RESEARCH OF DEVELOPMENT AND GROWTH PERSPECTIVES OF THE LOCAL ICT SECTOR

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ABSTRACT
Eastern Croatia and its most important urban and university center city of Osijek have undergone a drastic transformation of the economic structure in the last quarter century. With the disappearance of traditional industries (metal processing, wood processing, textiles, graphics and part of the food processing industry) and the inadequate development of the primary sector (agriculture, forestry) a huge gap was created in the economics equality of the regions in Croatia. The young generations of educated people remain unemployed for a relatively long time, migrate to large urban centers (in this case to Zagreb) or even emigrate to European countries in search of employment. Under these conditions, a small enthusiastic groups and individuals appear who, relying solely on its own intellectual capital, leave the limitations of the local environment and begin to produce services that can be implemented in the global market. This capital primarily consists of the knowledge and skills of the creative use of ICT. Recognizing the limitations of small separate groups in this sector, began their association in order to achieve better positions in the regional and global market, find new market niches, as well as to create educational centers parallel to the official teaching at schools and universities. There was no classic cluster approach applied, but in early 2013 the non-profit, non-government association named Osijek Software City (OSC) was founded. Its aim is to increase the attractiveness of IT development profession in Osijek, encourage IT entrepreneurship, networking and design of cooperation programs. Today, Osijek Software City brings together more than 40 companies and dozens of individuals. The aim of this study is to assess the possibilities for further development of the regional ICT sector, analyze data on the number of businesses and employment in this sector, as well as to determine whether there is a possibility that this region becomes more competitive and attracts even more young and educated IT professionals and large companies.

Keywords: Croatia, digital economy, employment, information technology, IT sector

1. INTRODUCTION
Croatia, alongside Slovenia, was the most developed republic in Yugoslavia, particularly in the areas of agriculture, industrial production, construction, oil industry, shipbuilding and tourism. After the break-up of Yugoslavia, the Croatian socialist and semi-market economy was transformed into a system based on private ownership and an open market economy. This transition, however, was delayed and hindered by the aggressive war against Croatia and the adjustment of economic policies to the needs of defense. Economic development was burdened by a large amount of war damage, estimated in 1999 to amount to USD 37.1 billion, which also made transformation and privatization more difficult. In addition, the transformation process
by which the former public (social) ownership became state owned and then privately owned, was undertaken in agreement between the political and business elite, frequently without the actual purchase of enterprises or investment in them. The transition therefore had many negative social and economic effects: the impoverishment of the population, a rise in corruption and economic crime, and the devastation of industry. After the immediate difficulties of the war had been overcome, Croatia moved into a phase of increasing Gross Domestic Product (GDP). The highest growth rate of 5.2% was recorded in 2002, and in 2003 GDP reached its level before the war (USD 24.8 billion, 1990). The rising trend of GDP continued until 2008, when a fall and then stagnation occurred, caused primarily by the worldwide recession. At the end of the 1990s, the largest proportion of GDP was accounted for by the service sector (59%) followed by industry (32%) and agriculture (9%), which was similar to most developed countries. Over the last couple of years, due to the cycles of recession in the global economy, there have been negative trends in all branches of the economy, except in tourism (Croatia.eu, n.d.).

Due the war situation and the disappearance of traditional industries (in part because of poorly executed privatization), a huge gap was created in the economic equality of the regions in Croatia. Nowadays, eastern Croatia is one of the least developed regions in Croatia. Eastern Croatia consists of 5 counties: Vukovarsko-srijemska, Osječko-baranjska, Požeško-slavonska, Virovitičko-podravska, Brodsko-posavsk. Graph 1 shows GDP per capita for eastern Croatia regions in 2014. Four counties that have the lowest GDP per capita can be found at the very bottom of all the counties in Croatia. Compared to Zagreb, the Croatian capital, these four counties have three times lower GDP per capita, while the Osječko-baranjska county is in slightly better situation, it has more than two times lower GDP per capita.

![GDP per capita](image)

**Graph 1**: GDP per capita of 5 eastern Croatia counties in 2014 (Croatian Bureau of Statistics, “Gross Domestic Product for Republic of Croatia”, available at: [www.dzs.hr](http://www.dzs.hr))

Export of Croatian products was reduced to former Yugoslav countries, significant market of loyal consumers, protected by customs duties and lost during the war and disintegration of Yugoslavia. On the other hand, new Western European markets were opened, which Croatia was yet to win, as a small Balkan country and a former member of the Federal Republic of Yugoslavia. With opening up the market, there were also new competitors who had not been present in the closed domestic market, and whose size, strength and experience of business on the open market were a great advantage compared to the unprepared and war-devastated Croatian companies whose adaptation was very slow (Mesarić, Franjković, Šebalj, 2014).
Under these conditions, a small enthusiastic groups and individuals appear. Relying solely on its own intellectual capital, they began to produce products and services (mostly software) that can be offered and implemented in the global market. In order to achieve better market position on the local and global market at first, they decided to launch a project named Osijek Software City (OSC). There was no classic cluster approach applied. According to information available on the website (http://softwarecity.hr/o-projektu/), Osijek Software City is a project started in 2012, through which IT companies in Osijek act towards the local community. In early 2013 the non-profit, non-government association named Osijek Software City (OSC) was founded. Its aim is to increase the attractiveness of IT development profession in Osijek, encourage IT entrepreneurship, networking and design of cooperation programs. Today, Osijek Software City brings together more than 40 companies and dozens of individuals (Osijek Software City, n.d.). In this study, authors will show the current situation in the local ICT sector and research its growth perspectives. The aim of this study is to assess the possibilities for further development of the regional ICT sector, analyze data on the number of businesses and employment in this sector, as well as to determine whether there is a possibility that this region becomes more competitive and attracts even more young and educated IT professionals and large companies. This work is funded by Croatian Science Foundation under Grant No. 3933 "Development and application of growth potential prediction models for SMEs in Croatia".

2. LITERATURE REVIEW

There is no lot of papers that deal with the local ICT sector in some country. Most of the papers investigated effects of ICT on GDP growth, where it can be concluded that ICT is an important and significant source of growth (Ceccobelli et al., 2012; Vu, 2011; Venturini, 2009; Kamel et al., 2009; Nasab and Aghaei, 2009; Park et al., 2007; Stiroh, 2002; Colecchia and Schreyer, 2002). Speaking of returns from IT investments, country level studies showed that for the developed countries returns from IT capital investments are estimated to be positive and significant, and for the developing countries they are not statistically significant (Dewan & Kraemer, 2000; Pohjola, 2000; Mankiw et al., 1992). Another type of research in this field was conducted by Holm and Østergaard (2015), who were researching the adaptability of a regional industrial system faced with the shock, like in times of crisis. Their research referred for regional ICT industries in Denmark. It was shown that the ICT sector in urban and agglomerated regions was sensitive to the business cycle, while the sector in less urbanized regions was resistant. They also stated that diversity makes the ICT sector more sensitive to changes in the business cycle, which worsen the effect of the shock but speeds up the recovery. Van Oort and Atzema (2004) in their research analyzed the factors that determine new firm formation in the ICT sector in the Netherlands. The results showed that new establishments in the ICT sector tend to be concentrated in urban areas that are already relatively specialized in this sector and where economic activity is spatially dense. If one looks at the ICT sector in the narrow area of city of Osijek, it can be seen that there is the same situation. Osijek became the place where new IT companies are established. In this area, there is a lot of, mostly young, companies in the ICT sector and economic activity in this field for the last 3–4 years is very high. Since the city of Osijek is a 4th largest city in Croatia as well as the biggest city in eastern Croatia, it implies a presence of other industries, not only IT industry. This confirms the above-mentioned conclusion stated by van Oort and Atzema. Atzema (2001) stated that ICT firms can also be found in smaller towns and outside of the urban concentrations. He conducted a research where identified geographical concentration of the 18,985 ICT firms in the Netherlands. Many ICT firms preferred a location outside the large cities. There was also a tendency of spatial specialization in which large firms in general, are still located predominantly in large cities like Amsterdam. Hall (2006) has researched a successful ICT cluster formations. He stated that one of the best documented ICT clusters was formed in the North Jutland area of Denmark around
the capital of Aalborg. In 2006 Danish ICT sector consisted of four major segments: IT/electronics, telecommunications, broadcasting, information/entertainment. Unlike Sweden, which has Ericsson, or Finland, which has Nokia, Denmark has no dominant company. In 1980s North Jutland was characterized by traditional industries and some of the highest unemployment in Denmark. In 1990s there was a strong growth of IT services and components for the electronics industry. In that time the NorCOM association was founded. It was a formal association formed by some businesses and Aalborg University. That cluster included 35-50 firms, 25 of which belonged to the NorCOM association. One of the main contributors to the growth was Aalborg University, since its capabilities in mobile communications research helped to bring R&D departments of several leading mobile companies to North Jutland. During 1999-2000 there was 35-40 NorCOM firms, employing 4,200 people – half the ICT employment in the region. North Jutland is currently recognized for its cross-sector cooperation and numerous networks involving companies, schools, professional and industrial bodies, public authorities and Aalborg University. The second example of the successful ICT cluster that Hall (2006) mentioned was Finland’s leading company Nokia and the ICT cluster that has grown up around it. Thanks to Nokia, Finland, a country with the few natural resources, achieved economic parity with countries like England, France and Germany. Unlike Finland, in eastern Croatia there is no so large and dominant company that could affect clustering around it. Furtherly, another thing helped ICT growth in Denmark and Finland. Initial cluster growth was stimulated by the establishment of the Nordic Mobile Telephony system in 1981-82. Hall (2006) also conducted a research about the current state of the Victorian ICT industry. Victoria is a state in southeastern Australia with a reasonably well developed ICT sector. There are several key research findings related to its ICT sector – poor involvement of women in the ICT industry, competition from overseas ICT industries, the lack of an Australian niche in the global ICT, too many people with ICT skills who are unemployed and, on the other side, a deficit of specific ICT skills in the ICT industry.

3. METHODOLOGY AND DATA
For the purpose of this study the structure and growth of the companies and employees number from the group J62 - Computer programming, consultancy and related activities (according to NACE\(^1\) classification) will be analyzed. Data were collected by the Croatian Bureau of Statistics and the Financial Agency. Using web solution Poslovnja Hrvatska (Business Croatia), where different data about companies in Croatia were collected by several sources, the information about all active companies and crafts in the group J62 (Computer programming, consultancy and related activities) were exported. On 31\(^{st}\) March 2017, there are total of 4,998 business entities that meet this condition. The exported file contains data about business entity’s name, place, ZIP code and county. From the web page of Croatian Bureau of Statistics the information about Croatian counties were collected in order to calculate the density of IT companies per area within the counties. For the purpose of visualization and data analysis, software Tableau was used.

4. RESULTS
The predominant part of the Croatian IT industry nowadays are small companies. According to Mesarić et al. (2014), in 2013 the number of companies with 1-9 employees amounted up to 92.1% of the total number of companies in the ICT sector (companies within Group J –

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\(^1\) NACE 2007 (National Classification of Activities) has been in operation since 1 January 2008, and it defines areas, divisions, groups and classes of all economic and other activities. The European Community has introduced a statistical classification of economic activities under the abbreviated name NACE that began with the application on 1 January 2008

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Information and communication were taken into account). According to the same research, the number of employees, as well as the number of the ICT companies in Croatia has been increased from 2009 to 2013. But what is the current situation in the local IT sector? The statistical data will be presented on the situation in the computer programming, consultancy and related activities of eastern Croatia, for the period from 2010 to 2014.

**Graph 2: Number of companies in IT sector (group J62) in the eastern Croatian counties (Authors, according to the Croatian Bureau of Statistics)**

From the Graph 2 it can be seen that all counties have a growth in number of companies in comparison to 2010, especially Osječko-baranjska county where the number of companies increased by 52%, and by 71% compared to 2008 (Barišić, 2016). It has to be mentioned that here are presented only results for legal business entities, while crafts are excluded since those data are not available by Financial Agency.

**Graph 3: Number of employees in IT sector (group J62) in the eastern Croatian counties (Authors, according to the Croatian Bureau of Statistics)**

The similar situation is with the number of employees in this group of activities. As can be seen in the Graph 3, the number of employees in almost all counties is increasing. According to Croatian Employers’ Association (2016), in the sector of information and communication
technologies (group J), the sub-sector of computer programming and IT services (group J62) stands out as a leader, since it employs the most of all sub-sectors within Information-communication technology. Computer programming is one of the sectors listed in the key industrial sectors and its results has risen to the very top. Revenue of this ICT sub-sector grew by 11%, but outstanding result was achieved in export – 31% growth only in 2015. The total number of employed ICT specialists is potentially two or three times higher, because some of them perform ICT jobs within the companies that are not registered for ICT activities. Some estimates that the number of employees in this sector will grow to 50,000 by 2025 (Poslovni dnevnik, 2016). Taking into account the indexes of the number of companies and employment growth in the Group J62 compared to all companies in eastern Croatia, as shown in Graphs 4 and 5, it can be seen that the number of companies in IT sector, as well as the number of employees grew at a higher rate than in other sectors. The biggest difference in growth was in 2013.

**Graph 4:** Index of trends in the number of companies in the eastern Croatian counties in group J62 and all companies, base = 2010 (Authors, according to the Croatian Bureau of Statistics)
Currently, the young generations of educated people remain unemployed for a relatively long time, migrate to large urban centers (in this case to Zagreb) or even emigrate to European countries in search of employment. In order to soften this negative trend, as mentioned earlier in the paper, the association of IT companies in Osijek was established. Graphs 4 and 5 show the results of that initiative. These graphs show that, compared to other sectors, IT sector had greater growth/smaller decline in number of companies and employees. This confirms that IT sector has a positive impact on economy of eastern Croatia. The high youth unemployment rate certainly forced one part of young people into entrepreneurial activities through self-employment, as researched by Franjković et al. (2015).

From another source, Poslovna Hrvatska (2016), the information about all active companies and crafts in the group J62 (Computer programming, consultancy and related activities) were exported. There are 4,998 valid entities on 31st March 2017. Those entities were separated by counties. The biggest number of companies has City of Zagreb - 2,386. If Zagreb was excluded, there are only 5 counties with more than 200 companies in J62 group of activities. Besides such absolute numbers, the density of IT companies per area within the counties was examined (the number of IT companies per square kilometers), which is shown in the Figure 1. City of Zagreb was excluded from the Figure 1, since its density is 3.722. The average density in the counties comes to 0.029 companies per square km. As much as 50% of all counties do not reach this average. It can be seen that eastern Croatia has a relatively small density, compared to north-western Croatia. Furtherly, the share of J62 companies and crafts in the total number of
companies was examined (Figure 2). Figure 2 shows that City of Zagreb has the largest share of J62 companies and crafts of all active companies, followed by Varaždinska, Međimurska and Osječko-Baranjska counties. The situation is very similar to the density, since the 4 of 5 counties of eastern Croatia are in the bottom half of the list. Exception is Osječko-Baranjska county, which is 4th.

Figure 2: Share of J62 companies in the total number of companies (Authors, according to the Croatian Bureau of Statistics)

5. DISCUSSION AND CONCLUSION

This research shows that the local IT sector still lags behind the rest of Croatia, especially its north-western part. However, in the last four years it can be noticed a positive change in number of IT companies as well as in number of employees in IT sector. Regardless of the crisis, the number of companies and employees is in increase in all eastern Croatian counties. From this research, it can be also seen that during several years IT sector in eastern Croatia grew more than other sectors, speaking of number of companies and employees. This only confirms that IT sector can be initiator of growth in eastern Croatia. How Osijek Software City influenced the establishment of new IT companies shows the share of IT companies in the total number of companies where Osječko-baranjska county took high fourth place. Those are indicators in which direction goes the development of IT sector. The association Osijek Software City has set good foundations for further development of this sector. This trend will certainly continue, since the Croatian economy is on the upswing. The main limitations of this research are missing data for crafts as well as outdated information gathered from the Croatian Bureau of Statistics. In future studies authors plan to define the main concentration areas of IT companies at the level of postal code districts.

LITERATURE: