

## COMPARISON OF WAGES IN ICT BY MAJOR CATEGORIES, THEIR RELATIONS TO GDP AND THE DIFFERENCES BETWEEN SALARIES OF MEN AND WOMEN

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### Abstract

The article examines wages in the field of information and communication technologies (ICT). Based on the so-called ISPV data (adjusted for inflation), CZSO and Eurostat data, several analyses were performed. The main conclusions are: (1) The number of ICT workers grew faster, their share in total employment increased from 2.2% to 3.9%. (2) From 2008 to 2013, the overall trend in wages is declining and they have been growing significantly since 2014 (influenced by both economic growth and falling inflation). (3) Wages of ICT specialists (CZ ISCO 25) grew considerably faster than those of ICT technicians (CZ ISCO 35). (4) Wages for the entire ICT and for the CZ-ISCO 25 category grew faster than GDP. (5) The gender pay gap in the Czech Republic is among the highest among the countries surveyed, although in 2019 it decreased compared to 2008. (6) Within the Czech Republic, the differences between the salaries of men and women in ICT are smaller than for the entire economy.

### Keywords

ICT; ICT wages; Wages – GDP ratio; ICT specialists; ICT technicians; Gender pay gap.

### Introduction

The basic macroeconomic relations include the relationship between labor productivity, wage growth and gross domestic product (GDP) growth. A number of articles deal with these relationships, see e.g. [1], [2], [3] or a new study for selected European countries [4]. In this article, we will therefore deal with the analysis of these relationships with a focus on workers in the field of information and communication technologies (ICT) in the Czech Republic.

There is no doubt that in recent years the dynamic development of ICT and its spread to virtually all professions and processes in companies, as well as into the daily personal life of most people, lead to what is referred to as *digitization of society* [5] or in case of manufacturing industries as *Industry 4.0* [6]. We can agree with many authors (see e.g. [3], [7], [8] or [9]) that the development of ICT and the increasing spread of these technologies significantly impact economic growth as well as the competitiveness of individual companies and entire countries. At the same time, ICT affects labor productivity in the whole economy, not just in one area [1], [10], [11], [12], as well as the volume and the quality of services.

Nevertheless, it can be assumed that now and especially in the future the impact of ICT on the whole environment, on the quality of human life, on education, on professional orientation

and many other areas is still not fully appreciated. Also, the concept of Industry 4.0 will lead to a fundamental change in the structure of employment [13]. It can be concluded that further digitization of society and the development of the Industry 4.0 concept will not be possible without a sufficient number of well-educated employees in the field of ICT. This is also one of the main reasons why ICT wage growth continues.

In the first part of the article, therefore, we will first perform a simple analysis of the development of the number of employees in the field of ICT and compare this trend with the development of the number of employees in the entire economy. We will also compare wage growth trends in the two main categories of jobs in this area: *ICT Specialists* and *ICT Technicians* (categories CZ-ISCO 25 and CZ-ISCO 35; these concepts are both further defined in the methodological part of the article). In this analysis, we will continue in the following subchapter where we will examine the relationship between the development of wages in ICT and GDP (considering inflation and the development of the CZK/EUR exchange rate, because of international comparison, wages are converted to EUR).

We will build on this analysis in the final part of the article by examining the differences in salaries in the Czech Republic in the field of ICT between men and women (the *gender pay gap* in ICT). This is a very important issue in the Czech Republic, in economic, political, and also social terms because these differences (for the entire economy) are among the largest in the European Union (see e.g. [14] or [15]).

A broader concept than *gender pay gap* is *gender equality*. This issue is also widely discussed in the EU and is part of various official statements and documents. One of them is The Gender Equality Strategy 2020–2025 in which Ursula von der Leyen stated *inter alia* that

*“Gender equality is a core principle of the European Union, but it is not yet a reality. In business, politics, and society as a whole, we can only reach our full potential if we use all of our talent and diversity. Using only half of the population, half of the ideas or half of the energy is not good enough.”* [16, p. 1]

However, in this article, we will focus only on the abovementioned concept of gender pay gap in the narrower sense of the term, while in practice, it is a very complex one. Many authors deal with the issue of equal pay for equal work for women and men. These studies can be divided into two main areas. The first group analyzes and compares the situation and trends in different countries over a period of time. We can mention, for example, the abovementioned studies [14] or [15]. The study [17] compares Germany and Austria.

The second group focuses on a specific country and within that country, for example, on certain sectors or categories of employment. An example of a study for Slovakia is e.g. [18]. Studies that focused directly on the Czech Republic are [19] or [20].

Based on our analysis, we formulated the following research questions:

*RQ1: Did the wages of ICT Specialists (CZ-ISCO 25) grow faster than the wages of ICT Technicians (CZ-ISCO 35) in the period 2008–2019?*

*RQ2: What was the trend of wage development in ICT in the observed period 2008–2019 in comparison with the trend of GDP development?*

*RQ3: What is the gender pay gap of the Czech Republic in international comparison and how did these differences develop over the period under review?*

*RQ4: What is the gender pay gap in ICT in the Czech Republic compared to the whole economy?*

## 1 Methods of Research

To answer the abovementioned research questions, we analyzed the time series of indicators described below and performed a linear regression on these data. The methodology of our article can be divided into the following sections:

- Data source, their characteristics and structure.
- Basic ICT professions framework.
- Methods of analysis of the data.

### 1.1 Data Source, their Characteristics and Structure

We drew some data from the Czech Statistical Office (CZSO), and we also needed selected data from Eurostat to examine the gender pay gap. However, the basic data for our analysis come from a survey conducted annually by Trexima on the basis of a mandate from the Ministry of Labor and Social Affairs of the Czech Republic, the so-called *ISPV data*: Average Earnings Information System. This survey is part of the official statistical survey programs announced by the Czech Statistical Office in the Collection of Laws for the relevant calendar year. In addition, it is also governed by Act No. 89/1995 Coll., on the State Statistical Service [21].

ISPV respondents are active economic entities. Sampling is statistical for economic entities with up to 249 employees; the selection is random, based on the size of the entity, the region and the branch of economic activity. The survey covers all entities with 250 employees or more. If an organization is selected for the survey, it will receive a letter in which it is acquainted with the next steps and has a so-called reporting obligation on the basis of the above-mentioned Act on the State Statistical Service. In addition, these surveys are harmonized with the European Union's structural survey called the *Structure of Earnings Survey* [22].

The analyzed data are always for the second quarter of each year. This period was not chosen arbitrarily but for several reasons: the Czech Republic has the smallest number of public holidays in this quarter, workers usually do not take much leave during this period and, at the same time, the smallest number of extraordinary bonuses are usually paid during this period. The data for the second quarter are thus least affected by fluctuations in the number of working days for the period and at the same time there is the smallest share of non-claiming parts of wages or salaries.

The main monitored indicators in terms of earnings include *gross monthly wage (salary)* and *hourly earnings*. We also analyzed the basic structure of earnings, i.e. bonuses, extra pay, and reimbursements. The gross monthly wage was calculated as the average hourly earnings for the second quarter multiplied by the average number of working hours, these hours being rounded to the nearest whole number.

We also analyzed the number of work hours (e.g. overtime) and of non-work time (e.g. sickness and vacation). Data from the above-mentioned survey (Average Earnings Information System) also contain a comparison of wages according to individual regions of the Czech Republic.

### 1.2 Basic ICT Professions Framework

For the basic division of ICT professions, we used the *Classification of Employment of the Czech Statistical Office (CZ-ISCO)*. CZ-ISCO is a national statistical classification of employment, prepared by the Czech Statistical Office in accordance with an international standard *ISCO-08: International Standard Classification of Occupations* [23]. This

classification divides all occupations into 10 major groups; two of them are important for the purposes of this article: Major group 2 – Professionals; Major group 3 – Technicians and associate professionals. And within these major groups, we are interested in two main subgroups:

- CZ-ISCO 25: ICT Specialists,
- CZ-ISCO 35: ICT Technicians.

These subgroups are further characterized in the classification as follows: [23]

*ICT Specialists (CZ-ISCO 25)* research, plan, design, create, test, provide consultations and improve IT systems, such as hardware, software, and related concepts for specific applications; process-related documentation, including principles, policies and procedures; design, develop, check, maintain and support databases and other information systems to ensure optimal performance and data integrity and security.

*ICT Technicians (CZ-ISCO 35)* support the regular operation of computer and communication systems and networks and perform technical tasks related to telecommunications and the transmission of image and sound and other types of telecommunication signals. They mostly perform routine technical activities.

### 1.3 Methods of Analysis of the Data

For the analysis, we mainly used the above-mentioned data from the survey on wages and salaries (so-called *ISPV data*); additionally, we used some data from the Czech Statistical Office and Eurostat. As the data cover a relatively long period of time, it was necessary to take into account *inflation* in individual years, and since wages (salaries) are given in EUR for better international comparison, we also present the development of the CZK/EUR *exchange rate*. Table 1 summarizes both.

**Tab. 1:** Annual inflation rate and annual average CZK/EUR exchange rate

Year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
<b>Infl. Rate</b>	6.3%	1.0%	1.5%	1.9%	3.3%	1.4%	0.4%	0.3%	0.7%	2.5%	2.1%	2.8%
<b>CZK/EUR</b>	24.94	26.45	25.29	24.59	25.14	25.97	27.53	27.28	27.03	26.33	25.64	25.67

Source: [23]

We used the linear regression method to approximate the trend of wage development and GDP development. All regression analysis calculations are performed at the 5% confidence level. In processing our results, we used two statistical indicators: (arithmetic) mean and median. In the case of the examination of wages, the median is generally considered to be a more appropriate indicator because wages do not follow a normal distribution but a log-normal one. The arithmetic mean is more affected by extremely high wages of a relatively small number of individuals. [24]

This is especially true for wages in the field of ICT, where the average wage for both subgroups (CZ-ISCO 25 + CZ-ISCO 35) exceeds EUR 8000 per month; it is significantly higher than the average wage in the whole economy. At the same time, however, it is true that the wages of ordinary ICT workers do not reach these values by far. We therefore consider the median wage to be much more appropriate and more indicative than mean; however, in some other tables and figures, we present results for both median and mean.

## 2 Results and Discussion

### 2.1 Development of the Number of Employees in ICT

First, before examining in more detail the development of wages and salaries in ICT, we focused on a simple analysis of the development of the number of employees in the field of ICT and comparing the development of this number with the development in the entire economy. The results are summarized in Table 2. Absolute numbers are in the second line. To save space in the table, the row is marked only as “Thousands” = ICT Professionals in Thousands, i.e. the total number of people employed in ICT that is the sum of subgroups CZ-ISCO 25 + CZ-ISCO 35. Both from absolute numbers and from base and chain indices, it is obvious at first glance that the total number of employees in ICT increased throughout the period under review, except for 2016 and 2017, when it more or less stagnated.

However, it is still necessary to compare the development of the number of employees in the field of ICT with the total number of employees in the economy, which is the last row in the table, marked as “Ratio in %”. This indicator rose throughout the period (of course, again except for 2016/2017) and during the period under review, this relative share almost doubled (from 2.2 to 3.9%).

*Tab. 2: Development of the number of employees in ICT and in the entire economy*

Year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Thousands	111	114	122	127	132	148	160	174	185	186	206
Base index	100	103	110	114	119	133	144	157	167	168	186
Chain index	x	103	107	104	104	112	108	109	106	101	111
Ratio in %	2.2	2.3	2.5	2.6	2.7	3.0	3.2	3.4	3.6	3.6	3.9

Source: Own, data from [21]

### 2.2 Comparison of Wages for Subgroups CZ-ISCO 25 and CZ-ISCO 35

We will now focus on the comparison of wages / salaries of these two main categories, i.e. on the research question *RQ1: Did the wages of ICT Specialists (CZ-ISCO 25) grow faster than the wages of ICT Technicians (CZ-ISCO 35) in the period 2008–2019?*

The data were recalculated according to the methodology described above (taking into account inflation, conversion to EUR). The results are summarized in the following two graphs (Figure 1 and Figure 2): both are for the same period and compiled in the same way. But in the first one, the arithmetic average of wages was used, while in the second, the median wage was chosen for the calculation. In the chapter devoted to methodology, we stated that the literature considers the median as a more suitable indicator for wages (due to the logarithmic-normal characteristics of wage distributions), however, it is clear from the graphs that the basic trend is practically the same.

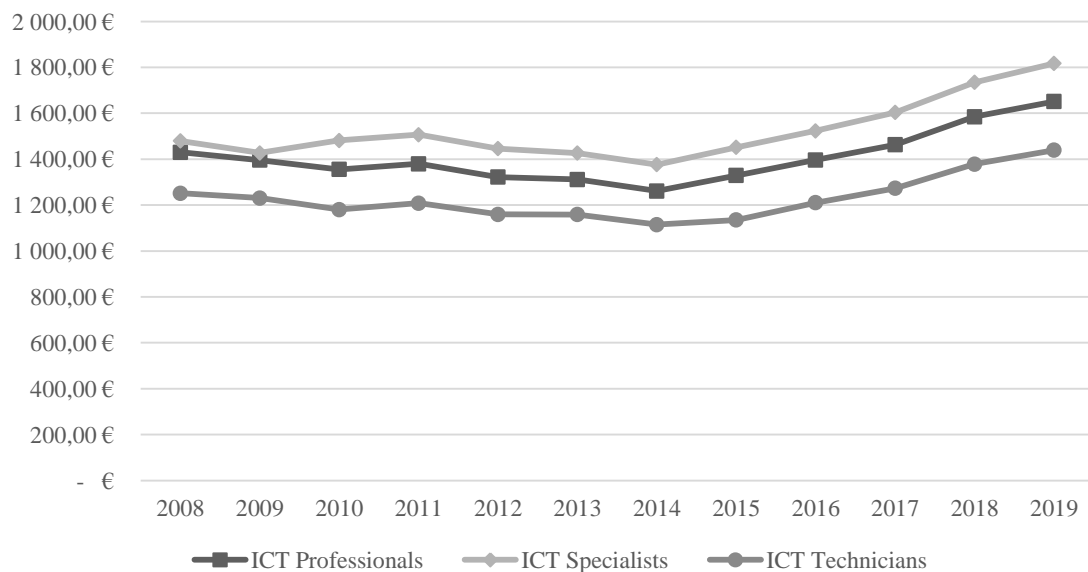
From 2008 to 2013, the overall trend is declining (with occasional very small year-on-year growth). This is a consequence of the crisis of 2008; but its effects in the Czech Republic lasted until 2013. After several years, when there was finally a more significant longer-term economic recovery and thus GDP growth and at the same time inflation fell significantly (2012 3.3%, 2013 1.4%, 2014 0.4%), wage growth (not only) in the field of ICT also started. As we present wages in EUR for reasons of international comparison, we must also take into account the development of the CZK/EUR exchange rate. But this growth in real wages in the area of ICT was so strong that it was not fundamentally affected by the devaluation of the Czech crown in 2014 and the subsequent relatively long-term interventions of the Czech National Bank to maintain this exchange rate.

Legend for both figures:

ICT Professionals = CZ-ISCO 25 + CZ-ISCO 35

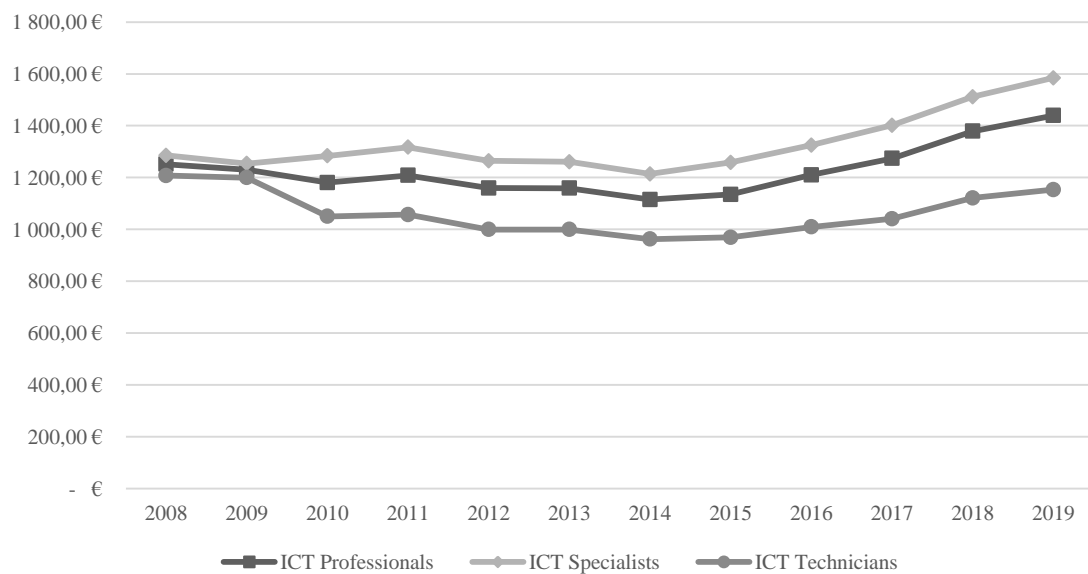
ICT Specialists = CZ-ISCO 25

ICT Technicians = CZ-ISCO 35



Source: Own, data from [21]

**Fig. 1:** Trend of the average of real gross wages of ICT Professionals (2008–2019)



Source: Own, data from [21]

**Fig. 2:** Trend of the median of real gross wages of ICT Professionals (2008–2019)

Table 3 summarizes the result of the regression model for both the median and the (arithmetic) average, and for the reasons given above, the year 2014 was chosen as the basis for the calculation. ICT Specialist wages tend to grow faster than ICT Technicians wages, regardless of whether we choose the median (which we consider more appropriate) or the arithmetic mean as the basic indicator for the calculation. The exact values of the regression coefficients (mean versus median) are, of course, slightly different, but not significantly.

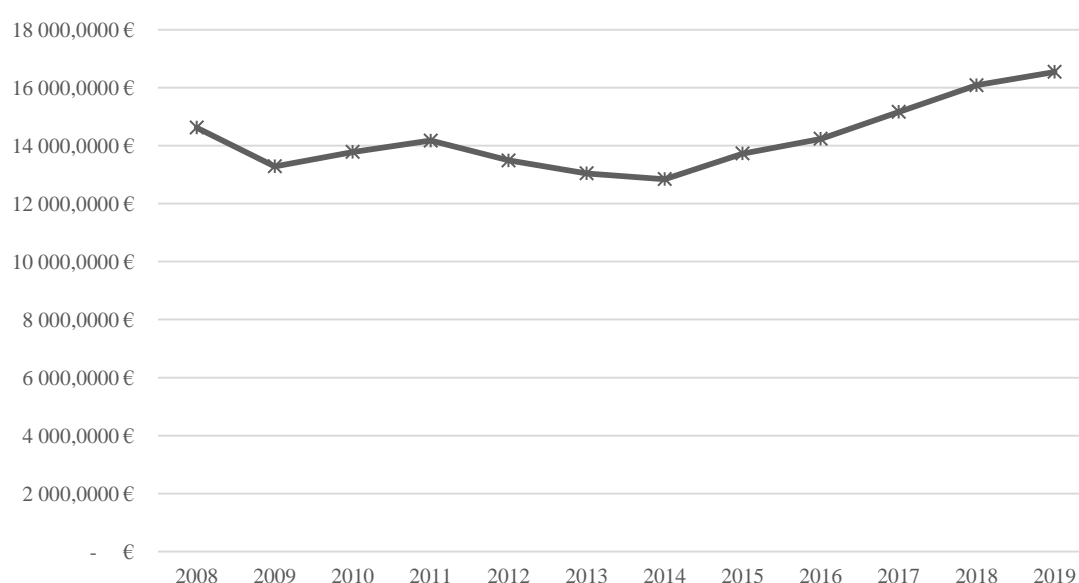
**Tab. 3: Trend Lines for 2014–2019**

Category	Indicator: Average		Indicator: Median	
ICT Specialists	$y = 0.0650x + 0.9237$	$R^2 = 0.9895$	$y = 0.0632x + 0.9174$	$R^2 = 0.9843$
ICT Technicians	$y = 0.0464x + 0.9467$	$R^2 = 0.9825$	$y = 0.0428x + 0.9338$	$R^2 = 0.9477$
ICT Total	$y = 0.0631x + 0.9269$	$R^2 = 0.9890$	$y = 0.0618x + 0.9121$	$R^2 = 0.9747$

Source: Own

### 2.3 Relation of Wage Development in ICT and GDP Development

First, let us consider the development of GDP per capita adjusted for inflation (Figure 3). It is clear that the trend in wages is copying the trend in GDP per capita. From 2008 to 2013, this indicator decreased overall, again with an occasional slight year-on-year increase, while it has been growing steadily since 2014 (however, after adjustment for inflation, it lasts till 2017 to be higher than in 2008).



Source: Own

**Fig. 3: Trend of the Czech Republic's GDP per capita (2008–2019)**

Similar to the wages, we will use the year 2014 as the base year for the regression model and determine the trend for the period 2014 to 2019. The resulting parameters of the regression model are summarized in Table 4.

**Tab. 4: GDP per capita (2014–2019)**

Trend line	R <sup>2</sup>
$y = 0.0589x + 0.9435$	0.9921

Source: Own

If we compare the calculated values of the regression model for GDP per capita and compare them with the calculated values for individual categories of workers (for the same period 2014–2019), we come to the conclusions summarized in Table 5.

**Tab. 5: Comparison of the trend lines: GDP per capita versus wages (2014–2019)**

Category	Indicator: Average	Indicator: Median
ICT Specialists (CZ-ISCO 25)	Higher	Higher
ICT Technicians (CZ-ISCO 35)	Lower	Lower
ICT Total (CZ-ISCO 25 + 35)	Higher	Higher

Source: Own

Among other things, we see from the table that there is no difference in the results if we use the average or the median. Overall, we can say that (a) If we take all ICT employees or only the category of ICT Specialists (CZ-ISCO 25), then in both cases for the period 2014–2019, wages grew faster than GDP per capita.

But if we examine only the development of wages for the category of ICT Technicians (CZ-ISCO 35), then we see that these wages in the given period lagged somewhat behind the GDP growth rate. The explanation why overall wages in ICT grew faster anyway, although not for the CZ-ISCO 35 category, is quite simple and given two factors: (a) wages in the CZ-ISCO 25 category grew significantly faster (b) the CZ-ISCO 25 category account for about two-thirds of the total number of employees in ICT.

## 2.4 Gender Pay Gap

In the final subchapter, we will focus on the *gender pay gap* in the Czech Republic and consider it from two perspectives: *international comparison* and *industry comparison*. First, we will examine the problem defined in the research question *RQ3: What is the gender pay gap of the Czech Republic in an international comparison and how did these differences develop over the period under review?*

In the comparison we included the Visegrad group countries Austria and Slovenia, i.e. countries that are similar at least in some characteristics. But first, let us take a brief look at all EU member states, according to a 2019 Eurostat survey [14]. According to these statistics, the average gender pay gap in the EU Member States was 14.7% in 2019; the biggest gender pay gap was in Estonia (22.7%) and the smallest one in Romania (3.0%).

A more detailed analysis of the data for the monitored countries is summarized in Table 6, which compares the situation in 2009 and 2019 and the magnitude of the change that has taken place in individual countries over 10 years.

**Tab. 6:** *Gender pay gap at the beginning and the end of the analyzed period*

Country	Gender pay gap in 2009 in %	Gender pay gap in 2019 in %	Difference in percentage points
Austria	24.3	19.9	−4.4
Czech Republic	25.9	18.9	−7.0
Hungary	17.1	18.2	1.1
Poland	8.0	8.5	0.5
Slovakia	21.9	18.4	−3.5
Slovenia	−0.9	7.9	8.8

*Source: Own, data from [14]*

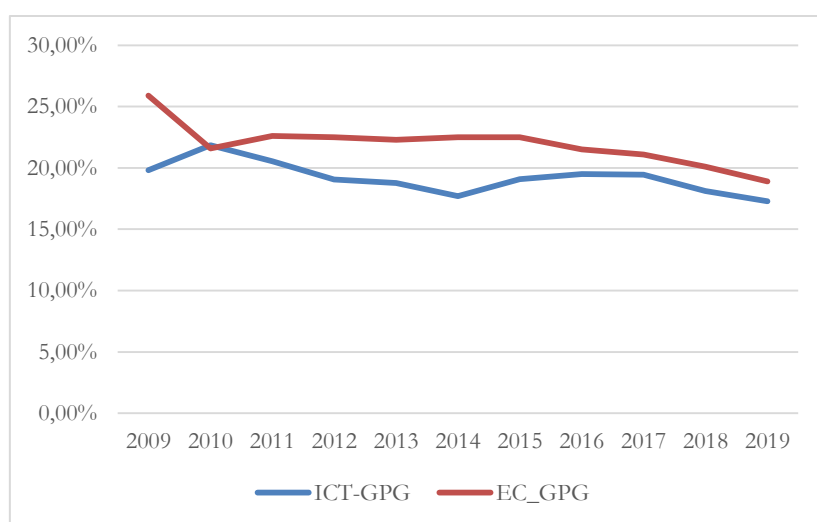
It is clear from the table above that a group of three countries (Austria, Czech Republic, and Slovakia) can be singled out. Countries in this group have undergone a similar development. In 2009, the gender pay gap was very high (over 20 % in all countries), narrowed by 2019 (but still considerably high and above the EU average) and converged to very similar values (19.9; 18.9; 18.4). The largest decrease from these countries (−7 percentage points) was in the Czech Republic.

The situation in the other three countries is quite diverse. In Hungary, this indicator was initially lower than in the three countries from the previous group, in the following years (not in the table) it decreased, but at the end of the observed period, it rose again to 18.2% in 2019, a value that is practically same as in Austria, Czech Republic and Slovakia.



If we compare the other two countries (Poland and Slovenia) only according to the values for 2019, it can be stated that they are practically the same (8.5 and 7.9) and significantly below the EU average. However, if we compare the year 2009, we see that the countries have undergone very different developments. While the situation in Poland has practically not changed, in 2009 women's wages in Slovenia were even slightly higher. This particular phenomenon would probably require a more detailed separate analysis of data from this country.

We will now focus on the comparison within the Czech Republic, i.e. on *RQ4: What is the gender pay gap in ICT in the Czech Republic in comparison with the entire economy?* The overall trend is shown in the graph in Figure 4 from which it is clear at first glance that practically throughout the period under review, the gender pay gap in ICT (marked as "ICT-GPG" in the graph) was smaller than the total value for the whole economy (marked as "EC\_GPG" in the graph). An interesting phenomenon occurred in 2010 when the values of the indicator were practically the same for both categories. This phenomenon can be explained by the fact that there was a significant decline in wages in ICT this year, as a result of the ongoing crisis of 2008.



Source: Own, data from [21]

**Fig. 4:** Comparison of the gender pay gap in the Czech Republic

## Conclusion

Based on data from the ISPV (Average Earnings Information System) survey, supplemented by data from the Czech Statistical Office and Eurostat, we can reach several conclusions. The total number of ICT Professionals (CZ-ISCO 25 + CZ-ISCO 35) grew throughout the period under review (except 2016/2017, when it more or less stagnated) and at the same time grew faster than in the whole economy, so the share of total employment increased significantly (from 2.2 to 3.9%).

This can be considered a positive trend, as a more significant growth in the number of ICT Professionals can be considered an important (but not sufficient) condition for the Czech Republic to maintain or even improve its competitiveness in international comparison and in the conditions of advancing digitization of the economy and Industry 4.0 development.

If we compare the wages of the two main categories of employment in ICT (research question *RQ1*), we come to the conclusion that the wages of ICT Specialists (CZ-ISCO 25) grew faster than those of ICT Technicians (CZ-ISCO 35). In our opinion, the explanation is relatively simple. If we look at the descriptions of these jobs (the basic description from the Czech

version of *ISCO-08: International Standard Classification of Occupations* is given in the text), it can be concluded that the activities performed by CZ-ISCO 25 workers are usually more creative, diverse and require more theoretical knowledge.

Comparing the growth of wages in ICT against the growth of GDP per capita (research question *RQ2*), we found that on average wages in ICT in the observed period grew faster than GDP per capita. This is positive on the one hand, as a number of studies have shown that the development of ICT and digitization contributes to economic growth. On the other hand, in some other sectors of the economy, wages are growing more slowly, which is causing an increase in the wage gap and in social inequalities. However, the difference between wage growth in ICT and GDP per capita growth is not dramatic, so these potential negative consequences will not be significant.

The analysis of time series of wage development, taking into account the influence of other factors, i.e. especially inflation and the development of the CZK/EUR exchange rate, showed that since 2014, wages in ICT have been growing continuously. Even the significant weakening of the CZK/EUR exchange rate in 2014 (as a result of CNB interventions) did not have a significant effect on the development of wages in ICT. After the end of these interventions in 2017, Czech crown strengthened again and inflation rose at the same time (from 0.7% in 2016 to 2.5% in 2017), but even this did not have a significant effect on the growth trend.

In an international comparison of the gender pay gap of the Czech Republic with a focus on the V4 countries Austria and Slovenia (research question *RQ3*) we came to the conclusion that three countries (Austria, Czech Republic, and Slovakia) underwent similar developments and the value of this indicator decreased during the period and at the same time converged to very similar values ranging from 18.4 to 19.9%. At the same time, it can be stated that the development in the Czech Republic is favorable (the largest decrease by 7 percentage points), but we remain well above the European Union average. It is therefore desirable to monitor the development of this indicator in the future. In the other three countries examined in more detail, developments have varied considerably.

When comparing the gender pay gap within the Czech Republic (research question *RQ4*), in almost all years the gender pay gap in ICT was less than the aggregate value of this indicator for the whole economy (except in 2010, when the values of the indicator were practically the same for both categories).

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## **Literature**

- [1] HANCLOVA, J.; DOUCEK, P.; FISCHER, J.; VLTAVSKA, K.: Does ICT capital affect economic growth in the EU-15 and EU-12 countries? *Journal of Business Economics and Management*, DOI: [10.3846/16111699.2012.754375](https://doi.org/10.3846/16111699.2012.754375)
- [2] CHRISTIANO, L. J.; EICHENBAUM, M.; EVANS, C. L.: Monetary Policy Shocks: What Have We Learned and to What End? In: *Handbook of Macroeconomics*, Elsevier: Amsterdam, The Netherlands, 1999; Part A, vol. 1, pp. 65–148. ISBN 978-0-444-50156-1.

- [3] YOUSEFI, A. The Impact of Information and Communication Technology on Economic growth: Evidence from Developed and Developing Countries. *Economics of Innovation and New Technology*. DOI: [10.1080/10438599.2010.544470](https://doi.org/10.1080/10438599.2010.544470)
- [4] STAMENKOVIĆ, M.; MILANOVIĆ, M.; PETROVIĆ, D. R.: Statistical Analysis of Interdependence of ICT and Economic Development of Selected European Countries. *Economic Themes*. DOI: [10.2478/ethemes-2021-0015](https://doi.org/10.2478/ethemes-2021-0015)
- [5] BLEY, K.; LEYH, Ch.; SCHAFFER, T.: Digitalization of German Enterprise in the Production Sector – Do they know how “digitized” they are? *Proceedings of Twenty-second Americas Conference on Information Systems (AMCIS 2016)*, Curran Associates, Inc., 2016, pp. 736–745. ISBN 978-0-9966831-2-8.
- [6] PESSL, E.; SORKO, S. R.; MAYER, B.: Roadmap Industry 4.0 – Implementation Guideline for Enterprises. *International Journal of Science, Technology and Society*. DOI: [10.11648/j.ijsts.20170506.14](https://doi.org/10.11648/j.ijsts.20170506.14)
- [7] BLOOM, N.; DRACA, M.; KRETSCHMER, T.; SADUN, R.; OVERMAN, H.; SCHANKERMAN, M.: *The Economic Impact of ICT*. London. UK: London School of Economics, Centre for Economic Performance, 2010.
- [8] DELINA, R.; TKAC, M.: The Impacts of Specific ICT Solutions on Productivity. *Proceedings of 18th Interdisciplinary Information Management Talks – Human Values, Innovation and Economy*, Linz: Trauner Verlag, 2010, pp. 23–32. ISBN 978-3-85499-760-3
- [9] SARANGI, A. K.; PRADHAN, R. P.: ICT infrastructure and economic growth: a critical assessment and some policy implications. *Decision*. 2020, Vol. 47, pp. 363–383. DOI: [10.1007/s40622-020-00263-5](https://doi.org/10.1007/s40622-020-00263-5)
- [10] LIN, W. T.; CHIANG, Ch.-Y.: The impacts of country characteristics upon the value of information technology as measured by productive efficiency. *International Journal of Production Economics*. DOI: [10.1016/j.ijpe.2011.02.013](https://doi.org/10.1016/j.ijpe.2011.02.013)
- [11] BALLESTEROS-CARRASCO, B. Usos socioeconómicos de las TIC relacionados con el empleo en Europa. *El profesional de la información*. DOI: [10.3145/epi.2013.jul.05](https://doi.org/10.3145/epi.2013.jul.05)
- [12] MANĎÁK, J.; NEDOMOVA, L.: Measuring Performance of European ICT Sectors Using Output-Oriented DEA Models. *Proceedings of 22nd Interdisciplinary Information Management Talks – Networking Societies – Cooperation and Conflict*. Linz: Trauner Verlag, 2014, pp. 79–86. ISBN 978-3-99033-340-2.
- [13] PIWOWAR-SULEJ, K. Human Resource Management in the Context of Industry 4.0. *Organization & Management Quarterly*. DOI: [10.29119/1899-6116.2020.49.7](https://doi.org/10.29119/1899-6116.2020.49.7)
- [14] EUROSTAT. *Gender pay gap in unadjusted form by NACE Rev. 2 activity – structure of earnings survey methodology*. [online]. 2021-02-24 [accessed 2021-08-18]. Available from WWW: [https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=earn\\_gr\\_gpgr2&lang=en](https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=earn_gr_gpgr2&lang=en)
- [15] LANDMESSER, J. M.; ORŁOWSKI, A. J.; RUSEK, M. A.: Gender Pay Gap Across the Income Distribution: Analysis for the EU. *Acta Physica Polonica A*. 2020, Vol. 138, Issue 1. DOI: [10.12693/APhysPolA.138.31](https://doi.org/10.12693/APhysPolA.138.31)
- [16] EUROPEAN COMMISSION: *Striving for a Union of Equality: The Gender Equality Strategy 2020–2025*. 2020. DOI: [10.2775/671326](https://doi.org/10.2775/671326)

- [17] BERGMANN, N.; SCHEELE, A.; SORGER, C.: Variations of the same? A sectoral analysis of the gender pay gap in Germany and Austria. *Gender, Work & Organization*. DOI: [10.1111/gwao.12299](https://doi.org/10.1111/gwao.12299)
- [18] MITKOVÁ L.: Occupational Segregation and Gender Pay Gap in Slovakia. In K. S. Soliman (ed.), *Proceedings of the 31st International Business Information Management Association Conference (IBIMA), 2018*. ISBN: 978-0-9998551-0-2 [online]. 2021-04-25 [accessed 2021-08-18]. Available from WWW: [https://www.researchgate.net/publication/324942638\\_Occupational\\_Segregation\\_and\\_Gender\\_Pay\\_Gap\\_in\\_Slovakia](https://www.researchgate.net/publication/324942638_Occupational_Segregation_and_Gender_Pay_Gap_in_Slovakia)
- [37] MAREK, L.; DOUCEK, P.: Vývoj mezd a příjmové nerovnosti u ICT odborníků v České republice. Wages Development and its Non-Equality by ICT Professionals in the Czech Republic. *Politická ekonomie*. DOI: [10.18267/j.polek.1118](https://doi.org/10.18267/j.polek.1118)
- [19] NEDOMOVA, L.; MARYSKA, M.; DOUCEK, P.: Unequal wage of men and women in ICT in the Czech Republic? *Gender, Technology and Development*. 2017, Vol. 21, Issue 1-2. DOI: [10.1080/09718524.2017.1385317](https://doi.org/10.1080/09718524.2017.1385317)
- [20] ISPV: *Informační systém o průměrném výdělku*. [online]. 2021. [accessed 2021-08-21]. Available from WWW: <https://www.ispv.cz/cz/O-ISP.V.aspx>
- [21] EUROSTAT. *Structure of Earnings Survey*. [online]. 2021. [accessed 2021-08-21]. Available from WWW: <https://ec.europa.eu/eurostat/web/microdata/structure-of-earnings-survey>
- [22] CZECH STATISTICAL OFFICE: *Klasifikace zaměstnání (CZ-ISCO)*. [online]. Praha, 2020-06-23. [accessed 2021-08-21]. Available from WWW: [https://www.czso.cz/csu/czso/klasifikace\\_zamestnani\\_-cz\\_isco-](https://www.czso.cz/csu/czso/klasifikace_zamestnani_-cz_isco-)
- [38] MAYER, T.: The Distribution of Ability and Earnings. *The Review of Economics and Statistics*. 1960, Vol. 42, Issue 2, pp. 189–195. DOI: [10.2307/1926538](https://doi.org/10.2307/1926538)

## SROVNÁNÍ MEZD V ICT PODLE HLAVNÍCH KATEGORIÍ, JEJICH RELACE K HDP A ROZDÍLY MEZI PLATY MUŽŮ A ŽEN

Článek zkoumá mzdy v oblasti informačních a komunikačních technologií (ICT). Na základě dat tzv. ISPV, ČSÚ a Eurostatu jsme provedli několik analýz. Data jsou od roku 2008 a proto bylo nutné zohlednit inflaci, pro mezinárodní srovnání jsou mzdy v EUR, takže důležitý je i kurz CZK/EUR. Hlavní závěry jsou: (1) Počty pracovníků v ICT rostly rychleji, jejich podíl na celkové zaměstnanosti vzrostl z 2,2 % na 3,9 %. (2) Od roku 2008 do roku 2013 je celkový trend vývoje mezd pokles, od roku 2014 výrazně rostly (ovlivněno jak ekonomickým růstem, tak poklesem inflace). (3) Mzdy ICT specialistů (CZ-ISCO 25) rostly značně rychleji než mzdy ICT techniků (CZ-ISCO 35). (4) Mzdy za celé ICT a za kategorii CZ-ISCO 25 rostly rychleji než HDP. (5) Rozdíl mezi platy muži/ženy v ČR patří k nejvyšším mezi zkoumanými zeměmi, i když v roce 2019 se oproti roku 2008 snížil. (6) V rámci ČR jsou rozdíly mezi platy mužů a žen v ICT menší než za celé národní hospodářství.

## DER LOHNVERGLEICH IN ICT NACH HAUPTKATEGORIEN, IHRE BEZIEHUNG ZU DEM BIP UND UNTERSCHIEDE ZWISCHEN DEN MÄNNER- UND FRAUENLÖHNEN

Der Artikel untersucht die Löhne im Bereich der ICT. Aufgrund der sog. ISPV-Daten, des Tschechischen statistischen Amt (ČSÚ) und Eurostat Daten haben wir ein paar Analysen durchgeführt. Die Hauptschlussfolgerungen sind: (1) Die Anzahl der Mitarbeiter in ICT ist schneller gewachsen, ihr Anteil an der Gesamtbeschäftigung ist von 2,2 % auf 3,9 % gestiegen. (2) Von 2008 bis 2013 ist der gesamte Entwicklungstrend der Löhne der Rückgang, seit 2014 sind sie ausdrücklich gewachsen (beeinflusst sowohl durch das Wirtschaftswachstum als auch durch den Inflationsrückgang). (3) Die Löhne der IT-Spezialisten (CZ-ISCO 25) sind bedeutend schneller gewachsen als die Löhne der ICT-Techniker (CZ-ISCO 35). (4) Die Löhne für ganze ICT und für die Kategorie CZ-ISCO 25 sind schneller gewachsen als das BIP. (5) Der Unterschied zwischen den Männer- und Frauenlöhnen in der ČR gehört unter den untersuchten Ländern zu den höchsten, obwohl er im J. 2019 gegenüber dem J. 2008 gesenkt wurde. (6) Im Rahmen der ČR sind die Lohnunterschiede zwischen Männern und Frauen in ICT geringer als in der ganzen Volkswirtschaft.

## PORÓWNANIE WYNAGRODZEŃ W BRANŻY TIK WEDŁUG GŁÓWNYCH KATEGORII, ICH STOSUNEK DO PKB ORAZ RÓŻNICE MIĘDZY WYNAGRODZENIEM MĘŻCZYZN I KOBIET

Artykuł bada wynagrodzenia w branży technologii informacyjno-komunikacyjnych (TIK). Na podstawie danych pochodzących z systemu informacyjnego nt. przeciętnych zarobków, danych Czeskiego Urzędu Statystycznego oraz Eurostatu przeprowadziliśmy kilka analiz. Dane są od 2008 roku, w związku z czym należało uwzględnić inflację. Dla porównania w skali międzynarodowej wynagrodzenia wyrażone są w EUR, a więc ważny jest też kurs CZK/EUR. Główne wnioski są następujące: (1) Liczby pracowników w branży TIK rosły szybciej, ich udział w ogólnym zatrudnieniu wzrósł z 2,2 % do 3,9 %. (2) Od 2008 do 2013 roku ogólny trend rozwoju wynagrodzeń jest malejący, od 2014 roku wyraźnie rosły (wpływ na to miał nie tylko wzrost gospodarczy, ale również spadek inflacji). (3) Wynagrodzenia specjalistów TIK (CZ-ISCO 25) rosły szybciej niż pensje techników TIK (CZ-ISCO 35). (4) Wynagrodzenia za całą branżę TIK oraz za kategorię CZ-ISCO 25 rosły szybciej niż PKB. (5) Różnica między wynagrodzeniami mężczyzn a kobiet w Czechach należy do najwyższych spośród badanych krajów, aczkolwiek w 2019 roku w porównaniu z 2008 r. się zmniejszyła. (6) W ramach RCz różnice między zarobkami mężczyzn i kobiet w branży TIK są mniejsze niż w całej gospodarce narodowej.