



Gender Differences in Educational Attainment: The Evidence from the European Union Countries*

ABSTRACT

RESEARCH OBJECTIVE: The aim of the article is to present the results of the analysis on diversity of the education attainment of women and men in the EU countries. By implementing such a purpose, it is possible to present not only heterogeneity in education on the basis of gender but also disproportions between individual EU countries.

THE RESEARCH PROBLEM AND METHODS: The article raises three important research problems: education, gender equality and diversification within the EU countries. The analysis covers 28 EU countries and a period: 2007-2016. The research method used in the paper is the analysis and criticism of the literature and taxonomic analysis.

THE PROCESS OF ARGUMENTATION: The line of reasoning consists of three essential elements. The first part presents the problem of education with particular emphasis on gender gap according to international literature on the subject. The second part contains description of the research tools and methods. Part three of the article presents the results of the comparative study in the field of education of woman and man in the European Union members.

RESEARCH RESULTS: The research results are consistent with previous studies indicating that the level of education of women is higher than that of men. The level of diversity of education of women and men in individual EU countries is moderate. Among the most educated economies, the Scandinavian countries should be indicated. On the other side are the countries of southern Europe.

CONCLUSIONS, INNOVATIONS, AND RECOMMENDATIONS: This type of research can have significant useful value for shaping the education policy of women and men and other development policies. Considering the importance of education of women and men, there are definitely more possibilities of confronting the results of research with various areas of the economy. The lack of this is definitely disadvantage of the elaboration and recommendation for continuing and deepening research in this area.

→ **KEYWORDS:** **GENDER, GENDER GAP, EDUCATION, LEVEL OF EDUCATION, EUROPEAN UNION**

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STRESZCZENIE

Różnice płci w osiągnięciach edukacyjnych: świadectwo z krajów Unii Europejskiej

CEL BADAWCZY: Celem artykułu jest prezentacja wyników badań na temat zróżnicowania osiągnięć edukacyjnych kobiet i mężczyzn w krajach UE. Sformułowanie takiego celu badawczego pozwala nie tylko pokazać heterogeniczność edukacji ze względu na płeć, ale także dysproporcje pomiędzy poszczególnymi krajami UE.

PROBLEM I METODY BADAWCZE: Artykuł podejmuje trzy ważne problemy badawcze: edukację, równość płci i dywersyfikację państw UE. Analiza obejmuje 28 państw UE w latach 2007-2016. Metody badawcze użyte w opracowaniu to analiza i krytyka literatury przedmiotu oraz analiza taksonomiczna.

PROCES WYWODU: Na proces wywodu składają się trzy istotne elementy. Pierwszy z nich obejmuje problem edukacji ze szczególnym uwzględnieniem różnicy pomiędzy płciami zgodnie z literaturą przedmiotu. W drugiej części zaprezentowano zastosowane narzędzia badawcze i metody. Część trzecia artykułu prezentuje wyniki badań porównawczych poziomu edukacji kobiet i mężczyzn w krajach członkowskich Unii Europejskiej.

WYNIKI BADAŃ NAUKOWYCH: Wyniki badań są zgodne z wcześniejszymi opracowaniami. Wskazują one, że kobiety osiągają lepsze wyniki edukacyjne niż mężczyźni. Poziom zróżnicowania edukacji kobiet i mężczyzn w poszczególnych krajach UE jest dość umiarkowany. Jako najbardziej wyedukowane społeczeństwa wymienić należy kraje skandynawskie. Z drugiej strony rankingu są kraje Europy Południowej.

WNIOSKI, INNOWACJE, REKOMENDACJE: Tego typu opracowanie może mieć istotną wartość użyteczną dla kształtowania polityki edukacyjnej kobiet i mężczyzn oraz innych polityk rozwojowych. Biorąc pod uwagę znaczenie edukacji kobiet i mężczyzn, zaznaczyć należy, że istnieje zdecydowanie więcej możliwości konfrontowania wyników badań z innymi, ważnymi sferami gospodarki. Nieuwzględnienie tego w opracowaniu jest znaczącym ograniczeniem artykułu i zarazem rekomendacją do prowadzenia dalszych, pogłębionych badań w tym obszarze.

→ **SŁOWA KLUCZOWE:** PŁEĆ, RÓŻNICA PŁCI, EDUKACJA, POZIOM EDUKACJI, UNIA EUROPEJSKA

Introduction

The article mentions three important research topics: 1) education, which is the basis in the process of competence development and the key factor of knowledge-based economy, 2) gender equality in economics shown in the example of education, and 3) diversification of education levels in the European Union countries. The combination of these three research areas allows the formulation of the article's purpose, however,

emphasizing the second and third of the aspects presented. The aim of the study is therefore to present the results of research on the diversity of the level of education of women and men in the European Union. By implementing such a purpose, it is possible to present not only diversity in education on the basis of gender but also disproportions between individual EU countries.

The analysis covers 28 EU countries and a period of 10 years: 2007-2016. The research method used in the paper is the analysis and criticism of the literature on the level of education according to the gender criterion, and taxonomic analysis using a set of diagnostic variables describing selected aspects of education.

The article was divided into related parts. In the first part, a synthetic review of literature in the field of women's and men's education was made. The second part contains a description of the quantitative research method used in the empirical part of the paper. The third part presents the results of own research on the education of women and men in the European Union.

Literature review

The importance of education for the country's economy is quite obvious. Education, various determinants of the level of education are considered the main determinants of human capital (Becker, 2009; Breen, Lujkx, Muller, & Pollak, 2010; Wach, 2014). Human capital in turn plays a key role as the driving force of economic growth in line with the concepts of endogenous growth (Lucas, 2010).

The introduction of the issue of gender as a category of analysis of education and human capital was primarily conducted in the context of searching for causes of inequalities in women's and men's wages and research on household production and allocation of time (Pujol, 1992; Albeida, 1997). An important stage in the inclusion of the issue of women's work in mainstream economics was the creation of a new household economy initiated by human capital theoreticians (Pollak, 2003). As part of this concept, topics related to school achievements and educational choices, as well as unemployment and the pay system were undertaken (Benham, 1974; Blau, 1976; Beller, 1979). With the development of the women's movement, a new – alternative approach to the issue of women and their role in the economy appeared. Within the scope of these studies, women's issues were presented primarily in the context of their discrimination, the conflict of power between women and men and the gender relationship in the household with all the consequences relating to the labor market, the value of unpaid labor and reproductive function (Deere, 1976; Folbre, 1982; Sen, 1990; Agarwal, 1992; Duggan, 1994). Numerous studies prove that returns from social investments in women's education outweigh the social gains from investment in men's education (Schultz, 1993; Hill & King, 1993).

The issue of diversity of education between women and men is also important in the activities of the European Union itself. According to the study conducted by Eurostat (2016), the level of education in the European Union countries improved over the

years. However, the diversification of gender-based education still remains, especially at the level of university education. Definitely more women than men undertake higher education. Similar conclusions, along with the prediction of implications for this labor market resulting from this trend, are provided by Pekkarinen (2012).

Hek, Kraaykamp and Wolbers (2016) point out that gender differences in the level of education are still poorly recognized in the literature on the subject. First of all, there is a shortage of long-term research that could indicate long-term trends. This is the most reasonable as it can be essential for different areas of society and economy. According to Boserup (2007), the development process is not sexually neutral.

Methods and research framework

Different approaches can be used to assess education at country level. This is a complex and multifaceted problem concerning various levels of education, the issue of financing education, education effectiveness, education of people of working age, etc. There is therefore a need to recognize the subject in a multidimensional scope. OECD (2015) proposes a set of indicators that provide information about the state of education in the world. The measures proposed by OECD concern the results of educational institutions, learning outcomes, financial and human resources invested in education, access to education as well as progress in education and teaching organization (OECD, 2015). Suggesting this approach, as well as the availability of data for the European Union countries in this study, we proposed the following set of diagnostic variables on education broken down by women and men:

Table 1
Diagnostic variables of education used in the study

Diagnostic variables	
1.	Population between 25-64 with tertiary educational attainment – level 5-8 (% of total)
2.	Early leavers from education and training (% of Total population)
3.	Managers, professionals, technicians and associated professionals with tertiary educational attainment – people between 24-64 (% of total)
4.	Unemployment rate with tertiary education (%)
5.	Participation rate in education and training – people between 24-64 (% of total)
6.	Population between 25-64 with less than primary, primary and lower secondary education – levels 0-2 (% of total)

Source: own study based on Eurostat Database.

Based on the proposed diagnostic variables, the aggregate education value (AEV) was calculated. This measure takes a numeric value from 0 to 1, while maintaining the information value of the verified diagnostic variables. A higher value indicates a higher

level of education. It gives the opportunity to comprehensively capture the general education level of a given country and is a great tool for comparing a larger number of countries studied, which would not be possible treating individual diagnostic variables separately, the more so that the analysis is dynamic. The studied period is the years 2007-2016. Aggregated measure of the education was calculated in accordance with the algorithm proposed by Hellwig (1967). A detailed presentation and at the same time attempts to develop this approach can be found in the works of Wydymus (1984), Zeliaś (2000), Malina (2004), Łuczak and Wysocki (2015), and Maciejewski (2017). The Excel sheet and Statistica software were used to calculate and present the results of the analysis.

Results and discussion

Table 2 presents descriptive statistics of the aggregate education value of the European Union countries in the years 2007-2016 divided into women and men. Due to the formal limitations of the article, it is not possible to present all the data that was obtained during the analysis. In addition, the AEV value adjustment for 28 countries for a period of 10 years is not transparent and vividly interpretable.

Table 2

Descriptive statistics of aggregated value of education of women and men in the European Union countries in the years 2007-2016

MALE										
Statistics/Years	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Max	0.738	0.716	0.694	0.686	0.706	0.703	0.687	0.685	0.640	0.694
Min	0.118	0.117	0.070	0.059	0.033	0.042	0.036	0.004	0.004	0.022
Average	0.381	0.371	0.372	0.368	0.373	0.375	0.376	0.358	0.377	0.385
Asymetry	-0.486	-0.498	-0.243	-0.232	-0.262	-0.331	-0.417	-0.430	-0.656	-0.709
Variability	50.918	50.918	50.918	50.918	50.918	50.918	50.918	50.918	50.918	50.918
FEMALE										
Statistics/Years	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Max	0.779	0.753	0.739	0.759	0.742	0.762	0.755	0.772	0.740	0.743
Min	0.057	0.065	0.016	0.010	0.089	0.077	0.061	0.040	0.034	0.045
Average	0.396	0.392	0.377	0.376	0.371	0.383	0.396	0.398	0.389	0.392
Asymetry	-0.119	-0.142	0.107	0.172	0.164	0.147	0.006	-0.048	-0.171	-0.176
Variability	52.062	51.869	52.133	52.091	51.253	51.373	51.406	51.341	51.387	51.227

Source: own work based on Eurostat Database.

Several observations can be made on the basis of descriptive statistics. First of all, there is a fairly large discrepancy between the most and the least developed country in terms of education. This is confirmed by the interval between the minimum and maximum values. This applies to both women and men. On the other hand, the value of the coefficient of variation at the level of approx. 50% indicates a relatively moderate differentiation in the level of education in the group of respondents. This means that, in general, the countries of the European Union differ on average in terms of the level of education, and a large gap indicates the existence of so-called “outliers.” Differences in the level of education remain practically all the time at the same level, while in the group of women it is larger and minimally decreases with the passage of the analyzed years. The average AEV is higher for women. Taking into account changes in analyzed period, this value is at a comparable level over the 10 years studied for both sexes. Asymmetry of the distribution is usually negative. The exceptions are the years 2009-2013 in the group of women. This proves that for the majority of countries the aggregated education measure was higher than the average. This is especially visible for men, where this asymmetry is relatively large and increases significantly in the last years of the study. In the women’s group, the asymmetry coefficient adopts low values, which indicates a much more symmetrical distribution of AEV for women than for men.

Figure 1 is aimed at presenting the diversity in education levels broken down by gender. Therefore, the AEV for women and men were presented in the subsequent years of the study.

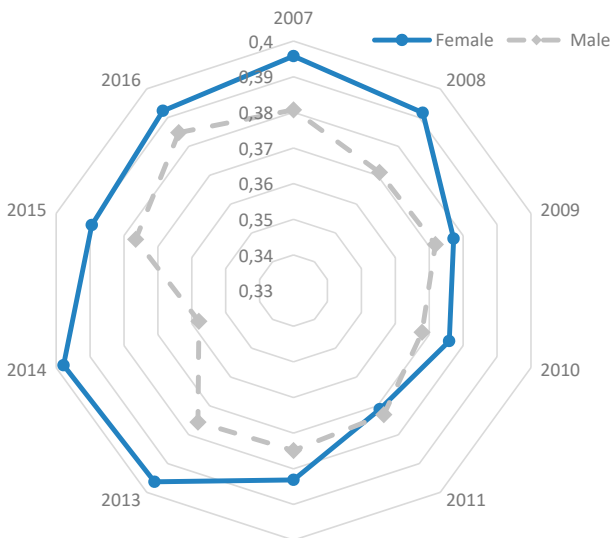


Figure 1. Aggregated education value of women and men in the European Union countries in the years 2007-2016.

Source: own work based on Eurostat Database.

Figure 1 indicates the existing diversity in the levels of education of women and men in the European Union. It turns out that men are less educated than women. The value of the aggregate education measure for both sexes equates only in 2011. A significant discrepancy between the education of women and men is visible primarily in the penultimate years of analysis: 2013-2014. Figure 2 shows how the situation is broken down by particular countries. It presents the first and last year of analysis in order to observe the changes that took place in the space of the respondents.

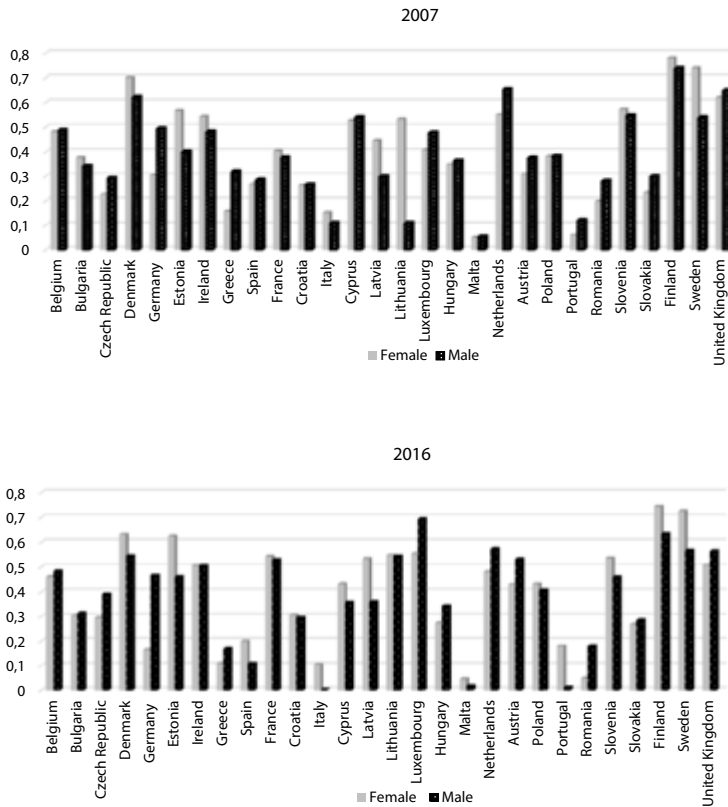


Figure 2. Aggregated education value of women and men in the European Union countries: comparison of 2007 and 2016. Source: own work based on Eurostat Database.

As it can be seen from Figure 2, the economies with the highest level of education are: Finland, Sweden, Denmark, the Netherlands, Luxembourg, Great Britain, Austria. In second place one can indicate a group of countries: Slovenia, Czech Republic, Croatia, Germany, Estonia, Lithuania, Latvia, Bulgaria, Ireland, Cyprus, Hungary, Poland, and Slovenia.

As countries with the lowest level of education, one should mention: Greece, Spain, Malta, Italy, Portugal and Romania. The largest discrepancy in the level of education by sex in 2007 can be seen in the case of Germany, Estonia, Greece, Lithuania, Latvia and Sweden. In turn, in 2016, this situation applies to: Germany, Greece, Spain, Italy, Latvia, Portugal, Romania, Sweden and Finland. Women are definitely better educated than men in Sweden, Latvia, Italy, Estonia and Denmark. This is noticeable throughout the period considered. The opposite situation occurs only in the Czech Republic, Germany, Greece, the Netherlands, Austria and the United Kingdom. The biggest discrepancy between the education of women and men is visible in Germany and this trend is intensifying due to the decline in women's education. In Romania, in turn, the deepening differential is caused by the increase in the level of education of men. An interesting situation is in the case of such countries as: Italy, Portugal and Spain, where we observe a significant drop in the education of men. The case of countries in the south of Europe is interesting and encourages to conduct in-depth research in the field of education, especially in relation to the economic situation of these countries and the situation on the labor market. Poland belongs to the group of countries with a relatively high level of education. The increase in the value of AEV in Poland is visible over the analyzed years. Gender, however, is not a determinant of the level of education in Poland, and Polish society can be considered as egalitarian in this respect, although in the last year of the analysis one can see a gradual difference in levels of education in favor of women.

Similar observations can be found in other studies. Hek, Kraaykamp and Wolbers (2016) showed, taking into account a longer research period and earlier years, that the diversification of women's and men's education is related to the participation of women in the labor market, the normative emancipation climate, and religiosity. The authors also emphasize that at present in most Western economies women are more educated than men. Similar conclusions can be drawn from the studies of Snyder and Dillow (2011) and Helbig (2012). Confirmation of the dominant position of women over men in terms of the level of education is also the study of Pekkarinen (2012). The author emphasizes that this does not diminish the educational gap between men and women. He adds that this polarization tendency can be important for the diversification of the labor market and the employment of highly qualified and low skilled workers. According to the prevailing trend, the best paid and qualified employees in the future are women, while workers relatively poorly paid are men.

Conclusions

Based on the literature review, it can be stated that the problem of the diversification of women's and men's education as a research problem has been undertaken in economics for a long time. Intensification of research in this area took place along with the emergence of feminist movements. At the moment, it is also a current and important topic. The inadequate recognition of the topic is still pointed out. The authors emphasize above all the changing role of women in the family, the household, society and the need to identify the opportunities and threats resulting of this.

Own research is consistent with previous studies indicating that the level of education of women is higher than that of men. This trend has been demonstrated on the example of the majority of European Union countries, however, as other studies show it is a global trend (Snyder & Dillow, 2011). The level of diversity of education of women and men in individual EU countries is moderate. In most countries, the value of the aggregated education measure is above average. It is the cases of individual states that significantly lower the average value. Among the most educated economies, the Scandinavian countries should be indicated. On the other side are the countries of Southern Europe. The most numerous group of countries are countries with a moderately high and medium-high level of education.

The results of the research provide specific and interesting conclusions not only from the cognitive point of view. They can have significant useful value for shaping the education policy of women and men and other development policies. Analysis of the collected material gives the opportunity to draw a lot more in-depth conclusions, which, however, cannot be presented due to publishing restrictions. This is undoubtedly a disadvantage of the study. The comparison of research results with the activity of women and men on the labor market would be much more valuable, which would show the effectiveness of education and structural determinants of the labor market. Considering the importance of education of women and men, there are definitely more possibilities of confronting the results of research with various areas of the economy. This is a significant impulse and recommendation for continuing and deepening research in this area.

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