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Overview of the Serbian ICT sector: Looking Optimistic Towards the Future

Abstract: The ICT sector in Serbia has grown from a nascent industry into one of the country's leading sources of net export growth and major contributor to GDP. Export revenues from ICT services in the period 2008-2015 tripled, and from computer services even quadrupled. More importantly, in foreign trade the ICT sector generates a large surplus. Observed in aggregate terms as of 2008, the net export value of the sector increased 7.3 times, while its trend in computer services is best described by exponential trend. Nevertheless, our impression is that the ICT sector reached outstanding results in a rather elemental and chaotic milieu. Strategic documents are outdated, the Action Plan for the Development of the Information Society is not in force, sector has excellent performance without large presence of foreign strategic companies etc. The important thing for further development of the ICT potential in the country is a significant investment in education and continuous improvement and harmonization of our education system with the market needs.

Keywords: ICT sector, computer programming services, export

1. Introduction

Technology has incredible power to improve people's lives, foster economic growth, and create opportunities for individuals, companies, and nations around the globe. From an economic point of view, ICTs boost productivity and reduce transaction and information costs. They allow new models of collaboration that increase workers' efficiency and flexibility. ICTs foster entrepreneurship and create new business models. Furthermore ICTs offer significant social benefits, notably by enabling access to basic services, including financial services and education. They also allow for a more direct interaction between populations and governments. (World Economic Forum, 2015).

ICT plays an important role in the Serbian economy as well. The ICT sector has grown from a nascent industry into one of the country's leading sources of net export growth and major contributor to GDP. FDI's have played a role in this context (but not decisive), with a healthy mix of large multinationals and local players operating in Serbia, providing employment to 35.000 persons in the industry. The country is a net importer of ICT products, especially of hardware and consumer electronics, but substantial net exporter of ICT services.

2. Analytical review

When it comes to international trade, there is a need to immediately define and ensure regular monitoring of the ICT net inflow, which cannot be aggregately expressed in normal export statistics. Therefore, we shall provide here a short review of the ICT sector performance in Serbia.

The domestic economy sector, which has recorded boom in recent years, along with the potential for even more significant growth in the future, is the ICT - information and communications technology sector. This concerns primarily ICT services, more broadly, and computer services within. Given the fact that the ICT sector in Serbia is characterized by a pronounced heterogeneity, its second segment, the segment of ICT manufacturing industry, now lags significantly behind. This weakness in the different variables of the Serbian ICT manufacturing sector contrasts with the strong performance of

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the ICT services sector. The ICT services sector generated more value added, created more jobs, invested more in R&D, and had more R&D personnel growth.

In the Table 1 below we provide „ID card“ of the ICT sector in Serbia, and we shall further particularly focus on its export performance. For a detailed definition of the ICT sector, the so-called 2007 OECD definition, see: Mas, M., & J. Fernández de Guevara, 2015. or even more detail in: Mas, Robledo and Pérez, 2012.

Table 1. Annual enterprise statistics for ICT activities of Serbia, in 2014

Nace code	ICT activities	Average number of employees	Average monthly gross wages in EUR	Revenues from sales of goods and services, in 000 EUR	Net profit (in 000 euro)
26	Manufacture of computer, electronic and optical products	5 566	510	178 255	10 328
2611	Manufacture of electronic components	485	440	7 469	- 440
2612	Manufacture of loaded electronic boards	1	109		- 2
2620	Manufacture of computers and peripheral equipment	2 467	583	100 832	3 336
2630	Manufacture of communication equipment	459	536	16 007	- 354
2640	Manufacture of consumer electronics	77	293	1 605	47
2651	Manufacture of instruments and appliances for measuring, testing and navigation	1 635	429	47 187	5 404
2660	Manufacture of irradiation, electromedical and electrotherapeutic equipment	126	677	1 275	1 390
2670	Manufacture of optical instruments and photographic equipment	310	408	3 863	941
2680	Manufacture of magnetic and optical media	5	182	12	4
61	Telecommunications	15 574	935	1 603 174	179 942
6110	Wired telecommunications activities	14 521	829	1 211 822	84 911
6120	Wireless telecommunications activities	665	3 285	363 054	90 222
6130	Satellite telecommunications activities	39	369	2 092	- 952
6190	Other telecommunications activities	349	928	26 206	5 761
62	Computer programming, consultancy and related activities	11 469	1 077	398 254	32 324
6201	Computer programming activities	9 911	1 030	311 700	24 872
6202	Computer consultancy activities	796	1 118	44 448	3 544
6203	Computer facilities management activities	13	258	324	13
6209	Other information technology and computer service activities	749	1 671	41 783	3 895
63	Information service activities	1 271	702	34 686	4 032
6311	Data processing, hosting and related activities	732	886	28 619	4 266
6312	Web portals	186	479	3 599	147
6391	News agency activities	338	448	2 152	- 394
6399	Other information service activities n.e.c.	15	240	316	13

Source: Business Registers Agency

First, it should be noted that the export revenues from ICT services in Serbia in the period 2008-2015 tripled, and from computer services even quadrupled. Nevertheless, this has not significantly offset lagging behind for the European countries in this sector, given that the export revenues from ICT services in the CEE (Central and Eastern European) countries increased 2.45 times in the same period, similarly as in the Eurozone countries (2.44 times), thus reaching EUR 15.2 billion in late 2015, i.e. EUR 214.1 billion, respectively.

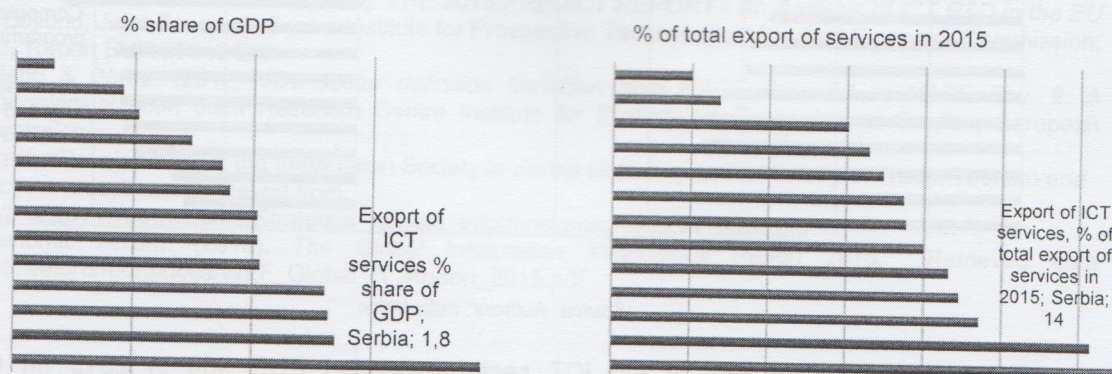
Table 2. Information and communications technology sector: Exports in EUR million, period 2013-2015

	2013	2014	2015	Net export in 2015
1. ICT products	50,8	57,2	67,5	-142,6
2. ICT services (total)	437,2	485,0	610,8	317,4
2.1. Telecommunications	138,5	153,6	151,5	32,8
2.2. Computer services	296,0	328,3	454,7	287,8
2.3. Information services	2,7	3,0	4,5	-3,3
ICT Total (1+2)	487,9	542,1	678,3	174,8

Source: National Bank of Serbia

The dynamic growth of our exports, compared with exports of the surrounding countries, did not provide the absolute significance on an international scale. Still, this sector is becoming increasingly important for Serbia, in terms of both small value of the national GDP and total export performance which is weak. Observed among the European emerging markets, relative significance of ICT exports for GDP, higher than in Serbia, is reported only by Estonia where this share stands at 2.52% of GDP. On the other hand, with 14.3% Serbia is second- ranked also by the share of exports of ICT services in the total value of exports of services.

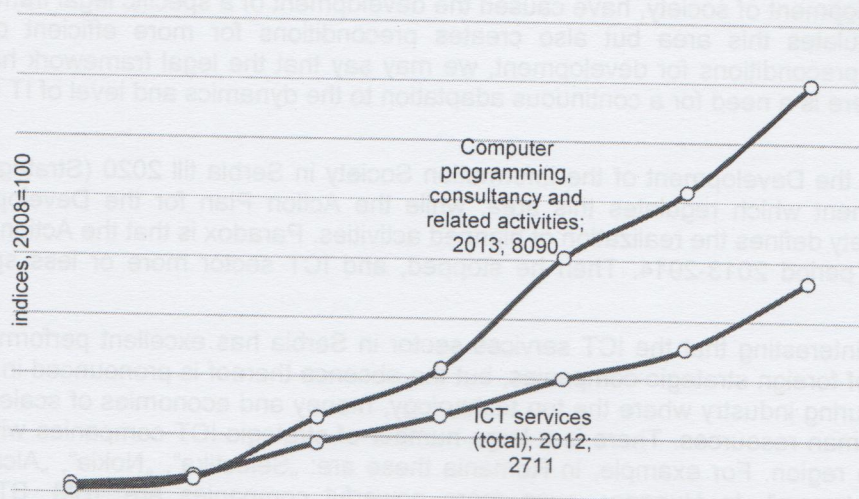
Figure 1. Export of ICT services



Source: Authors' calculation

More importantly, in foreign trade the ICT sector generates a large surplus. Observed in aggregate terms as of 2008, the net export value of the sector increased 7.3 times, while its trend in computer services is best described by exponential trend.

Figure 2. Net export growth of ICT in Serbia

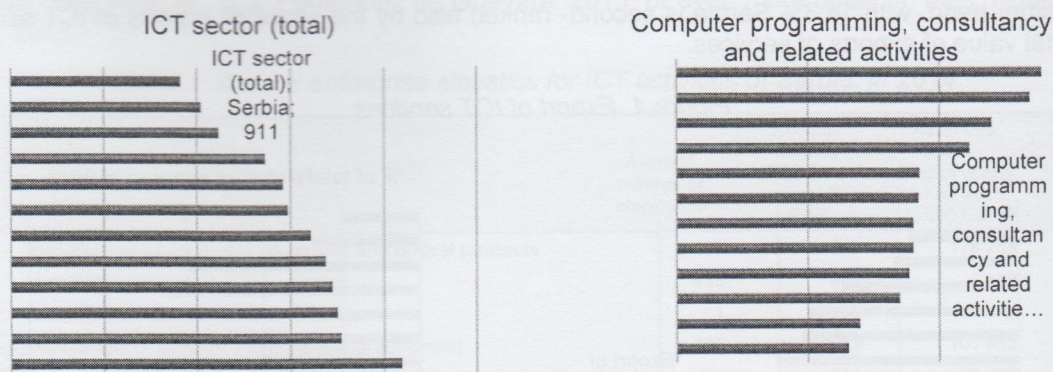


Source: Authors' calculation

The only two products that reported in Serbia better net export result in 2015 (i.e. those with higher contribution to a reduction in foreign trade imbalance) are maize and frozen fruit. Export of maize last year stood at EUR 342.9 million Import stood at EUR 12.3 million, thus net exports was worth EUR 330.6 million while total value of frozen fruit exports reached EUR 340.8 million and the net component thereof EUR 318.2 million. Tires and new cars reported far lower net export effect (cc. 180-200 mln., respectively). Export recorded by „Smederevo steelworks“, which was last year, after

the „FIAT Chrysler Automobiles Serbia“ ranked second most significant export company in the country, amounted to EUR 319 million, but net exports thereof was worth only EUR 56.4 million.

Figure 3. Average monthly Wages and salaries (total), in 2015



Source: Authors' calculation

As the average monthly wage in the ICT sector exceeded EUR 900 in 2015 (in Computer programming, consultancy and related activities wages and salaries are approximate on the average level of the CEE countries), it is not surprising that an ICT employee pays approximately two times higher taxes as an average employee in Serbia. The ICT sector, employing more than 35 000 people and with a significant share of social, health and tax payments, as well as the growth of productivity, is therefore an important pillar of the economy.

3. Conclusion

The dynamics of development, as well as the possibilities of IT implementation and their influence on the life and development of society, have caused the development of a specific legal framework which defines and regulates this area but also creates preconditions for more efficient development. Speaking of the preconditions for development, we may say that the legal framework has been well set. However, there is a need for a continuous adaptation to the dynamics and level of IT development in Serbia.

The Strategy for the Development of the Information Society in Serbia till 2020 (Strategy..., 2010) is the basic document which regulates this area, while the Action Plan for the Development of the Information Society defines the realization of planned activities. Paradox is that the Action plan defined actions only for period 2013-2014. Then he stopped, and ICT sector more or less spontaneously develops.

It is particularly interesting that the ICT services sector in Serbia has excellent performance without large presence of foreign strategic companies, but the absence thereof is pronounced in the segment of ICT manufacturing industry where the top technology, money and economies of scale are required in addition to human resources. There is a large number of strategic ICT companies with production capacities in the region. For example, in Romania these are: „Selestika“, „Nokia“, „Alcatel- Lucent“, „Flextronics“, „Intrarom“. In Hungary, even more powerful companies are: IBM, BT, „Ericsson“, „Samsung“, „Flextronics“, GE, „Nokia“. Hungary has a relatively high share of telecommunication production – related among others to the activities of *Nokia* and *Foxconn* – while the Czech Republic is the European computer hub (Bormann, S. & Plank, L., 2010).

Serbia must try to attract some of them or the similar companies, whether to „steal“ them or to convince some newcomers to invest here. We can offer them educated and flexible IT professionals and innovative and financial government incentives, an attractive business environment and the competitive labor price, although lagging behind the region in this segment is gradually reduced. On the other hand, the important thing for further development of the ICT potential in the country is a significant investment in education and continuous improvement and harmonization of our education

system with the market needs. The need to increase the enrollment quotas for this industrial branch is obvious, but we also have to work on improving the quality of education by adjusting the curricula to current trends in this field and creating the conditions for their expansion.

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1. Introduction

Although the validity of the university rankings is often debatable, their influence is increasing (Aubach, 2011). No higher educational system is spared from critics or praise upon the publication of annual ranking results. For example, the French higher educational system was widely criticized because of its unexpectedly low university ranks on the Shanghai Ranking (ARWU) list, while the Chinese ranking result was regarded with praise (Salasna, d'Hombres, & Salasna, 2011). In Serbia, the results of the 2015 Shanghai ranking (ARWU) have been widely elaborated and celebrated as the first Serbian university, University of Belgrade, entered the group 201-300 (Bic, 2016). These evaluations have also been government representatives and media place attention on annual university rankings.

Besides the above-mentioned ARWU, there are other world recognized university rankings such as the QS World University Ranking (QS), Times Higher Education (THE), SCImago, or the Leiden ranking and some of them a above criticism. ARWU has been criticized for being too oriented on research and output that favors universities from English-speaking countries (Marginson, 2007). Comprehensive analysis of weighting schemes of these three rankings pointed out their high level of bias which impacts the overall ranks (Dvorčić, Šušter, Schumann, & Jeremić, 2016; Jeremić, Đukić, Šušter, & Rodolović, 2011). Contrarily, SCImago and the Leiden ranking do not aggregate indicator values to an overall value, yet they enable ranking by each indicator. These two rankings do not attain the same level of wide public recognition as they are based on bibliometric data that require additional skills and knowledge to interpret (Marginson, 2014).

Recently developed ranking methodology is starting to attract more attention worldwide. The University Ranking by Academic Performance (URAP). This ranking, which is based on bibliometric data, stands out because of its impressive coverage: it covers more than 2000 universities. The ranking creators intentionally chose indicators that can easily be collected for a large number of worldwide institutions (Rauwangers, 2013). The indicator data used by URAP is research-related and gathered from academic sources. In their review of university rankings, Okoy & Bula (2016) state that "URAP is comparatively more comprehensive in measuring the overall research productivity as it has components from almost all criteria such as academic productivity, research impact, research quality, and international collaboration with approximately equal weights of each". However, like many other