

# THE READINESS OF HUMAN RESOURCES IN ICT FOR THE DIGITIZATION PROCESS IN THE CR

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## **Abstract**

Digitization is a global mega-trend that penetrates into all areas of society. The consequences of this process have (and will have) the greatest impact on the labour market. We can see here gradual changes: so-called creative-destructive process is getting faster, the demand for work is changing as well as the structure of employment and the level of education. The speed of modern technologies expanding and the introduction of Industry 4.0 elements are particularly conditioned by two processes. Firstly, it is necessary to create an appropriate qualification structure of the population. That means sufficient number of experts and specialists in ICT, robotics, cybernetics etc., who will provide the required production and services but also research and development. Secondly, at the same time, it is essential to increase the computer literacy of the population and to create appropriate infrastructure. The article is focused on HR readiness in ICT both on the production and service side and on the demand side. Based on an analysis of selected indicators, the Czech Republic's readiness in this area is shown. Finally, strengths and weaknesses are identified and recommendations are formulated.

**Key words:** HR, ICT, Industry 4.0, computer literacy

**JEL Code:** J 24, O 34, O 15

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## **Introduction**

At the start of this article, it is good to mention that every country has a somewhat different structure of workers depending on the overall structure of its economy. The Czech Republic is a small open economy, which is also called “industrial heart of Europe”. And just in the industry sector, there are a high percentage of employees who may be at risk of losing their jobs as a result of the transition to the Industry 4.0. On the other hand, the expansion of industry makes it possible for society to have a good level of technical knowledge and skills.

Today there are several studies available that attempt to deal with or quantify the impacts of digitization on labour market. For example Frey and Osborne (2013), Chmelař et al., MPO (2016). But individual studies differ quite a lot in the estimate of the number of jobs, which shall be effected by the creation-destruction process (i.e. the process of creation and ending of jobs). The main reason for that is the use of different research methodology especially.

Also, the OECD study (2016b) deals with the issue of job threats rate. Concerning the Czech Republic, it is said in the study that during the next 20 years 10% of jobs will be threatened by automation highly and another 35% of jobs will go through significant changes. In absolute numbers it means that about 408 thousand jobs will be in danger and about 1.4 million jobs will undergo significant changes. The Czech Republic together with Slovakia and Italy belong to the countries with the highest percentage of jobs, which will undergo a fundamental change.

The speed of the modern technologies expansion and the implementation of the Industry 4.0 elements will very much depend on the overall level of human capital in society, especially on preparedness of human capital in ICT – both the side of production and services providers and on the side of consumers likewise. (To the issue of Industry 4.0 see also Sirůček, Džbánkova, 2017; Svobodová, 2015.)

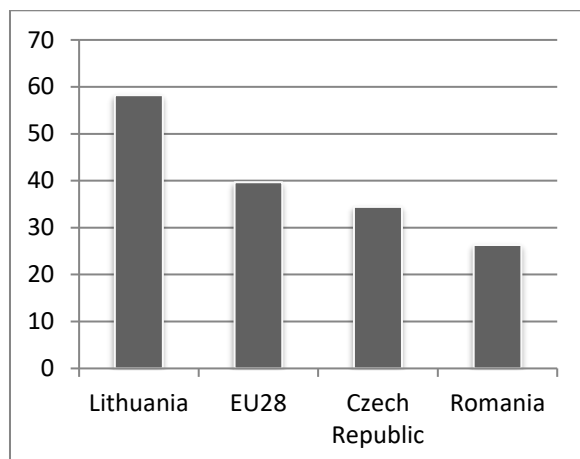
## **1 Level of human capital**

Achieved human capital level has a key role considering the EU competitiveness as a whole but also on the level of national economies and enterprises. Achieved level of education plays a crucial role for individuals who wants to prove successful on the labour market. For the above reasons, several indicators measuring the level of human capital are monitoring in the EU systematically – above all share of persons with tertiary education, persons with secondary education and early leavers from education and training.

As far as the indicator *Persons with tertiary education* in concerned, the Czech Republic is under the EU average (Figure 1), though the percentage of the workforce university educated has been growing. It is a development trend, which is apparent in all the EU Member States and which is a reflection of the growing requirements of knowledge and skills of workers. The Czech Republic (34.4%) lags behind other countries in the number of persons with tertiary education, nevertheless a technological leader – Germany – has even lower numbers of university graduates (33.8 %). But there are significant differences among

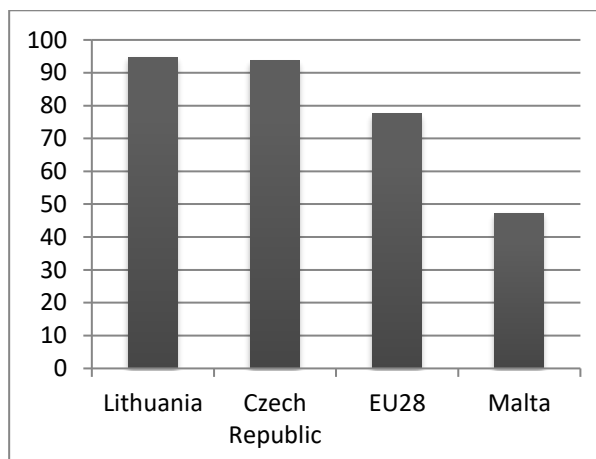
the countries – from 58.2% in Lithuania to 26.3% in Romania. The highest percentage of persons with tertiary education lives also in Cyprus (54.9%) and Luxembourg (54.4%), on the other hand are Italy (26 %) and Croatia (27.3%).

**Fig. 1: Persons with tertiary education<sup>1</sup> (2017, %)**



Source: Eurostat (16. 4. 2018), own processing

**Fig. 2: Persons with secondary education<sup>2</sup> (2017, %)**



Source: Eurostat (16. 4. 2018), own processing

For a long time, the Czech Republic belongs to the leaders as far as the indicator *Persons with secondary education* is concerned. This indicator achieves 93.8%; it is better only in Lithuania (94.8%). On the other hand, the lowest number of persons with secondary education is in Malta (47.3%) and Portugal (48.0%).

Also regarding the indicator *Early-leavers from education and training*, the Czech Republic is in one of best positions for a long time, because it has very low percentage of early leaving from education (6.8%). But in the long term the situation is getting worse. While in 2010 the CR was the best in the EU (with 4.9%), in 2017 Croatia (3%), Slovenia (4.6%), Poland (5.1%), Lithuania (5.2%), Ireland (6.1%), Greece (6.2%) and Luxembourg (6.7%) are better off.

The level of human capital in the Czech Republic is one of many important prerequisites for building the Industry 4.0. However, a coordination with other factors is very important – investment into science, research, education, innovation, quality of a system of education, connecting schools with practical experience etc.

<sup>1</sup> Indicator Persons with tertiary education express % of people aged 30–34 who completed higher education (tertiary level, grade 5–8 according to the ISCED 2011 qualification).

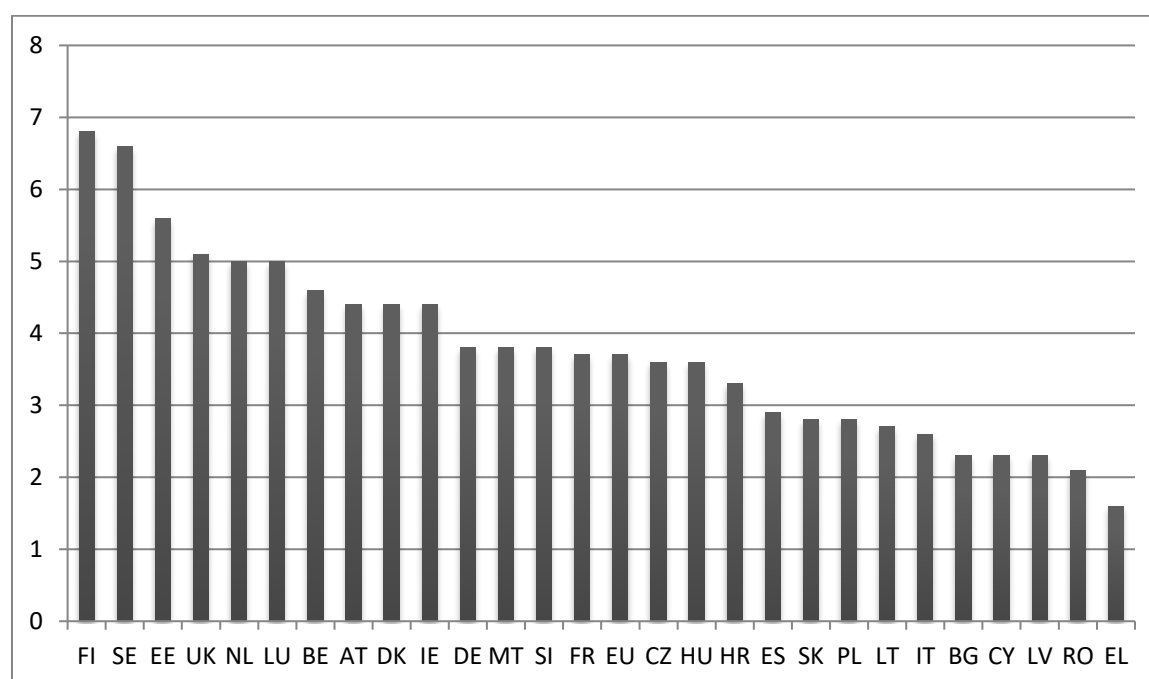
<sup>2</sup> Indicator Persons with secondary education express % of people aged 25–64 who completed at least higher secondary education (grade 3–8 according to the ISCED 2011 qualification).

## 2. The readiness of human resources in ICT

There is very difficult to express the readiness of human resources in ICT, but it is possible to gain some overall view through selected indicators.

Based on the available statistical data from Eurostat, it is possible to say that the employment rate in the ICT sector has not been greatly affected by the negative consequences of the financial crises and the following recession, which was apparent in global labour markets. During decade (2006–2015), the unemployment rate in this sector continuously grew in the EU, by 3% a year on average (which was 8 times more than the average rate of growth in total employment).

**Fig. 3: Employed ICT specialists – percentage of total employment (EU28, 2017, %)**



Source: Eurostat (16. 4. 2018), own processing

In 2017, the percentage of ICT specialists in total employment in the EU was 3.7%, in the Czech Republic, however, it was slightly below average – 3.6% (Figure 3). Traditionally high percentage of ICT specialists in total employment is in the Scandinavian countries, especially in Finland (6.8%) and Sweden (6.6%) followed by Estonia (5.6%), Great Britain (5.1%), Netherland and Luxembourg (both 5%). Compared to other new member states, Estonia is outstanding, because (besides Malta and Slovenia) they are under the EU average.

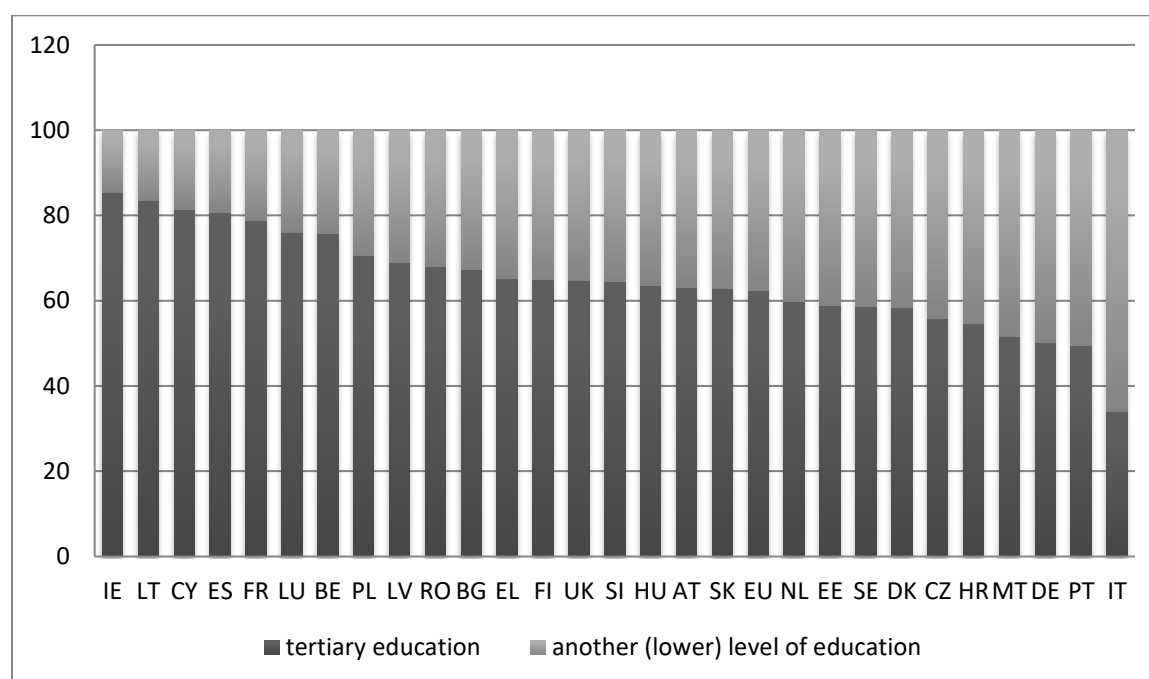
From the viewpoint of the central and the eastern European countries, the position of the Czech Republic is satisfactory; it is behind Estonia (with a big lead) and Slovenia.

Considering the changes in methodology, it is not possible to use a longer timeline to express the dynamics of this indicator. However, if we look at the evolution this indicator in period 2012–2017, the highest increase is evident in Estonia (by 1.8 p.p.), while there is stagnation in the Czech Republic.

Based on this analysis, it is possible to indicate that the digitization process of economy in the Czech Republic lose its dynamics and is delayed in the last period. Similar conclusion is also published in the study Initiative Industry 4.0 (MPO, 2016).

Quite fast rise in employment in the ICT sector in the Czech Republic is influenced, among other things, by outsourcing of ICT activities from mother countries, especially activities related to the medium and less demanding qualifications (like databases maintenance or programming). Work with the highest added value (development of information and cybernetic systems, development of new applications etc.) is still allocated in the head offices of mother companies. One of the prerequisites for changing this trend is necessity to focus on increasing the qualification level of ICT specialists (see Figure 4).

**Fig. 4: ICT specialists by educational attainment level (EU28, 2017, %)**



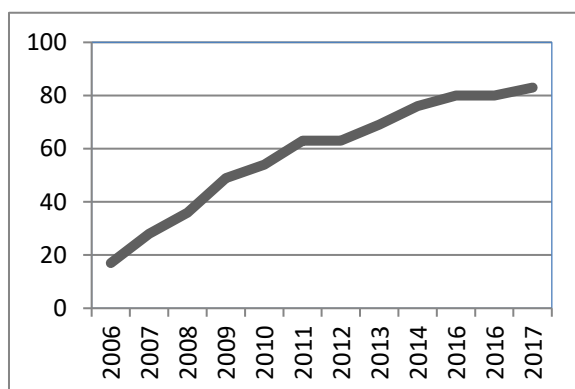
Source: Eurostat (16. 4. 2018), own processing

Majority of ICT specialists in the EU have achieved tertiary education (62.5%). The highest percentage of specialists with this level of education is in Ireland (85.4%), Lithuania (83.4%) and Cyprus (81.5%). On the other hand, the lowest percentage has Italy (34.1%), Portugal (49.6%) and Germany (50.2%). The Czech Republic moves above the EU average with its 55.9%. During period 2008–2017, there was a slight increase in the percentage of ICT specialists with tertiary education by 7.3 p.p. in the EU. However, developments in each the EU countries were different. The highest increase in the number of the ICT specialists with tertiary education was recorded in Slovakia (by 31 p.p.), Austria (29.4 p.p.), Hungary (24.6 p.p.) and also the Czech Republic (23.3%). But it is necessary to emphasize that in the CR this growth lost its dynamics over the last three years (2015–2017) – the number of ICT specialists with tertiary education decreased by 7.3 p.p. On the other hand, in some countries during monitored decade the number of ICT specialists with tertiary education decreased – most in Cyprus (by 3.5 p.p.) and Belgium (by 1.9 p.p.).

### 3. The readiness on the part of consumers

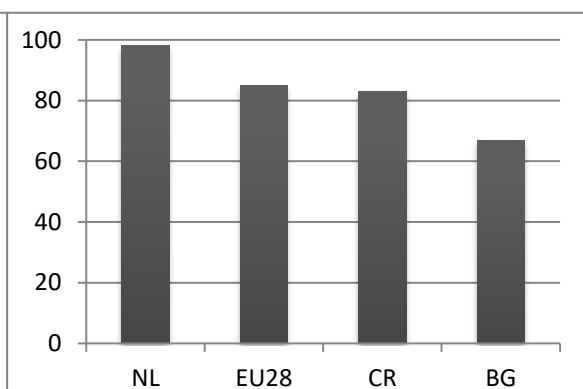
On the consumer’s side, there are two main conditions of building the Society 4.0, and these are – *Households with an Internet connection* and *Computer literacy*.

**Fig. 5: Households with an Internet connection in the CR (%)**



Source: Eurostat (29. 4. 2018), own processing

**Fig. 6: Households with an Internet connection in the EU (2017, %)**



Source: Eurostat (29. 4. 2018), own processing

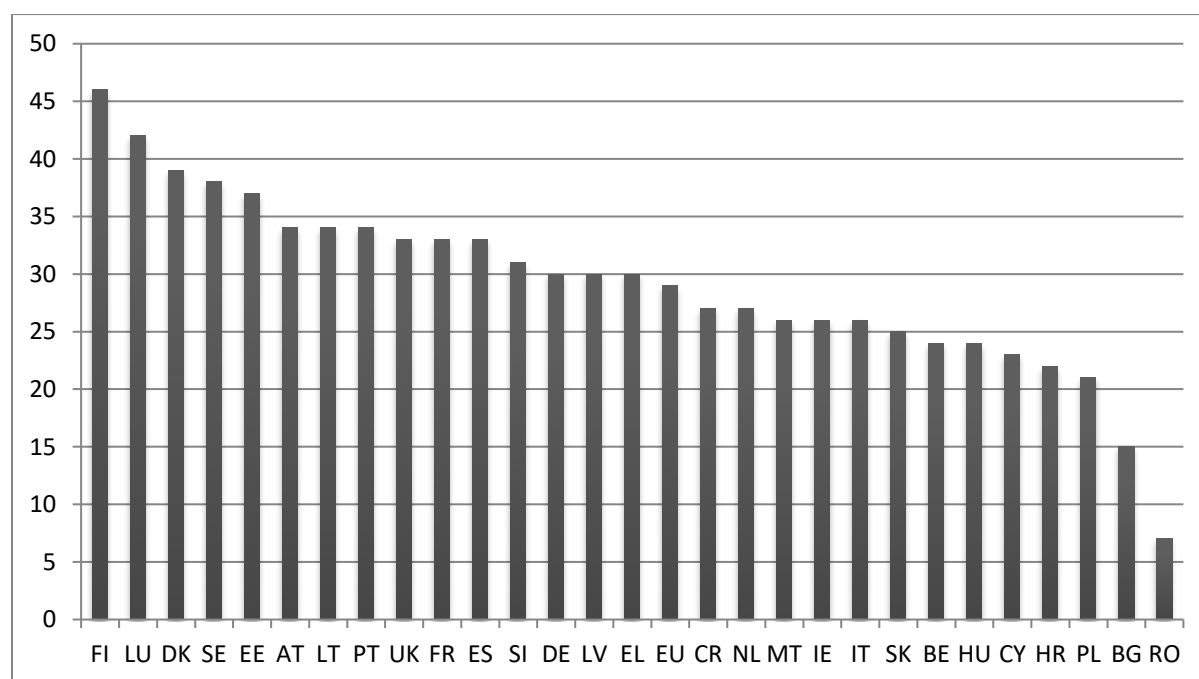
*Note: Figure 6 shows the CR, country with the best and the worst result and an average in the EU28.*

Connection of the Czech households to the Internet has been growing dynamically in the monitored period 2006–2017. While in 2006 not even 20% of households were connected

to Internet, in 2017 over four times more (above 80%). International comparison (Figure 6) shows that in spite of the dynamic increase, the number of the Czech households connected to the Internet still is slightly below the EU average, which is 85% (in the CR 83%). Countries with the highest number of households connected to Internet include Netherlands (98%), Luxembourg (97%), and also Great Britain, Scandinavian countries and Germany (all 92–93%). The lowest percentage of households connected to the Internet is in Bulgaria (67%). The Czech Republic is in relatively good position among the central and eastern European countries; only Estonia is better in this indicator (above EU average – with 87%). But it should be noted then there are big differences among the EU15 countries, because above all the southern European countries (Portugal, Italy and Greece which is worst with 71%) are lagging behind the EU average in this indicator. The same can be said about France, where only 79% of households are connected to the Internet.

But on the consumer's side are important not only numbers of households connected to the Internet (i.e. the quantitative aspect) but also level of computer skills (i.e. qualitative aspect).

**Fig. 7: Persons with high level of computer skills (EU28, % of people aged 16–74, 2014)**



Source: Eurostat (29. 4. 2018), own processing

Figure 7 shows that the most people with high level of computer skills are again in the Scandinavian countries, Luxembourg and also Estonia. The Czech Republic is slightly below the EU average in this indicator but compared with the countries of Central and Eastern Europe, it is behind the Baltic States (Estonia, Lithuania and Latvia) and Slovenia. The worst level of computer skills is in Romania and Bulgaria.

## Conclusion

The level of human capital in general and, in particular, the readiness of human resources in ICT, both on the side of producers and service providers and on the side of consumers, are very important for successful building of Industry 4.0. This issue is very closely related to the entry of generation Y on the labour market (Legnerová, 2017).

Based on analysis of selected indicators, it is possible to state that readiness of human resources in the Czech Republic is slightly below average of the EU countries. Compared to other countries of Central and Eastern Europe, a position of the Czech Republic is relatively good. The CR belongs to the countries with fast development of ICT, however, the digitization process of economy in the Czech Republic lose its dynamics and is delayed in the last period (evidenced by, inter alia, stagnation of the number of ICT specialists in total employment). On the other hand, dynamic changes in the education structure of the ICT specialist towards tertiary education are very positive. Computer literacy of Czech inhabitants is slightly under the EU average too. A position of the CR in this indicator is not outstanding neither among the Central and Eastern European countries, and it is slightly above average. Deficiency of experts in ICT and a lower level of computer literacy may be a barrier to the rapid development of digitization in the future.

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