

The impact of regional specialization on wages of women and men in ICT sector in Poland in 2012-2016

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Abstract: The aim of the presented study is to demonstrate the impact of regional specialization on total remuneration, disaggregated by gender in the ICT sector in Poland in 2012-2016. The first part of the article presents the general characteristics of the Polish ICT industry and shows (using the location quotient) regions in Poland that could be treated as areas of high concentration of specialization in this field; in the second part, the wages of men and women in the ICT sector are compared for the years 2012-2016; the third part presents the results of a statistical analysis of the impact of regional specialization on wages disaggregated by gender. The study ends with a summary and conclusions. The estimation of the parameters of the equations used in the analysis shows that the values of the location quotient (as a measure of regional specialization) largely explains the variation in total wages and the gender distribution with the following relationships - the greater the regional specialization, the higher the average wage and vice versa. However, the location quotient values do not explain the differentiation of the gender pay gap and it is not possible, on the basis of the analysed data, to claim any dependencies between regional specialization and the gender pay gap existing in a given voivodeship.

Keywords: regional specialization, gender pay gap, ICT sector

JEL codes: J31, O14

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1. Introduction

Information and communication technologies, due to their global reach through the Internet, are a tool to eliminate barriers and to equal opportunities. The ICT sector is characterized as one of the key sectors of economy, because through digital products and services, it improves business processes in other branches. Economic practice shows, however, that in the sector, which itself

contributes to a significant improvement in production efficiency, there is inequality in pay due to the sex of employees.

Since the last decade of the 20th century, the issue of geographical concentration of industry, thanks to M. Porter, has again gained researchers' interest (Baran, 2007: 197). This economist, introducing the concept of clusters as geographical proximate group of interrelated enterprises, influenced the perception of both business entities, as well as entire regions or countries (Porter, 1990: 16, 2001: 246). Important elements that should characterize this group are: unified nature of industry, close distance between economic entities and interrelationships, both formal and informal ones (Brodzicki et al. 2002: 2). Due to the fact that clusters employ qualified personnel, specialized suppliers and the business industry knowledge is gathered, these entities become more specialized than those that are not in clusters (Porter, 1998: 78). However, an appropriate personnel policy is required from the company in order to remain competitive. High expectations regarding the service determines the employment of qualified personnel, both women and men, specialists in their field, who will foster development and innovation (Gancarczyk, 2014: 5).

Following the prerequisites of employing only specialists in a given industry gives grounds for stating that employees (irrespective of their sex) in a given position will be compensated for their work in a comparable way. In addition, the legislator guaranteed legislative equality in the remuneration of employees providing work in the same positions, among others, in art. 18^{3c} of the Labour Code (Journal of Laws 1974, no. 24, item 141). Analyses regarding the labour market prove, however, the opposite relationships (e.g. Zwiech, 2010: 276; Cukrowska, 2014: 19; Sielska, 2017: 57), i.e. despite the presentation of the same skills in a parallel position, women receive lower pay than men. Wages and equality in this area are an important determinant of economic development because they stimulate the growth of human capital and can contribute to increasing or reducing the level of competitiveness in the region, they can also contribute to labour migration (Adamczyk et al., 2009: 87). The reasons for this persistent wage disparity can be found in the type of work performed by women and men. Polish economic practice shows that in industries in which men are primarily employed, employers offer higher cash benefits than those in which women are predominantly employed (Łopatka, 2015: 247). The ICT sector is an example of industry that focuses on high quality services and competence (Information and Communication Technologies). In this study, due to the form of the data presented by statistical

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offices, the ICT sector was identified as section J in the Polish Classification of Activities (Journal of Laws 251, item 1885).¹ However, it is worth emphasizing that this section refers only to ICT-related services, without ICT production which was classified in section D (with other production) (Witkowska et al., 2016: 41-42).

The aim of this study is to show the dependence of the level of specialization on the level of remuneration and the gender pay gap in the Polish ICT industry in the years 2012-2016. The study sought to answer the following research questions: Are there dependencies between the level of remuneration and the gender pay gap and the level of industry concentration, and if so, what is their nature? Is there a gender pay gap between men and women employed as specialists in information and communication technologies in every region? The following hypotheses were put forward:

- H1: The level of wages in the Polish ICT industry is greater when the level of concentration in the region is higher.
- H2: The values of the gender pay gap are lower when the specialization in the ICT sector is higher.

The aim and research questions determined the structure and content of the study. The first part presents a tool allowing the measurement of the level of specialization in the region, which is the location quotient. The second part presents the spatial diversity of remuneration in Poland, an attempt to characterize the essence of the gender pay gap and a way of measuring it. The third part presents a simple method of estimating the correlation between the location quotient and the level of wages in the ICT sector, as well as the location quotient and the gender pay gap. The last part of the article is devoted to the summary and presentation of the most important conclusions.

2. General characteristics of the ICT sector

The ICT sector (Information and Communication Technologies) is the branch covering the production and dissemination of information, service activity in the field of information

¹ Section J covers section 58 (publishing activity), section 59 (activity related to the production of films, video recordings, television programs, sound and music recordings), section 60 (broadcasting of public and subscription programs), section 61 (telecommunications, related to software), section 62 (activities related to consultancy in the IT scope and the related activities) and section 63 (service activities in terms of information).

technology, data processing or service activity in the field of information.² The role of the ICT sector has become more and more important over the years because information technologies are used in other sectors of the economy, they contribute to improving productivity in enterprises or they create tools that allow processing, storing and providing information in a digitized form instead of a traditional printout. In recent years, major technological, market and economic changes have been observed that force cooperation from enterprises operating in the field of ICT, i.e. competing with other entities in the industry, while cooperating with them (Golonka, 2012: 34). This process is best presented in clusters, because due to geographical proximity these processes are the easiest.

The number of employees on contract employment or business relationship in the Polish ICT sector in 2012-2016 increased from year to year, representing an average of 2.3% of all employees in Poland.³ In the analysed period, men accounted for nearly 61% of all employees in the industry, and women – 39%. Most people in the ICT industry were employed in the Masovian Voivodeship (an average of 117 thousand people), i.e. as much as in total in all other voivodeships together. The Lesser Poland Voivodeship came after the Masovian Voivodeship (an average of 23 thousand people), then the Silesian Voivodeship (an average of 17 thousand people), the Lower Silesian Voivodeship (an average of 16 thousand people), the Greater Poland Voivodeship (an average of 14 thousand people), and the Pomeranian Voivodeship (an average of 13 thousand people). In the remaining provinces, the employment of persons on contract employment was at the single-digit level, with the lowest number of employees in the Opole Region (an average of 1 thousand people). Persons employed in the ICT industry work primarily in the private sector (in 2012, the share of people employed in this sector was 93.98%, in 2016 already 96.33%).

² PKD (Polish Business Classification) 2007 which was introduced by the Regulation (EC) No. 1893/2006 of the European Parliament and the council of December 20, 2006 on the statistical classification of economic activities NACE Rev 2 and amending Council Regulation (EEC) No. 3037/90 and certain EC regulations on specific statistical domains (Journal of Laws EU L 393/1 of 30.12.2006).

³Own calculations based on data provided by the Central Statistical Office. It is worth emphasizing here that, according to the methodical principles of the labour market statistics and CSO remuneration, the data presented do not include people who work under contract, students, who have concluded an employment contract with the workplace for the purpose of vocational training, persons on parental leave for taking care over their child, non-working school pupils and listeners of higher education institutions who take summer or diploma traineeships, people who work on a contract agreement or specific-task contract or agents.

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While identifying the level of concentration of the ICT sector in a given region, the Location quotient (The Balassa-Hoover Index) was used (Batóg, 2008: 4).⁴ With this indicator, one can identify the level of professional activity in the industry in the regional space in relation to the whole country. This is not the only measure that is used in the process of examining the concentration of enterprises; among others, the input-output method or expert research (Dolińska, 2012: 49) can be distinguished. The location quotient, due to its simplicity, does not provide detailed information about groups of enterprises (e.g. links between clusters). However, it identifies regions where there is branch concentration, which is the key information for further analysis and makes it valuable and worth using.

The location quotient can be written using the following formula:

$$LQ_{ICT} = \frac{E_{ICTi}}{E_i} : \frac{E_{ICT}}{E} ,$$

where⁵:

E_{ICTi} – average paid employment in the ICT sector in the i - th region,

E_i – average paid employment in the i - th region,

E_{ICT} – average paid employment in the ICT sector in Poland,

E – average paid employment in Poland.

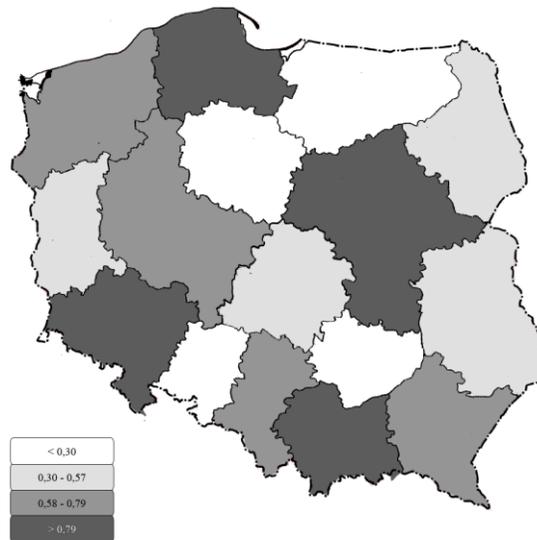
Instead of the number of people employed in a given sector, other features can be used, such as expenditure on innovations (Grzybowska, 2013: 55; Ciechowski, 2014: 6). The higher the location quotient value, the higher the degree of specialization (Celińska- Janowicz, 2016: 14). It has been assumed that a significant concentration can be identified when the location quotient values are greater than one (Karmowska, 2011: 7).

An average of LQs from the years 2012-2016 used to analyse the level of concentration of the ICT sector is presented on map 1.

⁴ In the article, due to the availability of data presented by the Central Statistical Office, the region is identified as the voivodeship.

⁵ Components of location quotient (the Balassa-Hoover Index) were taken from Central Statistical Office (data presenting average paid employment by section J in the Polish Classification of Activities).

Map 1. Location quotient in the ICT sector in Poland in 2012-2016



Source: own study based on the data published by Central Statistical Office. Available at: <http://www.stat.gov.pl>. Accessed 15 March 2018.

When analysing Map 1, four quartile groups can be distinguished. In the fourth group, characterized by the highest values of the location quotient in 2012-2016, there were the following regions: Masovia (2.27), Lesser Poland (1.17), Pomerania (0.99) and Lower Silesia (0.84). However, it is worth emphasizing that clusters in the Polish ICT sector can only be discussed in the context of two provinces, Masovia and Lesser Poland. In the Masovia region, the location quotient in 2012-2016 amounted to 2.27 on average, which means that there can be strong dependencies between business entities operating in the ICT sector due to the high concentration of employees employed in this sector in the distinguished region. The Lesser Poland is the second region, however, the concentration in this region is almost twice smaller than in the Masovia Voivodeship. Nevertheless, also here one can identify the geographical cluster of enterprises in the ICT sector. The province, whose value of specialization was close to 1, was the Pomeranian region (0.99). However, one cannot claim in this case that concentration of enterprises in the ICT sector in this region is significant, because the index should be higher than one, which is confirmed by many studies (e.g. Dachin, 2015: 56).

In the remaining quartile groups there were regions characterized by values of the location quotient that were smaller than one. This means that it is not possible to identify large groups of enterprises that would form a cluster in these regions. The lowest values of the location quotient

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were found in the regions of Opole (0.21) and Warmia and Masuria (0.24). Low values are caused by a small number of people employed in the ICT sector in 2012-2016 (in Opole region there were 1 thousand people employed, in Warmia and Masuria – 1,5 thousand people).

3. General characteristic of remuneration of women and men in the ICT sector in 2012-2016

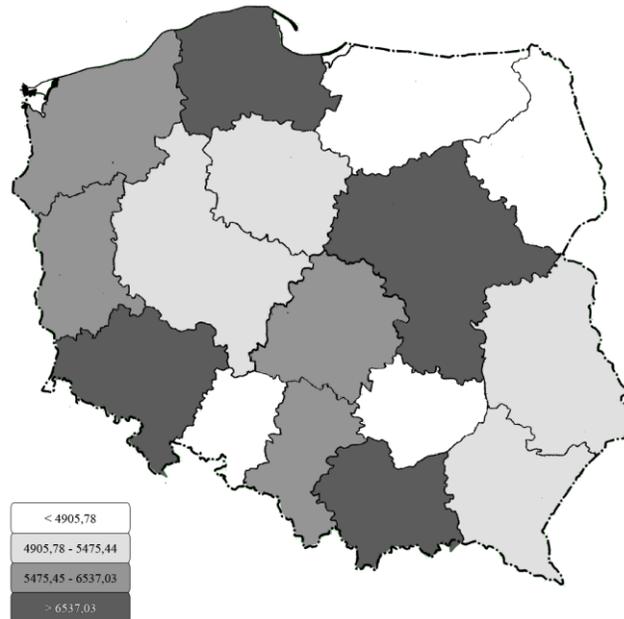
Clusters group high-class specialists. In these geographical areas employees face high expectations regarding their work, which is why the analysis of pay data on all employees working in the ICT sector, which at a later stage will be used to estimate the gender pay gap, would not be a right procedure. In this context, it was necessary to apply appropriate control variables, such as education, type of occupation or working time, which allowed isolating the appropriate group for further research. Such a group is formed by specialists in information and communication technologies.⁶

Analysing the remuneration level of employees holding positions included in the group of specialists in information and communication technologies in 2012-2016, it can be noticed that the average salary increased year by year (both in terms of the general level of remuneration, as well as broken down by gender). However, it is worth noting that men's salaries increased by 23% during the analysed years, while women's wages increased by 19%.⁷ The average level of remuneration divided into regions is presented on Map 2.

⁶This group includes: computer system analysts and programmers, specialists in the development of information systems, network and multimedia application designers, application programmers, computer system analysts and programmers not classified elsewhere, specialists in databased and computer networks, computer system administrators, specialists for computer networks, specialists in databased and computer networks not classified elsewhere in accordance with the Regulation of the Minister of Labour and Social Policy of August 7, 2014 on the classification of professions and specialities for the needs of the labour market and the scope of its application (Journal of Laws of 2014, item 1145).

⁷ Own calculations based on voivodeships statistical yearbooks for particular years.

Map 2. Average level of remuneration of ICT specialists in Poland in 2012-2016 (fixed prices from 2012)



Source: own study based on the data published by Statistical Offices. Available at: <https://wroclaw.stat.gov.pl/>; <https://bydgoszcz.stat.gov.pl/>; <https://lublin.stat.gov.pl/>; <https://zielonagora.stat.gov.pl/>; <https://lodz.stat.gov.pl/>; <https://krakow.stat.gov.pl/>; <https://warszawa.stat.gov.pl/>; <https://opole.stat.gov.pl/>; <https://rzeszow.stat.gov.pl/>; <https://bialystok.stat.gov.pl/>; <https://gdansk.stat.gov.pl/>; <https://katowice.stat.gov.pl/>; <https://kielce.stat.gov.pl/>; <https://olsztyn.stat.gov.pl/>; <https://poznan.stat.gov.pl/>; <https://szczecin.stat.gov.pl/>. Accessed 24 February 2018.

Regions, due to the varying level of remuneration, were divided into four quartile groups (analogous to the diversity of the location quotient). The first quartile group included regions characterized by the lowest average level of remuneration in 2012-2016, i.e. Holy Cross (4205.73 PLN), Podlasie (4297.76 PLN), Warmia and Masuria (4731.59 PLN) and Opole region (4844.41 PLN). It is worth noting that the regions of Warmia and Masuria, as well as Opole, were also characterized by one of the smallest values of the location quotient, i.e. in 2012-2016 in these two regions, the smallest number of employees from the ICT sector were employed and they received one of the lowest wages in Poland.

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The next quartile group included the Kuyavian-Pomeranian region (the average wage level in the analysed period amounted to 4926.24 PLN), Lublin region (5203.24 PLN), Subcarpathian region (5309.19 PLN) and Greater Poland region (5440.64 PLN). None of these regions were characterised by a wage level higher than the average wage level for all provinces, which in 2012-2016 amounted to 5771.07 PLN. Lublin region was in the same quartile group taking into account the level of remuneration and the value of the location quotient.

The Lubusz region (5510.26 PLN), Silesia (5797.47 PLN), Lodz region (6290.30 PLN) and the West Pomeranian region (6514.00 PLN) qualified for the third quartile group. Two of the regions (Silesia and West Pomerania) were in the same quartile group distinguishing mentioned the level of remuneration and the level of concentration in the ICT sector.

The last quartile group, characterized by the highest levels of remuneration in the analysed years, included Lower Silesia (6606.11 PLN), Lesser Poland (6977.79 PLN), Pomerania (7153.08 PLN) and Masovia (8529.32 PLN). It is worth noting that all the regions characterized by the highest wage levels in 2012-2016 were also characterized by the largest branch specialization. The nature of these dependencies will be presented in the next part of the study.

The level of remuneration at specialized positions in the ICT branch increased in the analysed period, however, by delimiting employees by gender, it can be noticed that the increase was not the same in both groups, which is why one can speak about the occurrence of inequality. Inequalities in pay between women and men occur when workers of one sex are treated worse than workers of the other sex despite performing the same duties in the same position (cf. Zachorowska-Mazurkiewicz, 2011: 12). The causes of this phenomenon, as well as the methods of its measurement are a continuous subject of analysis (Blau et al., 2003: 108). This study uses a measure used by European Statistical Office, which was also adopted by the Central Statistical Office to the data presented by them.⁸ The gender pay gap is understood as the difference between the average gross hourly earnings of men and the average gross hourly earnings of women expressed as a percentage of the average gross earning per hour by men. The indicator can be written in the form of the following formula:

,

⁸This results from Council Regulation (EC) no. 530/1999 of March 9, 1999 concerning structural statistics relating to earnings and labour costs (Official Journal EC L 63 of 12.03.1999, p. 6, as amended, Official Journal EU Polish special edition, chap. 5, vol. 3, p. 341, as amended), which aims to shape the policies of the European Union member states on the basis of reliable and comparable statistical data.

$$\text{GPG} = \frac{W_m - W_w}{W_m} * 100 [\%],$$

where:

W_m – average gross earnings of men per hour of work,

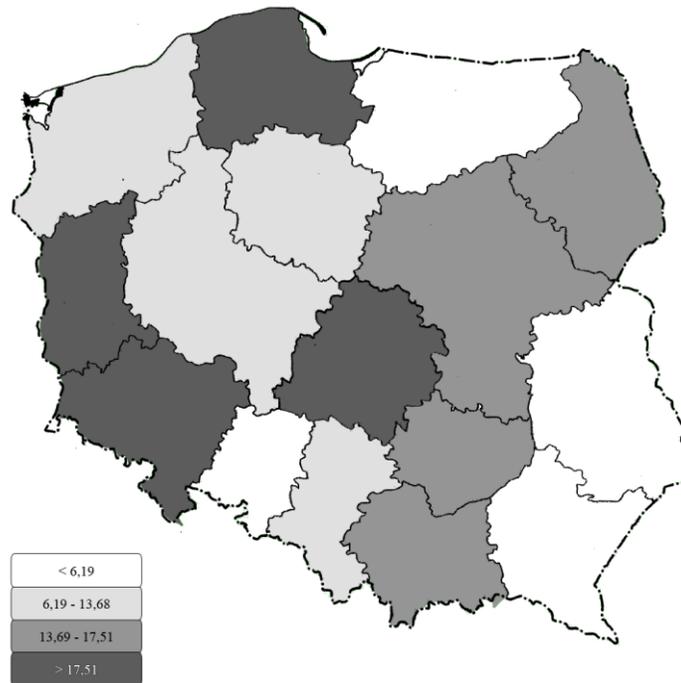
W_w – average gross earnings of women per hour of work.

In simplified terms, the value of the GPG index expressed in this form gives information on how much the salary of one sex is lower/higher than the salary of the other sex in the specified group. Positive values inform that men's salary is higher by a given percentage than women's remuneration, while negative values inform about the opposite relationship (at the same detailed job position not general one).

It is worth noting here that the indicator used both by the European Statistical Office, as well as the Central Statistical Office, defines the gender pay gap in the so-called unadjusted form (Śliwicki, 2017: 158). This measure does not take into account factors of a qualitative nature, such as education, the sector in which the employee is employed, the position or the family situation of the employee (Cukrowska- Tokarzewska, 2015: 3). Therefore, only ICT specialists were subject to analysis.

Persons holding a post that belongs to this group should be characterized by unique resources, such as specialist knowledge and competences, which will ensure a competitive advantage in the cluster. The specificity of the operation of the network of enterprises concentrated in the same geographical area is mainly based on human resources (Olko, 2015: 254). The company, acquiring high-class specialists, should first of all verify their competence regardless of the gender represented. The analysis of statistical data on the remuneration of persons holding positions in the group of ICT specialists in 2012-2016 showed a different regularity. The phenomenon of gender pay gap occurred in the vast majority of regions. The diversification of the pay gap is presented on Map 3.

Map 3. The values of the gender pay gap in the Polish ICT sector in 2012-2016



Source: own study based on the data published by Statistical Offices. Available at:
<https://wroclaw.stat.gov.pl/>; <https://bydgoszcz.stat.gov.pl/>; <https://lublin.stat.gov.pl/>;
<https://zielonagora.stat.gov.pl/>; <https://lodz.stat.gov.pl/>; <https://krakow.stat.gov.pl/>;
<https://warszawa.stat.gov.pl/>; <https://opole.stat.gov.pl/>; <https://rzeszow.stat.gov.pl/>;
<https://bialystok.stat.gov.pl/>; <https://gdansk.stat.gov.pl/>; <https://katowice.stat.gov.pl/>;
<https://kielce.stat.gov.pl/>; <https://olsztyn.stat.gov.pl/>; <https://poznan.stat.gov.pl/>;
<https://szczecin.stat.gov.pl/>. Accessed 24 February 2018.

Similarly as in the case of the value of the location quotient and the level of remuneration, the regions were divided into four quartile groups. The average value of the gender pay gap in the analysed period for all provinces was close to 11%. Regions, where the value of the gender pay gap reached the highest average were the Lubusz region (women received nearly 30% lower

wages than men in the same positions), the Lodz and Pomerania regions (in both regions, women earned 80% of men's salary) and Lower Silesia (women were remunerated by 19% worse compared with men).

In the second and third quartile groups, all the provinces except the Greater Poland region were characterized by double-digit values of the gender pay gap in favour of men. In Greater Poland, women were paid 8% less favourably than men.

The first group of regions, which was characterized by the smallest values of the gender pay gap, included the Subcarpathian, Lublin, Opole and Warmia and Masuria regions. In the last three regions, the inter-gender pay gap was characterized by negative values, which means that wages of women in these regions in 2012-2016 were higher than man's wages. However, it should be taken into account that in the Opole and Warmia and Masuria regions, in the analysed period, only 1-1.5 thousand people were employed based on the employment relationship, and women constituted a small percentage of employees in these voivodeships (in 2012-2016, in the Opole region, women in positions belonging to the group of specialists in information and communication technologies accounted for 0.1% of all the employees in the region, while 0.2% in the Warmia and Masuria region).

4. Analysis of relations between the level of specialization and total remuneration per gender

Analysing the relationship between the level of specialization and the level of remuneration of employees in the ICT sector (both on the general level of remuneration and broken down by women and men), the parameters of the following equations were estimated:⁹

The logarithmic-linear function (the logarithm from the payroll level is a linear function of the location quotient):

$$\ln w_{it} = a + b \cdot LQ_{it} \quad (1)$$

where:

w_{it} - average wage level in the i - th region in the t - year expressed in Polish Zlotys at fixed prices from 2012;

LQ_{it} – location quotient in the i - th region in the t - year;

⁹ The parameters of the following equations were estimated using the generally available GRETL statistical program.

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b – the relative (expressed in percentage) salary change caused by the increase of the location quotient by 1 percentage point;

a - the parameter has no direct economic interpretation;

and the logistic function (cf. Pindyck et al., 1991, cited in Szczepaniak et al., 2018: 52):

$$w_{it} = \frac{a}{1 + \exp(b - c \cdot LQ_{it})}$$

(2)

The parameters of the logistic function presented do not have a direct economic interpretation and $a, b, c \in R$.

The parameters of Equation (1) were estimated using the least squares method (LSM), while Equation (2), as a non-linear function, using the Marquardt procedure.

The estimated parameters of Equation (1) are summarized in Table 1, while the estimation of parameter c in Equation (2) in Table 2. This is because the value of parameter c in Equation (2) determines the direction of the independent variable in this equation.

Table 1. Estimated parameters of the log-linear function (1)

Independent variables	Dependent variable: logarithm from wages		
	total	women	men
fixed	8.428*** (206.321)	8.353*** (186.885)	8.439*** (195.684)
LQ_{it}	0.316*** (6.353)	0.260*** (4.779)	0.328*** (6.251)
R²	0.467	0.332	0.459
Corr. R²	0.456	0.317	0.448

Source: own study based GRETL statistical program. The appropriate t-Student statistics are given in brackets. *** - variables statistically significant at the 1% significance level; ** - variables statistically significant at the 5% significance level; * - variables statistically significant at the 10% significance level.

One can deduce several dependences from the estimation of Equation (1). The location quotient in 45.6% explained the variation in total wages, in 33.2% explained the women's pay

diversification, while in 44.8% explained the diversification of men’s wages (cf. corrected R^2). When comparing the estimations of parameter b (at the location quotient) and the corresponding t-Student statistics, it can be noticed that the location quotient with similar force influenced the wages of men and wages in general, and had a weaker effect on the women’s wages.

Table 2. Estimates of the c parameter of the logistic function (2)

Independent variables	Dependent variable: wages		
	total	women	men
LQ_{it}	0.911*** (7.625)	0.791*** (6.028)	0.928*** (7.514)
R^2	0.559	0.441	0.551
Corr. R^2	0.549	0.429	0.541

Source: Own study based on GRELT statistical programme. The appropriate t-Student statistics are given in brackets. *** - variables statistically significant at the 1% significance level; ** - variables statistically significant at the 5% significance level; * - variables statistically significant at the 10% significance level.

From the estimates in Table 2., similar conclusions can be drawn as from Equation (1) with the difference that the logistic Function (2) explains the pay variation from the log-linear Function (1) to a greater extent (this is due to the higher values of the corrected R^2). Thus, based on the presented estimation results, it can be pointed out that the first hypothesis characterized at the beginning of the article is true, i.e. the level of wages in the Polish ICT sector is all the grater, the higher the level of concentration in the region.

Analysing the impact of the value of the location indicator in the ICT industry in individual regions on the gender pay gap, the parameters of the following equations were estimated:

$$GAP_{it} = a + b \cdot LQ_{it} \tag{3}$$

and

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$$GAP_{it} = \frac{a}{1 + \exp(b - c \cdot LQ_{it})} \quad (4)$$

where:

GAP_{it} – gender pay gap in the i - th region in t - year;

LQ_{it} – location quotient in the i - th region in t - year;

b – the relative (expressed in percentage) change of wages caused by the increase of the location quotient by 1 percentage point;

a - the parameter has not direct economic interpretation;

and $a, b, c \in R$.

Equation (3) was estimated with LSM, Equation (4) with the Marquardt method. The estimations of the parameters of these equations are presented in Table 3.

Table 3. Estimated parameters of equations (3) and (4)

Independent variable	Equation (3)	Equation (4)
LQ_{it}	0.0723 (1.678)	0.0765* (1.728)
R^2	0.0577	00646
Corr. R^2	0.0372	0.0442

Source: Own study based on GRETl statistical program. The appropriate t-Student statistics are given in brackets. *** - variables statistically significant at the 1% significance level; ** - variables statistically significant at the 5% significance level; * - variables statistically significant at the 10% significance level.

On the basis of estimating the parameters, it is difficult to characterize the relationship between the specialization of ICT and the values of the gender pay gap. First, the location quotient explains the variability of the gender pay gap to a very small extent at the position of the ICT specialist (in the case of Equation (3) in about 3.7%, while in the case of Equation (4) in about 4.4%). Secondly, based on t-Student statistics, it can be concluded that the level of specialization in the ICT sector in individual regions of Poland does not affect the level of gender pay gap in the positions of ICT specialist (the impact of this indicator is on the borderline of

statistical significance (8-12%)). Lack of correlation between these variables is also confirmed by Pearson's correlation coefficient, which can be written using the following formula:

$$r = \frac{n \cdot \sum LQ_{it} GAP_{it} - \sum LQ_{it} \cdot \sum GAP_{it}}{\sqrt{[n \cdot \sum LQ_{it}^2 - (\sum LQ_{it})^2][n \cdot \sum GAP_{it}^2 - (\sum GAP_{it})^2]}}$$

where:

n - the sample size,

GAP_{it} – gender pay gap in the i -th region in t -year;

LQ_{it} – location quotient in the i -th region in t -year.

Pearson's correlation coefficient for the analysed data was 0.24.¹⁰ Thus, the second hypothesis put forward in the article has not been confirmed, i.e. the value of the gender pay gap is smaller when the specialization in the ICT sector is higher.

5. Conclusion

The information and communication technology sector, characterized as one of the key elements of the Polish economy, eliminates the communication and cultural barriers in many areas of life, also with the help of employees, but at the same time does not counteract pay inequalities between men and women holding the same position. The analysis carried out in the study suggests that in regions where the specialization is the highest, the level of remuneration is also the highest, and vice versa. However, it turns out that this dependence is mainly caused by the remuneration achieved by men who constitute the majority of employees in this industry. The analyses also show that the problem of the gender pay gap affected the vast majority of regions in 2012-2016. It is, however, not dependent on the concentration of the sector, i.e. the gender pay gap occurs regardless of the number of entities in the industry in given regions.

The rejection of the second hypothesis characterized in the introduction of the study gives a contribution to the further analysis of the existing problem, as wage disparities constitute a significant barrier to achieving sustainable economic growth. The introduction of additional

¹⁰ own study based on the data published by Statistical Offices. Available at: <http://www.stat.gov.pl>; <https://wroclaw.stat.gov.pl/>; <https://bydgoszcz.stat.gov.pl/>; <https://lublin.stat.gov.pl/>; <https://zielonagora.stat.gov.pl/>; <https://lodz.stat.gov.pl/>; <https://krakow.stat.gov.pl/>; <https://warszawa.stat.gov.pl/>; <https://opole.stat.gov.pl/>; <https://rzeszow.stat.gov.pl/>; <https://bialystok.stat.gov.pl/>; <https://gdansk.stat.gov.pl/>; <https://katowice.stat.gov.pl/>; <https://kielce.stat.gov.pl/>; <https://olsztyn.stat.gov.pl/>; <https://poznan.stat.gov.pl/>; https://szczecin.stat.gov.pl. Accessed 8 May 2018.

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control variables, such as a specialized position by definition requiring professional knowledge and appropriate qualifications, additionally allowed focusing attention on other sources of the problem of inequalities between women and men, which are worth conducting further analysis.

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w branży ICT w Polsce w latach 2012-2016*

Streszczenie

Celem prezentowanego opracowania jest wykazanie wpływu regionalnej specjalizacji na wynagrodzenia ogółem, oraz w rozróżnieniu na wynagrodzenia kobiet i mężczyzn w sektorze ICT (technologie informacyjno-komunikacyjne) w Polsce w latach 2012-2016. Struktura artykułu przedstawia się następująco: w pierwszej części artykułu zaprezentowano ogólną charakterystykę polskiej branży technologii informacyjno-komunikacyjnych oraz zaprezentowano (za pomocą współczynnika lokalizacji) regiony w Polsce, o których można mówić jako o obszarach dużej koncentracji specjalizacji z tego zakresu; w drugiej części przedstawiono kształtowanie się wynagrodzeń kobiet i mężczyzn w branży ICT na przestrzeni lat 2012-2016; w trzeciej części zaprezentowano wyniki statystycznej analizy oddziaływania regionalnej specjalizacji na wynagrodzenia kobiet i mężczyzn. Opracowanie kończą podsumowanie oraz wnioski z wcześniej przeprowadzonych analiz. Zastosowanymi metodami badawczymi są przegląd literatury oraz analiza danych udostępnionych przez Główny Urząd Statystyczny oraz Wojewódzkie Urzędy Statystyczne za lata 2012-2016, opisowe metody analizy zróżnicowania regionalnej specjalizacji, wynagrodzeń w branży ICT (ogółem i z podziałem na płeć) oraz metody estymacji: metoda najmniejszych kwadratów (MNK) przy wykorzystaniu funkcji logarytmiczno- liniowej oraz funkcji logistycznej.

Słowa kluczowe: regionalna specjalizacja, międzypłciowa luka płacowa, sektor ICT