 6.9‰ of total employees, Serbia is within the world average.

According to the Lisbon declaration, financial resources for R&D, for EU members and EU

candidate countries, should reach **1% of GDP of their national budget and 3% of GDP in total**. In Figure 21, which shows *Gross domestic expenditure in R&D*, one can see that investments in Serbia are among the lowest (round 0.8% of GDP) but surprisingly ahead of three EU members: Poland, Greece and Slovakia.

Figure 22 Gross Domestic Expenditure in R&D (as a percentage of GDP)



Source: OECD Science, Technology and Industry: Scoreboard 2009

All investments into Serbian R&D are not comparable to the world renowned universities or institutes whose annual budgets are above one billion Euros. The financing of Serbian science is facing the problem of the small amount coming mainly from one source and are then split towards a number of projects (more than 1000 471, of which are projects in the area of technological development)[2]

Current Situation regarding R&D in Serbia - ICT Related

Government ICT R&D Policy

The creation of the National ICT R&D policy framework started in 2005 and the relevant Government institutions were founded: the National Council for Science and Technological Development (NC), the Ministry of Telecommunication and Information Society (MoTIS), the Republic Agency for Telecommunication (RATEL), while the Ministry of Science and Technical

[2] European Commission - Information Society and Media, Serbia - ICT RTD Technological Audit, Bruxelles, 2010

Development (MoSTD) and the National Information Technology and Internet Agency (NITIA) were transformed. However, the ICT R&D progress is slow. The possible reasons might lie in frequent changes of the Government. In the 2005-2009 period there were three Governments and, consequently, three different Ministers of Science.

However, the changes have continued. Due to the Government reconstruction in 2011, as a measure towards solving crisis two ministries: MoTIS and MoSTD, as well as the NITIA agency have been abolished. The authority (jurisdiction) of MoTIS has been transferred to the new established "Digital Agenda" under the Ministry of Culture, Media and Information Society, while Ministry of Education and Science overtook the jurisdiction of MoSTD. These changes do not seem to be the best solution for ICT R&D, particularly because the focus of the Government during their expanding mandate is expected to be far away from ICT R&D.

The Government is playing an active role in strengthening the Serbian ICT R&D capacities for three main reasons: (1) R&D (and ICT R&D) polices are set at the national level; (2) majority of ICT R&D activities are funded by Government institutions; and (3) majority of relevant ICT R&D research institutions are state-owned.

The Government is the main relevant authority financing ICT R&D, and the Republic budget is the main financing source of ICT R&D in Serbia. From the budget programs are financed that are of general interest for Serbia.

The total budget for science in 2010 was about €221 million, and around 6% were allocated for both Electronics and telecommunications and Industrial software and informatics.

Several hundred ICT-related science and research projects held at Faculties indicate that scientific and research potential and results exceed the actual possibilities and interest of Serbian society to make use of them. The result is an increasing lagging of the Serbian economy and Information Society development compared to EU countries.

The economic situation of the entities from the ICT R&D sector is hindered due to a lack of financial resources. In addition, solutions competitive in both quality and price can be afforded neither by business nor by the governmental sector for the same reasons – the lack of finances. However, institutions active in ICT R&D have achieved significant results and preserved a solid base of experts in spite of the "brain drain".

The private sector in Serbia is only tangentially involved in ICT R&D and the role of ICT R&D business sector in Serbia is a modest one. There is low or no connection to ICT R&D institutes. However, companies from private sector are business-oriented and long for applied solutions. Between these steps lies the currently hidden potential for R&D. The Government almost exclusively follows up and regulates the relationships inside the ICT R&D area of state-owned entities and their financing.

Although the Serbian ICT R&D system is of inadequate efficiency, this sector is alive and active, mainly thanks to the ingenious isolated individuals. The number of activities seems to come from a single or small group of individuals, which invest in their own knowledge, expertise, authority and energy – with no or insufficient government support.

Serbian ICT R&D Legal and Policy Framework

The Serbian ICT R&D Legal and Policy Framework are at an early stage of development. All the processes initiated in this field were set up for the first time in 2005. The regulatory vacuum has just begun to fill; the Strategy on Development of Science and Technological Research has just started to follow the basic laws in this area. However, there is still no visible activity on the horizon, which is why the action plans will be more than welcome.

Strategy for Information Society Development and the Strategy for Science and Technological

Development (2010-2015) are the key policy documents for continuing ICT R&D development in Serbia. The main document defining the ICT R&D operational framework in Serbia is The Action Plan for the Implementation of the Strategy for Science and Technological Development in Serbia 2010-2015. Unfortunately, this Action Plan was expected to be adopted before the end of the year (2009) and currently does not exist. However, if Serbia wishes to get closer to the EU, the progress in R&D area has to be faster.

ICT R&D Infrastructure

Analysis based on desk research shows that current the infrastructure for ICT R&D activities in Serbia is **undeveloped** due to low and irregular investments, **inadequate** – due to the short amortisation period of this type of equipment and discontinuity in upgrades or renewing and **only partially meets** the real needs of Serbian science and research.

Considering a **planned infrastructure** for ICT R&D activities, the main Government plans are connected to the Government project for investment in Serbian R&D infrastructure, SEE Light project, National Supercomputing and Data Storage Centre Project – Blue Danube. For sure, the most important is the *Serbian R&D infrastructure investment initiative.*

The Government Project for investments in infrastructure, worth €400 million started in March 2010 and is projected to last until the end of 2015. **Budget planned for ICT infrastructure is between €50 - 80 million.**

The European Investment Bank (EIB) and the Serbian Government signed on 04/03/2010 in Belgrade a €200 million loan for the Public Sector Research and Development (R&D) project. The project, with an estimated investment cost of €420 million, concerns a series of investments aimed at revitalizing the country's public R&D activity. The investments include the upgrading of the existing infrastructure; creating a centre for the promotion of science, constructing accommodation for students and for young scientists, as well as creation of centres of excellence in the priority research fields.

ICT R&D Centres of Excellence (CoE)

As a new institutional form - the Centre of Excellence (CoE) was established in Serbia in the middle of 2008, according to the Law on Research Activities and following the Book of Rules and prepared by the National Council for Science and Technological Development. The appearance of CoE in Serbia is more than 5 years late in comparison to EU12 countries.

As in Serbia this type of entity has just begun to develop, it will take significant amount of time and money to achieve its full implementation in the following 3-5 years. For now, the existing CoE are still not recognised as real leaders of R&D activities in Serbia, which should happen in time to come.

CoE in this analysis are ICT R&D organisations and research units with the necessary critical mass of knowledge, resources and infrastructure, thus capable of achieving research results.

The adopted criteria for identifying organisations as the potential CoE is based primarily on the total number of ICT R&D researchers in a particular research unit (not the whole organisation) combined with achieved success in FP7-ICT projects. Whenever it was possible (based on public available data or good estimation) the number of realised projects and the number of published scientific works were taken into account. Apart from this, the high expertise and/or market approval in ICT area of the entities were considered. Based on the criteria above, selected entities were classified into three groups of potential CoE: a) centres of competence, b) centres of potential for FP7-ICT and c) centres of best practice. One entity was classified into no more than two categories.

(a) **Centres of Competence** are entities with a significant number of published scientific works and realised projects, and have a number of researchers with PhD. In this, the majority come from relevant state-owned organisations (departments of faculties and institutes).

(b) **Centres of Potential for FP7-ICT** are entities that have been successful in the FP7-ICT Theme.

(c) **Centres of Best Practice** – are exclusively ICT companies (from business and industry sector) which have good market reputation and strong reference list and have been "recognised and well-known by the specific expert community" or "recommended from the person of authority (in a specific area)".

72 organisations have been identified as potential CoE: 40 centres of competence, 9 centres of potential for FP7-ICT and 30 centres of best practice[3].

The authors are aware that the presented list is not complete. There are ICT entities which have participated in FP7 projects, both successfully and unsuccessfully, in non-ICT areas which have not been taken into account. In addition, there are ICT entities (research groups and individuals) inside organisations whose basic field of work is not ICT.

ICT R&D Expertise

Although mapped to FP7 themes (objectives) the expertise in the matrix below is a good illustration of ICT R&D expertise in particular areas.

Table 15 Competence/Share Matrix of Declared Expertise per Objectives

High competence – low share:	**High competence – high share:**
3.5 Photonic components and subsystems **3.1** Next generation nanoelectronics components (3.1-1) and electronics integration (3.1-2) **5.3** Virtual physiological human **2.1** Cognitive Systems and Robotics **6.5** Novel ICT Solutions for Smart Electricity Distribution Networks (Joint call between the ICT and Energy Themes)	**3.4** Computing Systems **6.4** ICT for Environmental Services and Climate Change Adaptation **7.2** Accessible and inclusive ICT **3.7** Networked embedded and control systems **6.3** ICT for the environmental management and energy efficiency **7.3** ICT for Governance and Policy Modelling **1.2** Internet of Services, Software and Virtualisation **1.3** Internet of Things and enterprise environments **4.3** Digital libraries and technology enhanced learning **4.4** Intelligent Information Management **3.3** Embedded Systems Design
Low competence – low share:	**Low competence – high share:**
5.4 International Cooperation on Virtual Physiological Human **1.4** Trustworthy ICT **1.5** Networked Media & 3D Internet **3.6** Microsystems and Smart Miniaturised Systems **7.1** ICT & ageing	-

Source: EC-DG INFSO (FP7-ICT Theme Call 4 inclusive)

Key comments on the Table above:

[3] European Commission - Information Society and Media, Serbia - ICT RTD Technological Audit, Bruxelles, 2010

- All objectives in the upper right quadrant (High competence-High share) with the square frame are confirmed expertise (successful FP7 projects);
- Beside the confirmed ones, all other objectives in High competence-High share quadrant are declared expertise.
- The objectives in upper left quadrant of CSM (High competence – Low share) offer a visible potential for expertise.

2.3.2. EU Support Dimension

The Seventh Framework Programme (FP7)

The Seventh Framework Programme of the European Union spans the period from 2007 to 2013, with a budget of €50.5 billion. On the basis of the Memorandum of Understanding signed by the Republic of Serbia regarding its Association to the EU Seventh Framework Programme for Research and Technological Development, as well as experimental activities Serbia was given the status of Associated Country on June 13, 2007.

On the basis of statistical data for the first two years of the programme (by the end of January 2009) 628 researcher groups / partner organisations from Serbia participated in the preparation of 499 draft projects applied for. Of that number, 63 projects involving 79 research groups/organisations from Serbia were granted funding, making a success rate of 12.6%. The funds stipulated on the basis of the total number of successful applications in the first two years of implementation of the Seventh Framework Programme amount to €15.19 million.

The brief estimation on the level of financial EU FP7 support for Serbian ICT R&D is under assumption that all Serbian participants in the all FP7 projects get the same part of contracted money. Based on this assumption ICT R&D in Serbia will get 1/7 of total sum, or €2.17 million for two years. If other multidisciplinary cooperation (Joint Call) strongly connected to ICT are taken into consideration, the FP7 contribution to the Serbian ICT R&D sector will be about €2 million per year.

Participation in FP6-IST and FP7-ICT Theme

Table 16 Success and failure rates of proposals in FP6-IST and FP7-ICT Theme.

	EU Proposals		**Serbian Proposals**		**Ratio (%) of successful proposals**		**SERBIA - Proposals share**	
	Total	Succesful	Total	Succesful	EU	SERBIA	Successful	Failure
FP6-IST Priority	8383	1123	125	16	13,4	**12.8**	**1.4%**	1.5%
FP7-ICTTheme	5586	840	77	12	15,0	**15.6**	**1.4%**	1.4%

Source: EC-DG INFSO (FP7-ICT Theme Call 4 inclusive)

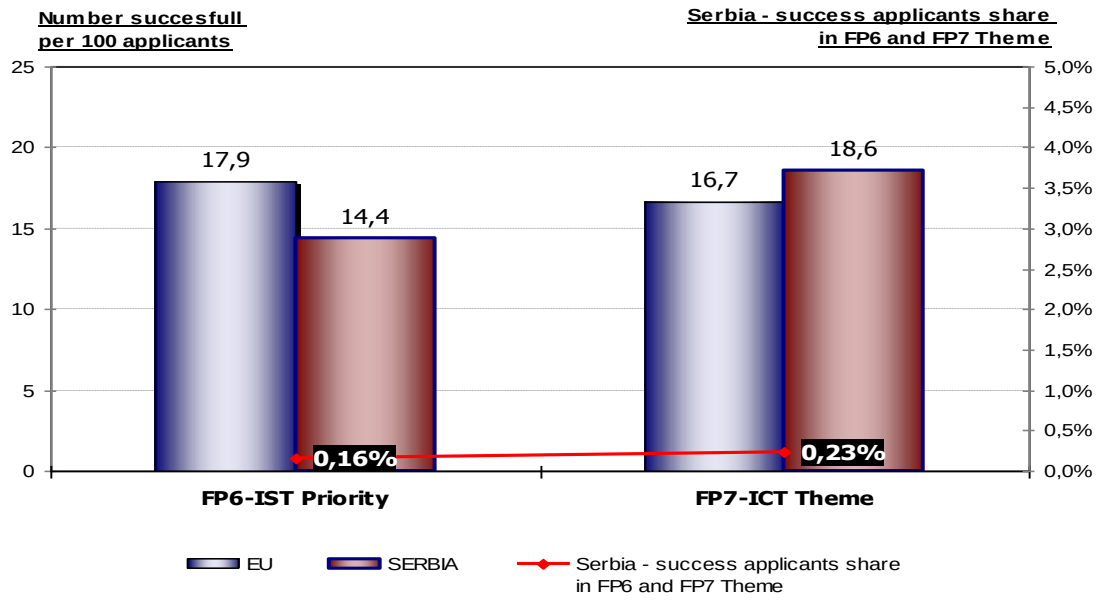
- In the FP7-ICT Theme, the EU countries achieved success rate of 15.0% (with 5586 submitted proposals and 840 approved),
- Serbia accomplished a higher passing rate of 15.6% (with 77 submitted and 12 approved proposals). In addition, this represents the growth of 2.8 percentage points compared to the Serbian success in FP6-IST Priority.

Comparison of Serbian Applicants to EU27 and AC

There is a visible contradiction between the impressive successes of Serbian applicants **(among the 38 most influential countries, Serbia is in the 8th place)** and a small share in the number of

projects **(among the 38 most influential countries, Serbia is 28th)**. This indicates either lack of critical mass of researchers or their modest interest in FP7-ICT participation.

Figure 23 Success Rates of Applicants in the FP6-IST and FP7-ICT for EU and Serbia



Source: EC-DG INFSO (FP7-ICT Theme Call 4 inclusive)

- With 18 successful applicants in FP7-ICT Theme Serbia achieved 18.6 successful applicants per 100 (Serbian) applicants compared to 16.7 of EU countries. Serbian rate of successful applicants (18.6%) is among the highest in the Europe.
- The share of Serbian participations in total EU successful participations (applications) rose to 0.23% from 0.16% in FP6-IST Priority.
- Despite the detected growth, Serbia is still among the countries with the lowest number of participants.

3. IT INDUSTRY OPPORTUNITIES – OUTSOURCING

This chapter provides the following information on IT industry opportunities - outsourcing:

- Current situation
- IT added value
- Trend and potential
- Combined Profile of Top 15 Outsourcing Companies
- SWOT – Opportunities and Barriers

3.1. CURRENT SITUATION

Identification and evaluation of Serbian IT companies (with the specific focus on outsourcing, software and IT services developers and providers for international market) has to be built on description of the current situation in Serbia, identification and analysis of the local and global IT trends and on the potentials arising from these trends for Serbian companies.

Total of 104 active enterprises, which accomplished revenue higher than €10.000 particularly, create the Serbian IT outsourcing sector in 2011. Total number of employees is 3.038 and represents 20.4% of total IT workforce in Serbia. Average number of employees is 29 and average revenue and added value - per employee, were €37.000 and €32.000 respectively.

Table 17 Basic Business Indicators of IT Outsourcing sector vs. Top10 in 2011.

OUTSOURCING	2011	Top 10	Index -Top 10 (%)
Number of Outsourcing Companies	104	10	9.6%
Workforce. Number of Employees	3,038	1,194	39.3%
Average Number of Employees	29	119	408.7%
Revenue (EUR)	112,797,000	60,805,000	53.9%
Revenue per head (EUR)	37,000	51,000	137.2%
Added Value (EUR)	96,238,000	51,845,000	53.9%
Added Value per head (EUR)	32,000	43,000	137.1%
Net Assets (EUR)	66,703,000	49,310,000	73.9%
Net Assets per head (EUR)	22,000	41,000	188.1%

Source: Mineco, 2012

Total revenue of the outsourcing sector is €112.8 million, while the Serbian computer and information services export is almost 50% bigger (€166.0 million). Mostly, the difference comes from the export of IT companies whose predominant activity is not outsourcing. Apart from that, the big IT international players who are present on the Serbian market through their local branches, such as MICROSOFT; IBM, HP, CISCO, ORACLE and SAP, are largely on their corporate budgets, which makes the currency inflow for Serbia visible.

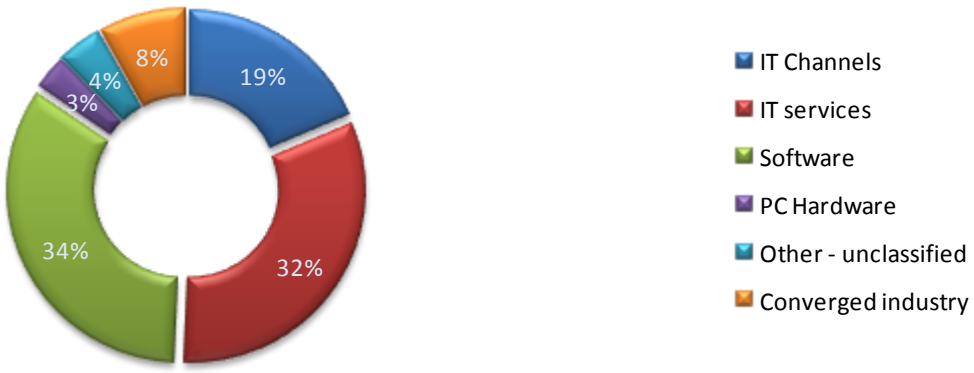
3.1.1. Added Value in the Serbian IT Industry

Added Value can be defined as the difference between a final selling price of a particular product and the direct and indirect input used in making that particular product (see Terminology). The importance of Added Value as parameter is coming from the spotted rule: high Added Value provides high profitability.

Serbian IT companies have accomplished Added Value amounting €487 million, which is 37% of

the IT industry revenue. This amounts to 1.5 % of Serbian GDP - an obvious increase in comparison to 1.2% from the year before.

Figure 24 Share of the Value Added (%) in Revenues of ICT Industry Sub-sectors



Source: Register of Financial Statement and Solvency, SBRA, prepared on Mineco's demand

Key comments for the figure above:

- Software sub-sector with 34% of the share achieved the highest added value (€164.7 million), IT services sub-sector follow (€156.3 million, 32%), the third place is held by the IT Channels sub-sector (€90.5 million, 19%), while the shares of other sub-sectors were significantly lower.
- The outsourcing part of the software sub-sector amounting €96.2 million, illustrates its significance and potential.
- The SME segment accomplished €260 million in 2011 and 53% of share in the total added value of the IT industry

The software and IT service sub-sectors have become the most challenging markets. System integrators and software companies which recognised the fast growing service market and went for it, achieved success. Additionally, companies that have partnered global IT vendors progressed rapidly thanks to the adoption of international experience and knowledge.

The international IT vendors have strengthened their local presence significantly in the past few years by establishing their own companies for global services. Microsoft, Intel, Cisco and Red Hat – each have one of their few global developing centres in Belgrade.

International IT companies are advancing into the Serbian IT market attracted by its potential. Local companies will be exposed to a strong globalisation effect, but at the same time the global IT companies will have to localise – meaning that they have to establish their own companies and local offices and employ local workforce.

While FDI affected Serbian developing market opportunities in the beginning by bringing already developed IT solutions, investments in later phases created a trend of engaging local IT companies for developing IT solutions. This trend is especially visible in the banking sector.

3.2. TREND AND POTENTIAL

3.2.1. Outsourcing Workforce – trend and potential

As an illustration we have used the Outsourcing sector dynamic growth the workforce growth rate of the 6 leading companies in the period (2009-2012.

Table 18 Workforce of Top IT outsourcing companies 2009-2011

	Company	Domestic Ownership	2009	2010	2011	Forecast Oct.2012
1	DMS GROUP	Y	75	75	**78**	*78*
2	SCHNEIDER ELECTRIC DMS NS	N	142	267	**392**	*650*
3	RT-RK	Y	51	160	**249**	*350*
4	NORDEUS	Y	-	5	**19**	*80*
5	GTECH	N	129	151	**165**	*185*
6	PSTECH	Y	70	98	**129**	*150*
	TOTAL		**467**	**751**	**1032**	**1493**

Key observations for the table above:

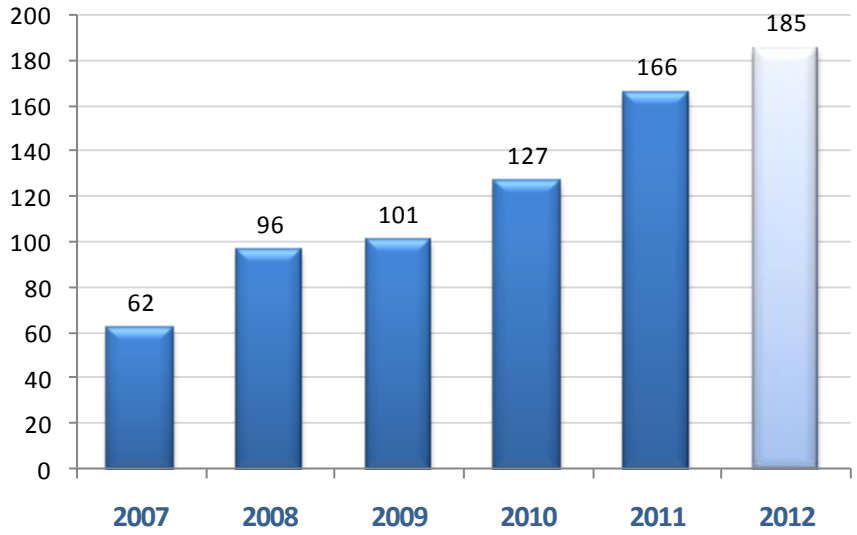
Total workforce of the 6 leading companies in IT Outsourcing sector in 2012 is estimated to be **1,493 employees, which is 3 times the workforce in 2009 -**!!! This is a good sign, especially in the situation of the growing overall unemployment where every position is important. In the same period (2009 – 2012), the economic crisis left the total IT workforce unchanged, proving the momentum and vitality of the Outsourcing sector. In addition, this vitality is opposite to the overall economy trend, where, due to the recession and economic crisis, total workforce shrunk for more than 100,000 positions.

Total employment of the software sector, which is Outsourcing for the most part, has the increasing trend of almost 1000 new employees per year, so all IT graduates in Serbia find work soon after graduating. However, the lack of high quality IT experts for development, programming, designing and web design is already noticeable. It is estimated that the software sector will attract the most and the highest quality IT experts for a longer period, thus increasing its competitiveness and significance in the total Serbian IT industry. Very soon now, an insufficient number of experienced programmers could lead to disturbance on the labour market and cause a great fluctuation, as the great number of employees will seek better job options through changing companies or the positions inside the companies. The new phase is coming in the area of certificates, too, as the number of certificates and the number of IT certified experts is going to rise significantly, because of the need to ensure the increasing competitiveness and quality for international clients.

3.2.2. Outsourcing market – trend and potential

Until a couple of years ago, one could still say that the Serbian ICT export is lower than expected, and “if Serbia is to become a respectable off-shoring destination for software development, the ratio of services export to GDP in ICT sector has to be much higher” (ibid, p.13). The analysis of the ICT exports shows that the export base in 2007 was low, which allowed for high growth rates at the beginning. However, continual development of the sector up to 2012, created significant cumulative effects and this picture has significantly improved today.

Figure 25 Export of Computer and Information Services, 2007-2011 and Forecast for 2012 [€ million]



Source: NBS

Total revenue of the outsourcing sector is €112.8 million, while the export of the Serbian computer and information services is bigger by almost 50% (€166.0 million). The difference between terms revenue and export used here is explained at the beginning of this chapter (p. 44).

With every year the Outsourcing share in GDP has been rising (from 0.5% in 2007 to 1.5% in 2011). The main reason is a significantly faster growth rate of the Outsourcing sector in comparison to the rate of the remaining part of the Serbian economy.

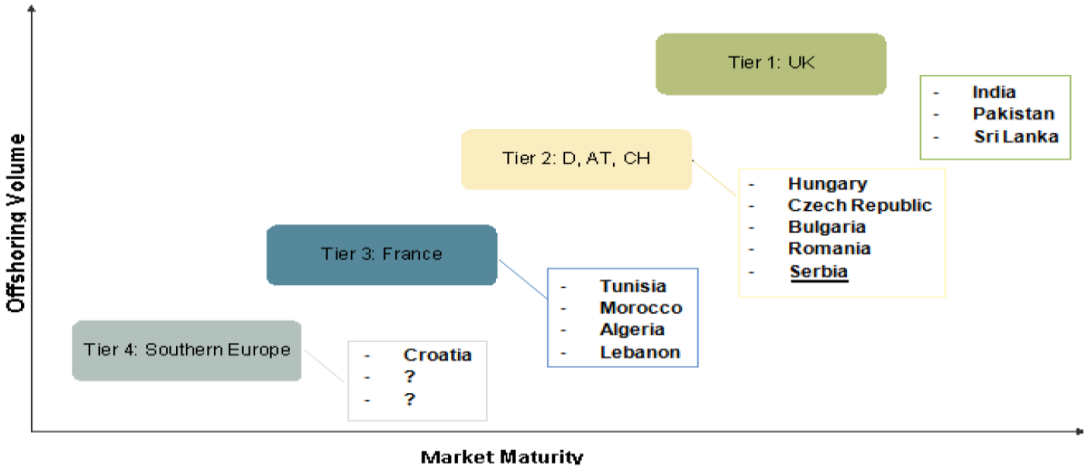
On the global market, IT companies from Serbia (SME and big ones alike) are involved in different outsourcing roles: writing codes (programming), testing software and designing websites, but also providing solutions in the embedded industry. The main markets for outsourced industry are: USA, Germany and the Netherlands. A trend has been observed, among the outsourcing companies, of making their own products with a high export value in the foreign markets. So far, a few companies have been successful, but these few companies made a worldwide success.

One of the most difficult issues of assessing the Serbian IT industry is the question of how much available sector/industry specific knowledge can be translated and "packed" into different software (applications). Success stories of the already mentioned companies (DMS, Execom, Nordeus, etc.) illustrate taking advantage of such knowledge. These companies developed business models based on their core competence, unique expertise and experience in a certain (technical) field, using their software only as a "wrap-up" and a way of how to deliver and market this knowledge. Programmers were important but not essential for developing such a business model. The knowledge, once developed and brought to a specific use, is not hard to "translate" into software.

Considering global and German market trends the (offshore outsourcing) potentials for Serbian companies have become clearly visible. Exploitation of these potentials Serbia can be built on several factors: the preference of European companies for near shoring to Eastern and South-eastern Europe due to distance and cultural issues, positive cost-benefit-ratio of relatively cheap but skilled labour (combined with the lack of experts in some markets like Germany), solid language skills and rising wages in some markets (like India). The trend towards smaller and shorter projects is helping Serbian SME additionally. A strong position and the growth predictions can be seen in the following chart where Serbia is listed as a mature **market with**

respectful market volumes.

Figure 26 Intra-European Offshoring Market Growth Pattern



Source: GOPA

3.2.3. Outsourcing sector – trend and potential

Who are the outsourcers in the Serbian IT market? A magic quadrant is used to illustrate the present Serbian Outsourcing scene and those who have recognised the chance and got involved in Outsourcing. The diagram below shows the two dimensions of the outsourcing companies: ownership and organisational form. The quadrant is divided into four regions: the vertical axis represents the ownership: local/foreign and the horizontal axis the organisational form: business company (LLC)/others.

Table 19 The ownership and organisational form of leading Outsourcing companies 2011

	Other	Business company
Foreign Ownership	Branch-office Employment agencies (4)	DMS GROUP SCHNEIDER ELECTRIC DMS GTECH LEVI 9 GLOBAL SOURCING SHADOWNET ASCENDANT TECH. COM-4T YOUNGCULTURE ELSYS VAST.COM … (1)
Domestic Ownership	Free-lance (Start-ups Small agencies Individuals) (3)	RT-RK NORDEUS PSTECH WIRELESS MEDIA EXECOM … (2)

Key observations from the magic quadrant are:

- In the first quadrant (1), 10 outsourcing business companies with foreign ownership, represent the most important outsourcing resource in Serbia: in revenue, number of employees

and in investments. Big investments in this sector started with TELVENT DMS (Schneider Electric DMS NS since October 2012), while GTECH (USA) has been characterised by smaller but continual investments for more than a decade. These two leaders are focused on their own products development, for their needs on the global market.

Other Outsourcers from the first quadrant provide programming (writing codes), testing software, designing websites, and developing solutions in the embedded industry.

- The second quadrant (2) involves Outsourcing business companies owned locally which are placed second in terms of outsourcing corpus size. Five companies listed in this quadrant are the leading ones among numerous domestic outsourcing companies.

- In the third quadrant (3) we have entities with local ownership, categorized as "Others"- which denotes freelancers. The specific significance of the free-lance market has to be further explored as, on the one hand, this group involves an unknown number of readily available skills and expertise and, on the other hand, a large group of individuals without the economic basis or chance for permanent employment, with all the difficulties that come with this status. This quadrant may also include start-ups at incubators, innovation centres and clusters. Start-ups should be supported and stimulated as one of the transitional forms from free-lance to company status. Finally, one of the common forms of software business organisation is a small enterprise agency. Educational and motivational programs could help relocating significant Outsourcing corpus from quadrant (3) – free-lance to quadrant (2) - companies.

- The fourth quadrant (4) represents the informal set of business activities, which foreigners use before the formal beginning of the outsourcing. For now, Greenfield investments are more often present in Serbian outsourcing, while acquisitions, although less frequent, are reserved for the biggest deals (for example SCHNEIDER ELECTRIC DMS and GTECH). More acquisitions are expected in the future, as practice shows that companies with revenue exceeding 5 million EUR become interesting to foreign investors.

Local branches of big international players: MICROSOFT; IBM, HP, CISCO, ORACLE and SAP are also classified in the fourth quadrant (4). Although software outsourcing is not on their business line, their main business activities are significant IT service export from Serbia.

For most Serbian IT companies (almost exclusively for micro and SME) outsourcing contracts are simple and often the sole "survival" strategy, as it is the way to escape from financially insolvent local market. Some of the reasons are explained in more detail in the chapters and sections above, including the company size, access to the capital for development of their own products in the short and medium term, low demand of local companies in other sectors, degree of specialisation etc.

It can be assumed that, within the timeframe of the following ten years, taking an improved access to the capital and IT professionals into account, outsourcing will remain one of the core pillars of services sold to local and foreign clients. Depending on how fast the ICT sector matures in Serbia and the region, the market will create an ever growing divide between companies which do outsourcing as a core (especially software development) or sole competence (specialised outsourcers) and those that work on outsourcing contracts occasionally.

There is no single pattern for Serbian companies that would tell how to enter foreign markets. Although it is not possible to provide an accurate assessment on which of the presented models provide the most successful results, it is worth elaborating further on a few common approaches. Following are the models:

- Getting the job through contacts created at international fairs. Usually companies manage to get small contracts at first; thereafter they develop trust and more serious contracts.

- Getting the job through Serbian IT experts working abroad.
- Getting the job through B2B events organised by the government, clusters and associations or international development agencies. All of them recognise Serbian ICT as a sector with high export potential.
- In a number of cases, Serbian companies have obtained international contracts based on their personal acquaintances overseas.

It is very important to emphasise the lack of market intelligence on international markets among Serbian ICT companies. Serbian companies have insufficient specific knowledge as to what could the potential markets for their goods and services be and how to access these markets.

3.2.4. Potential - Specialisation

In the IT sector, service industry and software developers benefit from their specialisation, due to their in-depth knowledge of the processes and dynamics specific to each industry. The more specialised service-providing companies and the more specialised products, both horizontally and vertically, the more visible success is enabled.

A few representative examples illustrating the success stories (best practice): DMS, GTECH, RT-RK, NORDEUS etc.) are listed below.

SCHNEIDER ELECTRIC DMS

Its main product, the DMS Software, encompasses a variety of analytical functions for calculation and optimisation in the electrical industry, and provides the tools necessary for efficient monitoring, managing, design and optimisation of distribution systems.

In a March 21, 2012 Gartner report* examining nine global smart grid providers, Telvent (now Schneider Electric DMS) received a “strong positive”, the highest rating possible, after evaluation of its Advanced DMS (ADMS) solution. “Telvent's product suite creates an industry benchmark from a functional viewpoint. In addition, it is one of the only vendors with a majority of ADMS functions running in production — including at its largest implementation site, Enel (Italy), which has 32 million customers. After gaining significant market traction in 2010 (by signing 12 new contracts — the largest number of contracts among evaluated ADMS) Telvent continued that momentum by signing 16 new clients representing 15 million meters in the past 12 months.”

GTECH

Products & Services

For 25 years, GTECH has earned a global reputation for delivering value added services and technology solutions for its customers. The Company is a pioneering leader in transaction processing and enterprise-wide systems integration.

Core capabilities are applied to:

Lottery. As a global leader in the world's online lottery business, the name GTECH is synonymous with the industry it pioneered and helped to build. GTECH is a full service technology partner catering to all of the systems and support needs of online lottery operators worldwide. This comes from the Company's ability to analyse the specific needs of each customer and to design solutions that meet the widest array of operating requirements.

RT-RK

RT-RK offers high quality software development services (off shore as well as on customer's premises) in the area of embedded software development.

With the engineering staff of more than two hundred, the company is capable of handling projects of different complexity and magnitude. Close cooperation with the University of Novi Sad ensures further availability of IT expertise in the company.

For the past few years RT-RK has focused on establishing hardware design and production facilities which offer their customers complete designing services, production services and services of testing and verifying electronic equipment.

NORDEUS

Nordeus is a leading and award-winning European game developer, and officially the best European gaming start-up of 2011.

The company's game, Top Eleven, is the most played online sports game in the World, with more than 6 million monthly and 2 million daily users on Web, Android and iOS devices.

At Nordeus, the goal is to provide a seamless gaming experience to millions of people, regardless of the devices they are using. That is why they make social games that are free and accessible to a wide range of people. Their team in Belgrade puts all of their talent into making 5-star games, and every day, millions of people enjoy what they have created.

Awards:

- Techtour, November 2011 – selection from 25 most perspective European companies
- Europas Awards , November 2011 – for the best game setting
- Webfest.me, November 2011 – the best Facebook application
- London Web Summit, March 2012 – users award
- 2012 Red Herring Europe Top 100 Award - Red Herring Award, April 2012
- The best employer, may 2012 – The best employer in Serbia and the region

Combined profile of Top 15 Outsourcing Companies

Business concentration on Serbian Top 15 outsourcing companies is increasing from year to year, illustrating their faster growth rate than the average sector rate. Fifteen biggest outsourcing companies, according to their revenue in 2011, employed 47.9% workforce, accomplished 63.3% of revenue and 63.6% of price difference of the total outsourcing sector. Net asset of top 15 is 76.58% of total outsourcing sector asset.

As the leading 15 companies so obviously shape the whole outsourcing sector, it is useful to present their main characteristics using their combined profile presented in the Table below.

Table 20 Combined Profile of Top 15 Outsourcing Companies in Serbia, 2011

Top15 OUTSOURCING PROFILE		Mark (1 min... 5 max)	NoCE
Q1 Company's business focus – business verticals	· Telecom & Hightech	3,6	7
	· Banking & Insurance	3,0	2
	· Public & Health	3,0	1
	· Energy & Utility	4,0	4
	· Others	4,9	12
Q2 Company's business focus – horizontal business	· Own product	4,8	8
	· Solution Engineering:	5,0	4
	· Gaming	5,0	2
	· Nearshore-Software-Development	4,8	8
Q3 Key user	· Internal Development	4,5	8
	· Global Vendor	3,0	2
	· Various Clients	4,1	8
Q4 Software Engineering	· User Interface: Concept and Design	4,4	7
	· Software Architecture	4,3	9
	· Software development	4,9	11
	· System integrations	4,6	13
	· Testing	4,6	13
	· Deployment	4,4	12
Q5 Market Geography	· Local Market	3,4	5
	· Regional Market	4,6	11
	· International Market	4,9	8
Q6 Company's market role (possible multiple choices)	· Market lider	4,5	4
	· Market developer	3,7	3
	· Market follower	3,0	8
	· Market niche	3,0	4
Q7 Company's products/services user category (type)	· Truly Loyal	4,0	2
	· Trapped	4,0	3
	· Accessible	4,0	7
	· High risk	4,0	3

Legend:
Mark (1…5) – Mark NoCE average for service, product or solution expertise (1 being minimum 5 being maximum)
NoCE – Number of Companies with expertise
(NOTE: total number of NoCE is bigger than the total number of companies (15) due to possibility of one company to have multiple expertise)

The main intention of combined profile is pointing out directions and dimensions on which the outsourcing companies are focused and enabling a better understanding for potential investors. This profile is observed through 5 "focus dimensions" (from Q1 to Q5) and through two market characteristics: market position (Q6) and users' loyalty (Q7).

Key observations on the Table above:

- **Vertical focus** of the Top 15 Serbian outsourcing companies is analysed according to their expertise concerning the four key sectors for IT investment: *Telecom & Hightech* (7 companies are recognised to have solutions for this sector), *Banking & Insurance* (2), *Public & Health* (1) and *Energy & Utility* (4). All other sectors are in the category "*Others*" which holds on 12 companies with expertise for other industries. However, category "*Others*" has the highest average expertise mark (4.9 of the maximum 5.0) for solutions and services, while *Banking & Insurance* has the

lowest one (3.0). The most prominent solutions have SCHNEIDER ELECTRIC DMS for *Energy & Utility* and RT-RK for *Telecom & Hightech*.

- **Horizontal focus of Top 15** Serbian outsourcing companies is slightly more visible in *Solution Engineering* (4 companies with expertise) and *Gaming* (2). On the individual level, Top 15 have a strong – individual focus. Half of the Top 15 companies have their own solutions or products, thus proving how this is important. Naturally, these companies, regardless of their ownership, foreign (5 companies) or local (3), base their work on internal development. The most prominent horizontal solutions have two worldwide gaming leaders: international GTECH and the local NORDEUS. Eight companies offer a capacity for nearshore software development in the wide range of horizontals. All of them refer to cooperation with number of variety clients.
- **Focus on developing own solutions** (through internal development) is significantly bigger among the Top 15 then in the rest of the Outsourcing sector. The business focus of the remaining outsourcing sector is mainly based on nearshore software development and a number of different clients.
- **Focus on project roles** is moving toward the more significant ones. 7 companies usually work on *Concept and Design,* 9 on *Software Architecture*, 11 on *Software development*, 13 work on *System integrations, and 13* on *Testing,* while 12 work on *Deployment* (12). Considering the experience and high expertise of the Top 15 outsourcing companies, it is easy to interpret the good result considering their expertise in different roles in the outsourcing software projects.
- According to **the target market**, the greatest focus of Top 15 Serbian outsourcing companies is on the regional market (11 companies), which shows a wide nearshore software development. Eight companies work on global market, while only 5 companies have clients on the local market.
- Are the Serbian companies inferior to the competition? A quick answer based on the stereotype is affirmative. However, several companies from the Top 15 have made extraordinary results on this highly competitive global market (SCHNEIDER ELECTRIC DMS, GTECH and NORDEUS). These companies can be freely stated as the global market leaders. It is not rare for a particular Serbian organisation or individual to achieve superb results in various areas, but it is always related to individual efforts and enthusiasm.
- All Top 15 outsourcing companies work in the highly competitive environment on all levels: extremely high competitiveness of IT global vendors, strong competitiveness of the regional ones and the modest competitiveness of the number of small companies. In addition, one can rarely count on “truly loyal” buyers, as is often present with a wide base of “accessible“ clients accustomed to having choices and ready to change both solutions and providers.
- Top 15 outsourcing companies mostly use the *strategy of distancing* to get the competitive advantage. The aim of this strategy is to enable products and services which differ from others in the branch, but cover as many market segments as possible. The biggest ones like SCHNEIDER ELECTRIC DMS, GTECH and NORDEUS stick to the *strategy of focusing* which is suited to satisfy the needs of only particular groups of clients. It is positive that none of the Top 15 companies has the *strategy of cost leadership,* which is based on low-cost approaches. On the other hand, it does not mean that this strategy is not widely present among the rest of outsourcing companies in Serbia.

Understanding these outsourcing Serbian success stories, visible even on the international level, can be the starting point for finding potentials in different directions and dimensions (local, regional and international):

- *As the basis for the product development.* The core competence of having excellent knowledge and understanding of an industry, its technology and processes is illustrated with the mentioned

success stories of e.g. DMS, Nordeus

- *As the basis for industry or other sector service providing.* On the IT companies´ side a clear picture of specific needs and demands of other sectors, referring to ICT products and services is often missing or incomplete. However, some of the IT companies have recognised that opportunity and developed high expertise in the sector of Telecom & High-tech, Banking & Insurance, Public & Health and Energy & Utility.

The main impression is that every success story is a story for itself. However, it is obvious that some of the key components are common and, could probably be used as Best Practice guidelines. They are the following:

- *Investment – big amounts or smaller ones, but continual over a longer period (several years)*
- *Excellent knowledge and understanding of industry, technology and market*
- *Recognition of industry or other sector needs*
- *Workforce with high expertise*
- *Vertical or horizontal specialisation*
- *Use the strategy of distancing or the strategy of focusing*
- *Focus on more significant project roles*
- *Focus on developing own solutions/products*

3.3. OUTSOURCING – Opportunities and Barriers for Serbian IT Companies

For the accomplishment of the SWOT analysis "Outsourcing – Opportunities and Barriers for Serbian IT Companies on International Markets" the following five major aspects in the identification and analysis of the opportunities and barriers were considered:

- Serbian IT Outsourcing Sector – opportunities and barriers in approaching international markets
- IT Sector – general status (including all sub-sectors)
- ICT R&D sector - general status of research-technological development (including high education, institutes, business and industry sub-sectors)
- ICT Higher Education - general status
- ICT environment - to enable the ICT sector to be treated as one of the priorities the Government has to create a stimulating environment for ICT development

Each aspect is examined through the lens of a SWOT analysis, i.e., by examining related strengths, weaknesses, opportunities and threats. The final SWOT table is presented below.

Table 21 SWOT Analysis Summary

Strengths	Weaknesses
A IT Sector in Outsourcing • Young and emerging sector with active, innovative behaviour • Good command of English language within the sector. • Strong capacity to adjust to new conditions and market demands • Several great world class examples of best practice facilitate promotion • Three well organised ICT clusters give institutional support to companies and activities in the sector B IT Sector General Status • Above average price / quality ratio of Serbian ICT services • Despite the economic, social and institutional crisis and a difficult transition process, the Serbian ICT sector has survived, which proves entrepreneurial strength and vitality C ICT R&D Sector • A solid number of Serbian experts still available • Solid market orientation of ICT related institutes D ICT Higher Education • ICT-related education system (after the Bologna reforms) • Growing interest of young people for ICT studies and solid geographical distribution (availability)	A IT Sector in Outsourcing • Low level of specialisation inside ICT companies • Lack of references and experience in getting (big) contracts • Insufficient experience in search of international partners B IT Sector General Status • Lack of cooperation among companies as well as other stakeholders • Insufficient knowledge and skills on international market penetration – insufficient level of internationalisation • Missing a public national database related to the ICT sector C ICT R&D Sector • Insufficient interest of academic researchers to participate in international projects • Low level of national funds for ICT R&D • Lack of official Centres of Excellence D ICT Higher Education • Weak cooperation between industry and education

Table 22 SWOT Analysis Summary - Continued

Opportunities	Threats
A IT Sector in Outsourcing • Potential for increasing outsourcing significantly • Geographical proximity to the European market opens outsourcing potentials • Using experts from Diaspora for entering foreign markets • Nearshoring - targeting the regional market and Central and Eastern Europe • Using the capacities of leading Serbian entities • Strengthen cooperation and networking among local and international IT entities. • The Serbian Government's plans for the development of the IT sector and setting up a range of technology parks in Belgrade, Niš, Novi Sad and Indjija, the latter to be the largest technology park in the region • Transfer of knowledge and experience from successful ones • Outsourcing promotion, regional conferences, events and support actions • Strategic shift from focus on outsourcing toward development and providing solutions, including in cooperation with foreign partners B IT Sector General Status • Work on raising the critical mass of ICT experts • Low penetration of IT/ICT within Serbian business sector makes a good market potential in the future • Exploit the hidden potential of the SME IT sector C ICT R&D Sector • Rising compatibility with international ICT R&D sector • Already noticeable improvement in exploiting the hidden potential of the ICT business sector • Solid expertise in particular FP7-ICT areas • Positive attitude towards FP7-ICT D ICT Higher Education • Harmonisation of the Serbian education system with economy (market) needs E ICT Environment • EU integration of Serbia will have a positive impact on the ICT sector • ICT is recognised as one of the key sectors by the Government, line ministries and international development organisations • Ambitious plans expressed in strategy papers in the ICT R&D field • ICT infrastructure improvement. New ICT R&D Infrastructure investment initiative (€50-80 million out of €400 million) • Serbia as a natural gathering and coordinating regional centre for West Balkan countries	A IT Sector in Outsourcing • Brain drain of ICT professionals • Insufficient inflow of new programmers and other ICT graduates • Weak cooperation on ICT projects • Command of other languages (German and French) is significantly weaker than English B IT Sector General Status • Insufficient ICT demand (in the period of economic crisis) • Great inflow of foreign IT companies might seriously hamper the existing IT labour market C ICT R&D Sector • Serbia as a latecomer to the international ICT R&D scene (2001) D ICT Higher Education • Lack of problem solving skills and entrepreneurial spirit, excessive theoretical knowledge and inadequate general and specific technical skills E ICT Environment • Financial crisis and other instabilities at targeted international and domestic markets • Still present political instability in the country/region • Uncertain sources of funding • Mistrust in the promises of the policy makers • Stereotypical image of Serbia • Weak communication of the ICT sector with the policy creators • Insufficient Government support for ICT development (weak political will, expertise and financial resources)

APPENDIX

Terminology

ICT Products

According OECD definition broad level categories for ICT products are: (1) Computers and peripheral equipment; (2) Communication equipment; (3) Consumer electronic equipment; (4) Miscellaneous ICT components and goods; (5) Manufacturing services for ICT equipment; (6) Business and productivity software and licensing services; (7) Information technology consultancy and services; (8) Telecommunications services; (9) Leasing or rental services for ICT equipment and (10) Other ICT services.

IT Market Structure

The IT market is typically divided into three components: IT hardware, software and IT services.

ICT Market Value

The IT market value (expressed in Euros) is defined as end-user (household and business) spending on IT hardware, IT services and packaged software.

Telecommunication Market Value (expressed in Euros) is defined as end-user (household and business) spending on telecom equipment and telecom services. This includes the Internet market.

ICT Investment

ICT investment is only a subset of ICT products (since it reflects only expenditure on ICT products that satisfy the rules on investment of the basic system of national accounts or SNA). Expenditure on rental of office machinery (which is part of the ICT sector) will normally not be recorded as investment. In practice, ICT investment is typically divided into three components: IT equipment, communications equipment and software. These components represent the subset of ICT products that can usually be capitalised.

Revenue

In business, revenue is income that a company receives from its normal business activities, usually from the sale of goods and services to customers. In many countries, such as the United Kingdom, revenue is referred to as turnover.

Added Value = Price that the product/service is sold at - cost of producing the product

Added Value can also be defined as the difference between a particular product's final selling price and the direct and indirect input used in making that particular product.

Net Assets

Net assets, sometimes referred to as net worth, is the shareholders' equity = assets minus liabilities.

For a company, total assets minus total liabilities. Net worth is an important determinant of the value of a company, considering it is composed primarily of all the money that has been invested since its inception, as well as the retained earnings for the duration of its operation. Net worth can be used to determine creditworthiness because it gives a snapshot of the company's investment history, also called owner's equity, shareholders' equity, or net assets.

Assets

Any item of economic value owned by corporation (or an individual), especially that which could be converted to cash. Examples are cash, securities, accounts receivable, inventory, office equipment, real estate, a car, and other property.

ICT Sector

The ICT sector is defined according to the OECD (WPIIS) definition, first released in 1998 and revised slightly in 2002. It was revised again in 2007 (ISIC Rev. 4).

Table 23 OECD ICT sector definition

ICT manufacturing industries	IT	IT industry Sector
2610 Manufacture of electronic components and boards	C	
2620 Manufacture of computers and peripheral equipment	Y	PC Hardware
2630 Manufacture of communication equipment	C	
2640 Manufacture of consumer electronics	C	
2680 Manufacture of magnetic and optical media	C	
ICT manufacturing industries		
4651 Wholesale of computers, computer peripheral equipment and software	Y	IT Channels - Wholesale and retail
4652 Wholesale of electronic and telecommunications equipment and parts	C	
5820 Software publishing	Y	Software
61 Telecommunications	C	
62 Computer programming, consultancy and related activities	Y	IT services Software
631 Data processing, hosting and related activities; Web portals	C	
951 Repair of computers and communication equipment	Y	IT services

IT Industry

The four constituent sub-sectors i.e. set of companies focused on: PC hardware, Software, IT Services and IT Channels/Distribution. The starting point for the structural analysis is the official NACE registration of ICT companies, given in the table above.

IT Company Size

The enterprise size categorisation due to the number of their employees, size-class according to EUROSTAT Standard is following: (a) micro company – up to 9 employees; (b) small company – 10-49 employees; (c) medium company – 50-249 and (d) large company - 250 and more employees.

Outsourcing

The term outsourcing is used inconsistently but usually involves the contracting out of a business function - commonly one previously performed in-house - to an external provider. In this sense, two organisations may enter into a contractual agreement involving an exchange of services and payments.

Outsourcing - Offshoring

Offshoring involves shifting work to a foreign, distant organisation in order to reduce production costs.

Outsourcing - Nearshoring

Nearshoring is a derivative of the business term offshoring. Nearshoring is "the transfer of business or IT processes to companies in a nearby country, often sharing a border with your own country", where both parties expect to benefit from one or more of the following dimensions of proximity: geographic, temporal (time zone), cultural, linguistic, economic, political, or historical linkages. The service work that is being sourced may be a business process or software development.

Business Sector

A business (also known as enterprise or firm) is an organisation engaged in the trade of goods, services, or both to consumers. Businesses are predominant in capitalist economies, where most of them are privately owned and administered to earn profit to increase the wealth of their owners

Non-financial industry

An industry which does not deal with financial or investment-related goods or services.

ICT education

OAS: Tertiary-type A education. Programs (ISCED 5A) are largely theory-based and are designed to provide sufficient qualifications for entry to advanced research programs and professions with high skill requirements, such as medicine, dentistry or architecture. Tertiary-type A programs have a minimum cumulative theoretical duration (at tertiary level) of three years' full-time equivalent, although they typically last four or more years. These programs are not exclusively offered at universities. Conversely, not all university programs fulfil the criteria to be classified as tertiary-type A. Tertiary-type A programs include second degree programs like the American Master.

OSS: Tertiary-type B education. Programs (ISCED 5B) are typically shorter than those of tertiary-type A and focus on practical, technical or occupational skills for direct entry into the labour market, although some theoretical foundations may be covered in the respective programs. They have a minimum duration of two years full-time equivalent at the tertiary level.

Advanced Research Qualifications. Tertiary programs that lead directly to the award of an advanced research qualification, e.g., Ph.D. The theoretical duration of these programs is three years full-time in most countries (for a cumulative total of at least seven years full-time at the tertiary level), although the actual enrolment time is typically longer. The programs are devoted to advanced study and original research.

Abbreviations

ACCESS	Assistance to Competitiveness and Compatibility with the EU of Serbian SME
AC	Associated Countries, i.e. Serbia, Switzerland, Israel, Norway, Iceland, Croatia, Macedonia, Montenegro, Liechtenstein, Albania, Turkey
BkVF	Balkan Venture Forum
CAGR	Compound annual growth rate
CCR	Compound Competence Ratio
CCS	Current Competence Share
CIP	Competitiveness and Innovation Programme
CMMI	Capability Maturity Model Integration
CoE	Centres of Excellence
CRM	Customer Relationship Management
DAS	Diplomske akademske studije (Graduate Academic studies - Masters)
DED	Deutscher Entwicklungsdienst (DED) gGmbH
DS	Doktorske studije (PhD studies)
EEN	Enterprise Europe Network
EIB	European Investment Bank
ERP	Enterprise Resource Planning
ETF	Elektrotehnicki Fakultet (School of Electrical Engineering)
EU	27 member states of European Union (EU27)
EU10	10 new members states which joined the EU in 2004
EU15	15 members states which joined the EU before 2004
FDI	Foreign Direct Investments
FIT	Faculty of Information Technology
FON	Faculty of Organisational Sciences
FP6, FP7	Framework Programme 6, Framework Programme 7
FTE	Full Time Employed Researchers
GCI	Global Competitiveness Index
GDP	Gross Domestic Product
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH
ICT	Information and Communication Technologies
ICT-PSP	ICT Policy Support Programme (under CIP Programme)
ICT-R&D	Information and Communications Technology Research and Technology Development
IDI	ICT Development Index
IMP	Institute Mihajlo Pupin
IPA	Instrument for Pre-Accession Assistance
IS	Information Society
IT	Information Technologies
JISA	Jugoslovenski Informaticki Savez (Union of ICT Societies in Serbia)
MDCS	Microsoft Development Center in Serbia
MoSTD	Ministry of Science and Technology Development of the Republic of Serbia

MoTIS	Ministry of Telecommunications and Information Society of the Republic of Serbia
NACE	Statistical classification of economic activities in the European Community
NARD	National Agency for Regional Development
NIP	National Investment Plan
NITIA	National Information Technology and Internet Agency
OECD	Organisation of Economic Co-operation and Development
R&D	Research and Development
RTD	Research and Technology Development
RATEL	Republic Agency for Electronic Communication
RNIDS	Serbian National Register of Internet Domain Names
SANU	(or SASA) Serbian Academy of Science and Art
SAS	Specijalističke akademske studije (Specialist Academic studies)
SBRA	(or APR) Serbian Business Registers Agency
SCoC	Serbian Chamber of Commerce
SBAN	Serbian Business Angel Network
SPEA	Serbian Private Equity Association
SECEP	Support to Enterprise Competitiveness and Export Promotion -EU IPA Project
SEE	South-East Europe
SEE ICT	South-East Europe ICT
SIEPA	Serbia Investment and Employment Promotion Agency
SITO	Serbian IT Observer
SME	Small and Medium-sized Enterprises
SORS	(or RZS) Statistical Office of the Republic of Serbia
SSS	Specijalističke strukovne studije (Specialist Vocational studies)
SWOT	S-Strengths, W-Weaknesses, O-Opportunities, T-Threats
ToR	Terms of Reference
UNDP	United Nation Development Programme
VOICT	Vojvodina ICT Cluster
VoIP	Voice over Internet Protocol
WEF	World Economic Forum
OSS	Osnovne strukovne studije (Basic Vocational studies)
OAS	Osnovne akademske studije (Bachelor Academic studies)

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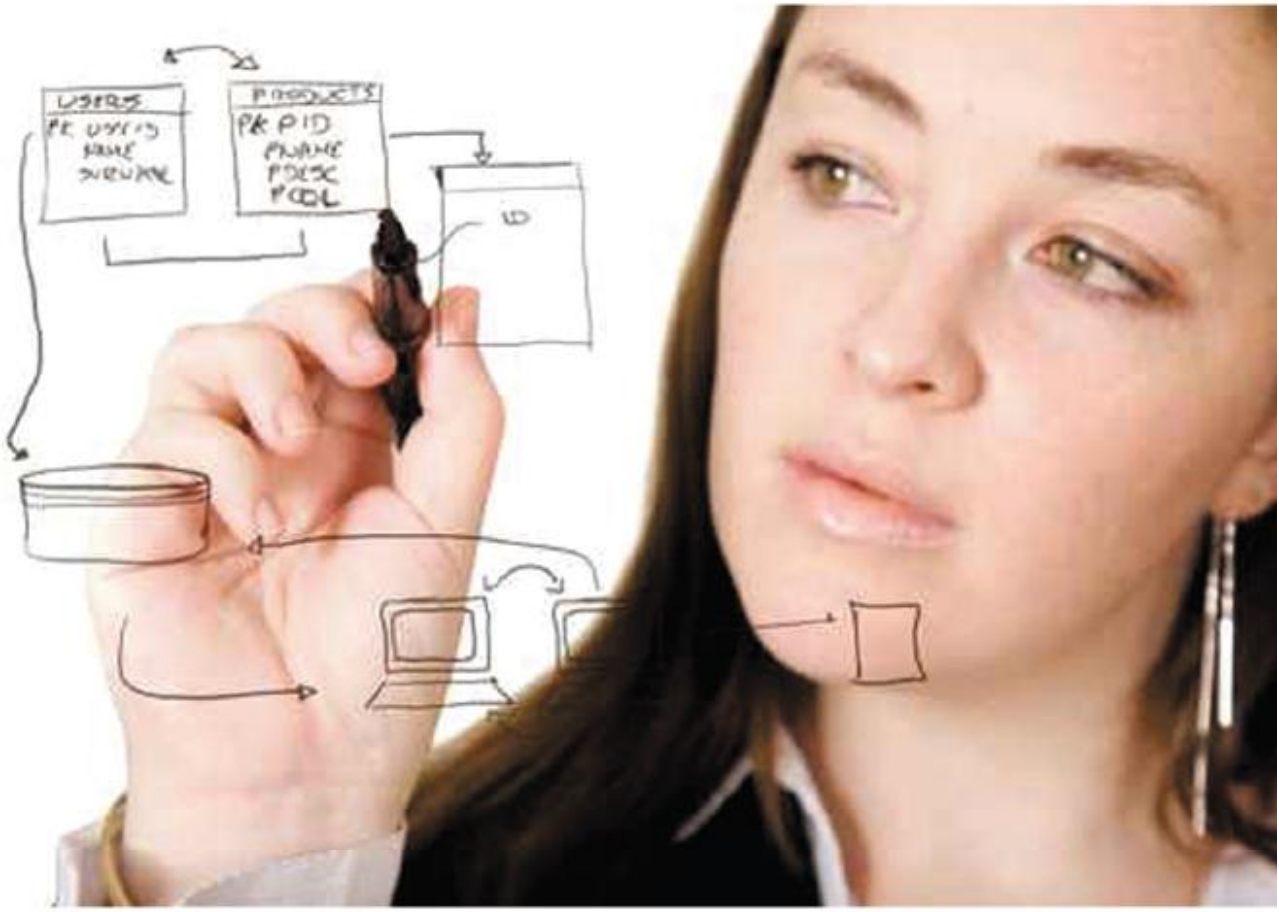

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