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ICT IN THE MORAVIAN-SILESIA REGION IN THE FRAMEWORK OF CZECH CONDITIONS

Summary: In last 3 decades information and communication technologies (ICT) became a global phenomenon. It is apparent that ICT is included in all spheres of life. The same is true in the Czech Republic. Available data for the period 2008-2015 show significant progress in ICT usage in households and businesses. The companies operating in the ICT sector became an important source of economic growth. ICT sector has interdisciplinary focus, the capability to respond quickly to customer needs and the capability to innovate. ICT subjects are important within regional and local economies. The regional metropolis Ostrava becomes the center of ICT in the Moravian-Silesian Region. In this paper we focus on the company TIETO with headquarters in Ostrava, which provides ICT services in the global markets.

Keywords: ICT sector, Moravian-Silesian Region.

JEL Classification: R1, R11.

Introduction

Information and communication technologies (ICTs) have become in recent decades an important source of economic growth. Extensive development of ICT in the world started in the 80s of the 20th century. Currently they pervaded into virtually entire spectrum of economic sectors. The application of ICT leads to more efficient production of goods and services, but also to the emergence of entirely new products and industries. ICT also significantly affect consumer behavior. ICTs gradually penetrated into the corporate sector, but also are increasingly applied and used in the institutional structures, e.g. in public admin-

istration. Currently, ICT is a sector significantly contributing to the GDP in all developed countries. From a broader perspective, ICTs contribute to changes in economic processes and social institutions. They have become a global phenomenon. The impact of these technologies is much broader. In principle, they penetrated into all areas of modern life [see Castells, 2011, Doucek, Nedomová, 2011, Lelek, Volejníková, 2011, Hes, Šálková, Regnerová, 2010].

ICTs and their applications have become a very important factor in competitiveness, especially in developed countries and are contributing to the overall economic development [see Dedrick et al., 2003; Venturini, 2009]. Marčan [2006] points out that the rate of usage of ICT is considered as a critical factor affecting the competitiveness and efficiency of national economies. Especially positive effect on increasing labor productivity is often cited as a factor influencing entire competitiveness of economies. Fischer, Vltavská, Doucek and Hančlová [2013] attempted to construct an estimate of the impact of ICT development on labor productivity and total factor productivity in the Czech Republic. They conclude that particular area of ICT services has a significant contribution to labor productivity in the Czech Republic. The research results demonstrate above-average labor productivity per hour worked relative to the rest of the economy. Novotný, Voříšek et al. [2010] in their study mention some other positive effects of ICT. ICT are classified among the most innovative sectors, also having multiplier effects in other sectors. At the same time, they mention relatively easy export of ICT products and services, associated with relatively easy codification of these products and services. Conversely, some of the negative aspects of ICT, especially in relation to the environment are stated in the contribution of Plepys [2002]. Negative impacts of ICT are mentioned also by Avgerou [2003]. According to this author, ICT contribute to the expansion of the enormous differences between developed and developing countries.

From the spatial perspective empirical work of van Oort and Atzema [2004] is interesting. These authors focus on the factors determining the formation of new companies in the field of ICTs among the municipalities in the Netherlands. They mention in particular the role of agglomeration economies and other localization attributes. One of their conclusions is that high-tech firms (i.e. also ICT) tend to the collocation in the areas with dense economic activity. This are mainly urban areas that adequately meet the in requirements. Particularly urban areas already relatively specialized in this industry and relatively rich in the presence of other industries, are areas attractive for localization of new companies [see also Beardsell, Henderson, 1999]. Acs [2003] present in this context, that the new technology skills, which are also applied in the ICT sector, are usually tacit

by its nature. Thus, the availability of this knowledge as well as their growth spillovers is limited by the spatial proximity of high-tech companies or knowledge institution [see also Glaeser et al., 1992; Glaeser, 1999; Dumais et al., 2002; van Soest, Gerking, van Oort, 2004]. On the territory of the Czech Republic ICT from a spatial perspective is analyzed by Reinöhlová [2005], which discusses the possible effects of ICT on the development of peripheral areas. Blažek, Žížalová, Rumpel and Skokan [2011] deal also partly with ICT. The case studies are evaluated in this contribution. They focus on the biotech cluster and the ICT cluster. They examine their impact on the typologically two very different regions, the capital city of Prague and Ostrava.

1. Materials and methods

The main objective of this paper is to analyze and assess development of the ICT sector in the Czech Republic and in the Moravian-Silesian Region (MS region). Attention is given also to the Tieto Czech ltd. and to the impacts of this company on the local and regional economy.

The first part is focused on the development of the information society in the Czech Republic and further on the ICT sector in the country. Data were analyzed for the period between 2008-2015, or in some cases only into 2014 due to limited availability of data. The actual data was obtained from publicly available database of the Czech Statistical Office. Based on the selected indicators, we're trying to point out large rate of penetration of ICT into the lives of people in the Czech Republic. Subsequently, we analyzed some selected characteristics of the development of ICT Sector in the Czech Republic.

The second part of the paper is focused on ICT in the territory of the MS Region. First, we analyzed development of the ICT sector in MS Region between years 2008-2014. Once again, we are relied on data, obtained from official statistics of the Czech Statistical Office. Secondly, we focus on the company Tieto Czech ltd. The Tieto Czech belongs among the largest employers in the ICT sector in the MS Region. Attention is focused on the influence on the regional as well as local economy. The company's official website, are used in this case as a source of information.

We start from the definition and delimitation by CZ – NACE, defined by the Czech Statistical Office, for the identification of ICT sector. Czech Statistical Office defines the ICT sector in several major categories as follows: ICT manufacturing industries, ICT trade industries and ICT service industries. ICT sector involves all businesses whose dominating activities belong to the CZ-NACE groups as follows (Table 1).

Table 1. ICT sector by Czech Statistical Office

ICT manufacturing industries	Manufacture of electronic components and boards (26.1)
	Manufacture of computers and peripheral equipment (26.2)
	Manufacture of communication equipment (26.3)
	Manufacture of consumer electronics and media (26.4 and 26.8)
ICT trade industries	Wholesale of information and communication equipment (46.5)
ICT services industries:	
<i>a) Telecom. activities</i>	Wired telecommunications activities (61.1)
	Wireless telecommunications activities (61.2)
	Satellite and other telecommunications activities. (61.3 and 61.9)
<i>b) IT services</i>	Software publishing (58.2 and 62.0)
	Data processing, hosting and related activities; web portals (63.1)
	Repair of computers and communication equipment (95.1)

Source: Czech Statistical Office [2015]; personal.

2. Results

In the following part of the article we focus on the development trends in information and communication technologies in the Czech Republic. Selected indicators are monitored between 2008-2015. The actual chapter is divided into two parts.

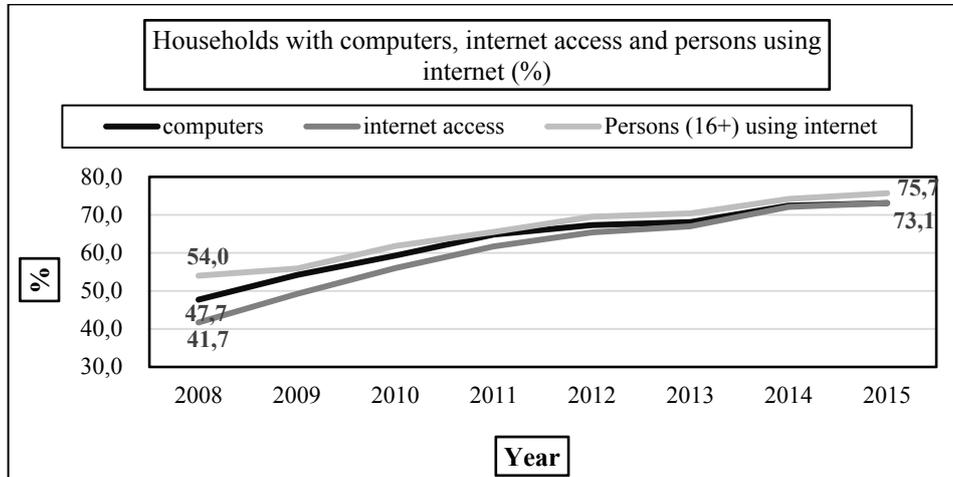
In the first part we follow the evolution of households with computers and internet access in the Czech Republic. We also pay attention to development of the share of people using the internet and their age structure. We also focus on selected activities of internet users. Further we analyze ICT sector as an economic sector in the Czech Republic.

The second part of the chapter focuses on ICT in MS Region. Firstly, we analyze selected indicators of the ICT sector. Furthermore, we focused on a selected company Tieto Czech ltd providing ICT services in the MS Region.

2.1. From Information Society of the Czech Republic towards its ICT sector

Figure 1 shows the evolution of households with computers and internet access in the Czech Republic and the development of internet users at time. Through this chart, we show the rate of penetration of ICT into the lives of people in the Czech Republic.

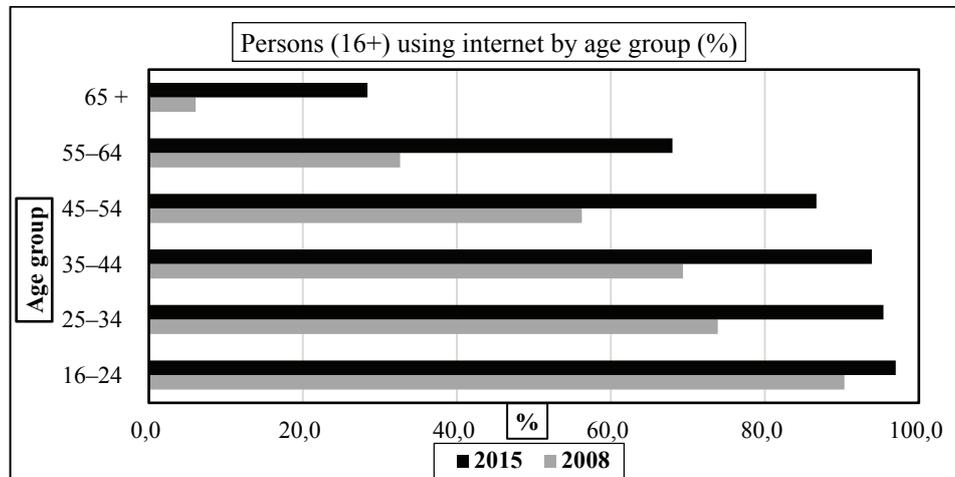
Figure 1. Households with computers, internet access and persons using internet (16+) in the Czech Republic



Source: Czech Statistical Office [2016a]; personal.

When we focus on the all of three monitored indicators, we note a significant increase in their values over time. Less than 50% of households in the Czech Republic was equipped only with computer, in 2008. Over the next seven years there has been an increase of about 25%. Therefore, computer was owned more than 3 million households in 2015. Even more significant growth we register in the case of households with internet access. During the same time period there was an increase of more than 30%. At the beginning of the period not all computers were connected to the internet. At the end of the period internet has been standard computer component. Significant upward trend is apparent also in the development of the proportion of internet users (16+). During the reporting period there was an increase of internet users by more than 20%. In 2015, internet users were $\frac{3}{4}$ persons (16+) in the Czech Republic.

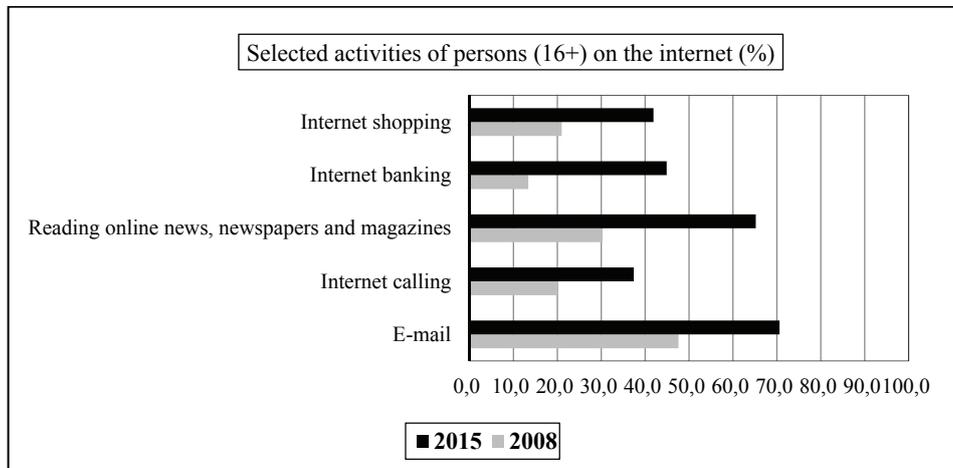
Overall, we can say that computer with internet access has become a normal part of households in the Czech Republic and the majority of people over 16 years are become internet users. At the same time, there did not show any significant effects of the economic crisis. We start from the growing trend of buying computers, despite some slowdown in the rate of growth.

Figure 2. Persons (16+) using internet by age group in the Czech Republic

Source: Czech Statistical Office [2016a]; personal.

Internet users by age structure are shown in Figure 2. A general view shows increasing number of people using the internet in all six designated age groups. Naturally, the largest proportion of people using the internet is in the youngest age group of 16-24 years, which is valid in the long time. During the reporting period, there was the smallest increase in the proportion of people using the internet, only 6,7%. However, due to the high initial values in this age group, we are approaching to the limit of 100%. The lowest percentages of people using the internet is apparent in the age category 65+. This age group is made up of people of retirement age. However, we register a significant increase of 22,3%. Internet users were more than $\frac{1}{4}$ of people of retirement age in 2015. The most striking change can be observed in the age group 55-64 years. During the seven years it has increased the proportion of internet users by 35%. Currently, in this age category internet users are almost 70% of people. Increase of the proportion of internet users more than 30% we can found in the age group 45-54 years. In the age range 16-44 years are the proportion of internet users an average 95% in 2015.

Overall, we can say that in relatively short period of time there has been a sharp increase in the proportion of people using the internet. This boom was apparent across the age structure of the population. In the future, we can expect continuing growing number of internet users, particularly in older age groups.

Figure 3. Selected activities of persons (16+) on the internet in the Czech Republic

Source: Czech Statistical Office [2016a]; personal.

In another part of the paper we focus on selected activities of the population on the internet. We monitored the developments in the following categories: Internet shopping, Internet banking, Reading news, Internet calling and E-mail communication. These selected categories represent basic human activities such as buying goods and services, financial transactions, information needs and interpersonal communication. We focus on the changes between 2008 and 2015. In all selected categories, we can see a significant increase in the satisfying needs by internet. We see a gradual shift of activities into the digital sphere. The most striking progress we register in reading news and internet banking, more than 30%. The most widespread activity conducted through the internet has long been an e-mail communication. In the reporting period it increased by 23%. Communication by e-mail is used more than 70% of persons over 16 years in 2015. In the area of purchasing goods and services, we can see an increase by 20,9% and in the internet calling by 17,4%.

The above data show growing confidence in digital technologies, or there is gradual shift of meeting needs into the digital sphere.

Table 2 shows selected economic characteristics of the ICT sector in the Czech Republic. Due to limited availability of data time series was data observed only in 2014.

Table 2. ICT sector in the Czech Republic 2008-2014

ICT sector	2008	2009	2010	2011	2012	2013	2014
Number of active enterprises	29 931	31 259	32 315	32 657	32 789	32 876	33 931
Number of employees	143 044	137 406	136 668	140 917	141 139	140 418	143 425
Average gross monthly wage per FTE employee (CZK)	36 820	39 455	39 827	40 851	42 461	42 152	43 828
R&D expenditure (million CZK)	5 163	4 732	4 790	5 643	6 199	6 499	8 515
Total revenue (million CZK)	672 219	627 658	665 424	649 293	659 877	651 545	693 277

Source: Czech Statistical Office [2016a]; personal.

Due to the development of monitored indicators, we can conclude that the ICT sector is also suffering for the impacts of the economic crisis. In some areas the impact of the crisis is tangible, for example in the decline of the number of employees or in decline in R & D expenditures or in the decrease of total revenues. However, we can see a relatively quick turnaround to a growing trend. On the other hand, it can be observed that the economic crisis did not stop the formation of new businesses in the ICT sector. There was an increase of enterprises in the ICT sector by 4000 between 2008 and 2015. Also, average gross monthly wage showed a continuous rise. The increase in average gross wages in the same period amounted to 7000 CZK. We can also mention that the average gross wages in the ICT sector, moving well above the long term average gross wage in the business sphere in the Czech Republic.

Based on the observed indicators and their development in time, we can say, that the ICT sector appears to be relatively resilient to the impacts of the recent economic crisis in the Czech Republic.

2.2. ICT in the Moravian – Silesian Region

Table 3 shows some selected economic characteristics of ICT sector in the Moravian-Silesian Region. Due to limited availability of data time series, the data were observed until 2014.

Table 3. ICT Sector in the Moravian-Silesian Region

ICT in the MS Region	2008	2009	2010	2011	2012	2013	2014
ICT specialists, Headcount (thousands)	10,4	10,6	14,5	13,7	11,5	14,9	14,8
Average monthly gross wage in ICT (CZK)	29 303	30 552	30 674	34 707	34 357	36 828	34 424
Average monthly gross wage in business sector (CZK)	24 421	23 749	24 568	23 746	23 994	24 089	24 257
Export of computer services (CZK millions)	N/A	1 298	1 696	1 936	2 421	2 642	2 612
Businesses by CZ-NACE (ICT) principal activity	3 531	4 044	4 418	4 105	3 692	3 451	3 239

Source: Czech Statistical Office [2016b]; personal.

ICT sector can be characterized by a growing trend in the MS Region. Looking at the development of the labor force we can observe an increase in the number of employees overtime. There was an increase of more than 4000 workers between 2008 and 2014. Increase in the number of workers is accompanied by an increase in the average gross wage. While the average gross wage in the business sector even slightly decreased in the MS Region, we can register a growing trend in the average wage in ICT. There was an increase by more than 5000 CZK. The average gross wages reached the level of 140% compared to the average gross wage in the business sector in the MS Region in 2014. Thus, apparent is above average compensation to the employees in the ICT sector. There was evident also more than twofold increase in exports of the computer services between 2008 and 2014. The impacts of the economic crisis influenced mostly development of the businesses in the ICT sector. In this case, can we see a drop in the number of enterprises by nearly 300 companies between 2008 and 2014.

The ICT sector has also institutional facilities on the territory of the MS Region. Due to the nature of the ICT sector, its strengths and recent developments in the region, the ICT is considered also by the institutions. ICT sector has been identified as one of the strategic sectors in the MS Region and have been incorporated into the strategic documents, such as Development Strategy of the Moravian-Silesian Region or Regional Innovation Strategy. From the spatial perspective, regional city of Ostrava has become an imaginary center of the ICT sector in the MS Region. In Ostrava there are 40% of all ICT businesses in the region. There is also headquarters of the IT Cluster. IT Cluster connects educational institutions and businesses. ICTs have also a significant research and development facilities in Ostrava. The main role is played by the VŠB – Technical University of Ostrava. There is independent faculty focused on the ICTs, Faculty of Electrical Engineering and Computer Science. Significant growth impetus for the ICT sector has become a national supercomputing center IT4 Innovations. IT4 Innovations is also part of the Technical University of Ostrava. Here are performed basic research and also applied research. Part of IT4 Innovation are two supercomputers ANSELM and SALOMON. The main research areas are excellent scientific research in the areas of high performance computing and embedded computing industry focus. IT4Innovations is also part of the prestigious partnership between European supercomputing centers, associated by PRACE initiative. The largest ICT company in the region, Tieto Czech, ltd. is also located in Ostrava. The company will be described in following section.

Tieto belongs among the largest North European IT companies providing IT services. The company has headquarters in Helsinki. It currently employs

more than 13 000 experts in almost 20 countries. It is a joint stock company whose shares are traded on NASDAQ. The company provides IT services to both private and public sector. For example, in 2015 the company became a provider of data center services and capacity services for the Finnish government sector. On this contract is involved approximately 100 employees of the Ostrava branch Tieto Czech. Tieto Czech is the largest employer in the area of ICT services in the Moravian-Silesian Region and ranks among the largest employers in this sector in the Czech Republic.

Tieto corporation opened a software center Tieto Czech ltd in the regional city of Ostrava in 2004. Areas, which Ostrava branch addresses are e.g. Business Information Exchange, Business Intelligence, Business systems, etc. within the branch, also application development operates there. In the hierarchical structure of the organization Ostrava branch is in third place, according to the number of employees. Currently, it employs more than 2000 employees. According to the number of employees occupied the company fourth place among the largest employers in Ostrava, towards the end of 2015. From the private sector it was ranked second just behind ArcelorMittal Ltd. [see: City of Ostrava, 2016]. During the first eight years of existence, the number of employees rose so much that activities of company had to be located in four separate buildings. This unsustainable trend was manifested by construction of a new architecturally valuable building, called The Tieto Towers. The company pays attention to the impacts of their activities on the environment. They have prepared own environmental policy with clearly defined measurable goals. They declared responsibility to the environment, where environmental responsibility is perceived as one of the key and long-term priorities. Ecological principles are respected also by the Czech branch. The new building Tieto Towers meets environmental requirements, which is confirmed obtain the British certification BREEAM. The certification is issued to the building with a favorable impact on the environment. The company also supports staff mobility, when allows both short and long stays on its foreign branches. The Significant position of the company also confirms, that its CEO Peter Lukasik was appointed by Finnish honorary consul for MS region, Olomouc, Hradec Králové and Pardubice region in 2014 [see: Tieto Czech, 2016].

On the other hand, we should mention some negative aspects of the company. Employees receive substantially lower wages in the Ostrava branch, than employees in the parent company in Finland. The content of the Ostrava branch is also research and development activity. However, research and development activities there play rather negligible role compared to other activities. We can

register reserves with connection Ostrava branch to the existing research and development infrastructure in the Moravian-Silesian Region.

The impact of the company on the regional economy can be perceived also in the form of effects on the image of the region. Image of the territory can be included among important soft factors of regional development. We can say that it is a perception of a particular territory by individuals, who are not directly located in this territory. Image therefore primarily operates beyond the region itself. Currently, image is considered as important soft factors of regional development. Image of the territory is co-created inter alia, through image of the individual companies operating in the territory. Currently, we can perceive Tieto Czech as a company with positive effect on the region's image. We can see here a win-win situation. On the one hand, we can register the strengthening brand of the company itself thanks to the company's activities and on the other hand, strengthening the positive image of the region. This situation reflects many awards that the company received in recent years. Individual awards are associated with their media reflection, of course.

Tieto Czech was awarded by the Czech marketing company for Building Brand Awareness in 2014, when the company positively affects competitive conditions in the region. Award was granted primarily for business success, cultivating relationships with employees, professionals and public, as well as socially responsible activities of regional scope. The firm was also awarded as Bicycle-Employer of the Year in Ostrava, in 2016. It seems important to considerable popularity among young educated workforce.

Tieto Czech won award the most attractive employer in the MS region in 2015. Award was received in the context of a survey conducted by AIESEC named The Most Desired Company. The survey was conducted among university students in the Czech Republic. Tieto Czech was ranked among the five most attractive employers in the IT sector in the survey TOP Employers 2016. The survey was organized by the Czech Union of Students and graduates and was conducted among university students in the Czech Republic. The survey involved more than 10 000 students. For students were especially crucial job content, career development opportunities and corporate culture for the choice of the most attractive employers. The company was ranked at fourteenth place among one hundred most attractive IT employers in the ranking of the Czech Republic's Most Attractive Employers 2016 in the Czech Republic. While doing so, company was not included in the original tender companies, for which it is possible to vote. The students spontaneously added this company into the ranking and pushed up her on the fourteenth place. For this reason, Tieto Czech has earned

another award Highest New Entrant 2016. In the survey conducted by Univer-sum in cooperation with Studenta Media voted more than 14 000 students from 63 universities and more than 4000 young and senior professionals. We see that the company is highly appreciated among the young educated workforce, so important for the regional economy. It is also clear that the company is perceived positively among students across the Czech Republic. We can say that there is not only obvious positive brand perception of the company, but also strengthening positive image of the region.

Conclusions

This paper demonstrated significant penetration of ICT into the lives of people in the Czech Republic. Within a relatively short period, in Czech households there occurred a substantial increase in computer facilities and internet access. The increase in the proportion of people (16+) using the internet, across all age categories is also noticeable. In the future, we can expect that will occur to growth of internet users in the Czech Republic in a relatively short period. Internet is increasingly used as a means of meeting the basic needs of the population, such as the purchase of goods and services, financial transactions, communications, and as a source of information. Overall, we can say there is growing confidence in digital technologies in the Czech Republic. ICT sector appears to be relatively resilient to the impact of the recent economic crisis. At the national level as well as the territory of the MS Region, one can contemplate ICT sector is growing.

The center of the ICT sector is becoming a regional city of Ostrava in the MS region. Forty percent of companies from the ICT sector in MS region are located in Ostrava. It houses the largest IT company in the region Tieto Czech ltd. Impacts of the company on a local or regional economy, can be seen in two dimensions. The first of these are as tangible factors. The Company is an important employer in important progressive economic sector of ICT services. Among the activities of the local branch development section is present too. Employees receive considerably higher wages than is average wage in business sector in the MS region. Despite foreign ownership fairly considerable resources are invested into Ostrava branch. Another feature is the connection to supra-regional and global networks. The second level can be described as an intangible factors. Here we emphasize in particular the effect of specific corporate culture, with respecting the concept of sustainable development. Crucial role can be as-

cribed also to the creation and strengthening the positive image of the city, or the whole region. We see the necessity of building a positive image of the territory, which plays a significant role especially in the so-called old industrial regions, into which can we include also Moravian-Silesian region.

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ICT W KRAJU MORAWSKO-ŚLĄSKIM W KONTEKŚCIE UWARUNKOWAŃ REPUBLIKI CZESKIEJ

Streszczenie: W ostatnich trzech dekadach technologie informacyjne i komunikacyjne (ICT) stały się zjawiskiem globalnym. Jest oczywiste, że ICT zawierają się w każdej dziedzinie życia, również w Republice Czeskiej. Dane dostępne dla okresu 2008-2015 wskazują znaczący postęp w wykorzystaniu ICT przez gospodarstwa domowe oraz biznes. Firmy działające w sektorze ICT stały się ważnym źródłem wzrostu ekonomicznego. Sektor ICT cechuje interdyscyplinarność, zdolność do szybkiej odpowiedzi na potrzeby konsumentów oraz zdolność do innowacji. ICT jest także istotny dla gospodarek regionalnych i lokalnych. Regionalna metropolia Ostrawy przekształca się w centrum ICT w kraju morawsko-śląskim. Artykuł analizuje przypadek firmy TIETO z siedzibą w Ostrawie, która zapewnia usługi ICT na rynkach globalnych.

Słowa kluczowe: sektor ICT, kraj morawski-śląsko.