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PRIVATE SPENDING ON EDUCATION IN EUROPEAN HOUSEHOLDS

This article aims to present differences and changes in private expenditure on education in European households, with particular emphasis on Polish households. The analysis is carried out based on data from Eurostat and Statistics Poland. The research methods used include, among others, the simple regression method, Ward's method, and the k-means method. In 2021, the highest share of education expenditure in relation to total expenditure was recorded in Cyprus. The lowest share of private spending on education occurred in Sweden, Belgium, and Finland. In most European countries, the percentage of spending on education in relation to total spending has increased. The share of expenditure on education in Polish households was most similar to that of households from Lithuania, Denmark, and the Netherlands. A comparison of different types of Polish households showed that most of the money spent on education was by self-employed people, the richest people, and people from large cities.

Keywords: education, private spending, households, cluster analysis, consumption.

1. INTRODUCTION

In the era of the knowledge-based economy, education plays an important role. Investing in education promotes the development of human capital, which proves the competitiveness of both individuals and entire economies. Education spending is a key element of sustainable social and economic development. Investing in education can contribute to creating societies that are more ecologically conscious, innovative and able to make good decisions (Zafar, Shahbaz, Sinha, Sengupta, Qin, 2020). In order to obtain competitive advantages, innovation depends on the quality of human capital. Investing in education can increase the skills and knowledge of household members, which in turn can foster innovation. Innovations in many spheres of life may result from education and be a key element of sustainable development (Vare, Lausselet, Rieckmann, 2022; Dean, Elliott, 2022).

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Constantly developing countries that strive to improve qualifications are characterized by higher society wealth and better living conditions of the population (Brożek, Poteralska, Łabędzka, 2022). Societies are aware of the importance of investing in education. Better educated people with high qualifications and skills can obtain higher income from work, adapt more easily to the changing environment, and have greater opportunities to find an interesting place of employment. This results in greater opportunities to meet needs, especially higher-order needs (Piekut, 2014).

The aim of the article is to show differences and changes in private expenditure for educational purposes in European households, with particular emphasis on households located in Poland.

The study consists of the following parts: after the introduction, the theoretical aspects related to the EU policy on investment in education are presented and the more important concepts related to the issue are explained, then the methodology of the study is shown, followed by an analysis of the distribution and changes of private expenditure on education in European households and the identification of groups of countries with similar expenditure and its structure in households. Finally, the findings and conclusions of the analysis are presented.

2. LITERATURE REVIEW

2.1. European Union policy on investment in education

The European Union (EU) is involved in shaping education policies, although competence in this area is mainly in the hands of individual member states. Nonetheless, there are areas where the EU can influence education policy, especially through community programs and sustainable development strategies. Thus, the EU has adopted the Europe 2020 strategy, which includes goals for employment, innovation, education and poverty reduction. As part of this strategy, targets are set for education spending, such as increasing the share of 30- to 34-year-olds with tertiary education or reducing school dropout rates (Hoedl, 2011; Pasimeni, Pasimeni, 2016).

Erasmus+, on the other hand, is an EU program that supports education, training, youth and sports. It aims to increase the quality of education, develop skills and competencies, and foster innovation. The program is an important part of EU policy, affecting the mobility of students, teachers and other education-related staff (Corradi, 2015; Violano, Sotiropoulou, Triantis, 2018).

The EU is working to create a unified higher education area in Europe (EHEA). Programs such as the Bologna system aim to facilitate the comparison and recognition of qualifications and increase the mobility of students and academics in the European space (Díaz-Méndez, Gummesson, 2012, Bergan, Deca 2018).

The European Credit Transfer and Accumulation System (ECTS) is a system that facilitates the comparison of curricula and grades between different European countries. It is a tool that supports student mobility and increases the availability of information on different educational systems (Wagenaar, 2018).

The EU offers financial support to member countries for the development of education, especially in the context of innovative projects adapted to the challenges of the labor market and technology (Kula, Pękowska, 2022). The EU has various financial instruments, such as the European Social Fund (ESF), which support education and training projects, especially those aimed at socially excluded groups.

In addition, the European Union is working with international partners to achieve the goals of the 2030 Educational Agenda, developed by UNESCO. These goals include guaranteeing equality in access to education and ensuring quality education (Michelsen, Wells, 2017).

The above elements show that while the EU does not have full control over the education systems of member states, there are numerous initiatives and programs that aim to support education, increase its quality, mobility and access for all sectors of society. EU education policy seeks to harmonize standards, create synergies between member states and promote sustainable development through education. Private household spending on education is also becoming an increasingly important area of analysis, especially in the EU context. Given the diversity of educational, cultural and economic systems in EU countries, understanding private investment in education becomes crucial to assessing the effectiveness of public systems and the diversity of access to education.

Increased spending on education from public funds can affect the availability of education for all sectors of society. Equality in access to education can contribute to social equality, which is one of the cornerstones of sustainable development. In addition to analyzing public spending, it is important to analyze private household spending on education, which can indicate certain social trends and also unmet needs in this area.

2.2. Private spending on education – some terms

A household is a group of people who share common assets and budgets, which are used to fulfill the underlying purpose of meeting the needs of all its members. In accordance with its basic function, households acquire financial resources, which they then dispose of by using them to purchase consumer goods that meet their needs. Income is obtained through wage labor, social transfers, self-employment, or from non-profit sources (Bywalec, 2010).

On the other hand, consumer spending as defined by the European Statistical Office can be divided in relation to the purpose of consumption based on COICOP classifications, the classification of individual consumption by purpose. According to COICOP, there are twelve categories of spending, which include: (1) food and non-alcoholic beverages, (2) alcoholic beverages, tobacco, drugs, (3) housing, water, electricity, gas and other fuels, (4) clothing and footwear, (5) health, (6) transportation, (7) furniture, household appliances and ongoing household maintenance, (8) recreation and culture, (9) education, (10) communications, (11) restaurants and hotels, (12) miscellaneous goods and services (Eurostat, 2023a). This study discusses private spending on education in European Union countries.

Education is paid for with both private and public funds. In Poland, funding is mainly based on funds from the state budget. Based on data made available by the European Commission, it is noted that public sources of funding for education in Poland include: (1) the educational part of the general subvention from the state budget; (2) own funds of local government units; and (3) targeted subsidies from the state budget (European Commission, 2023a). Public financing of education can be measured using a breakdown of the share of education spending in relation to GDP (Gross Domestic Product).

Funds from the state budget are supplemented by private funds of households, the level of which varies. Determinants of educational spending include:
- parents' education,
- place of residence,
- the level of per capita income in the household,

- the main source of income,
- type of household in terms of its composition (Sztanderska, 2013).

Education expenses include, in their scope, tuition fees for kindergartens and schools (including colleges). These include entrance fees, registration fees, tuition, camps, field trips, fees for courses, diplomas, exams, graduation, laboratory, physical education, etc. (United Nation, 2018). The study compares EU countries in terms of private financing of education. For this reason, the funds incurred by households for this purpose were juxtaposed in relation to total spending.

3. DATA SOURCE AND RESEARCH METHODOLOGY

The analysis included data from the European Statistical Office and the Central Statistical Office. The object of interest was the 27 countries of the European Union. The survey consisted of two stages:

Step 1 Investigating changes in education spending by European households required:
- aggregating data from the Eurostat database for individual countries,
- calculation of the share of education spending in total spending in households from each country,
- the creation of a ranking of countries in terms of the share and changes in that share of household education spending.

Step 2 Identify household types in terms of the share and structure of education spending in European countries. Implementation of this task required:
- standardization of the data (the procedure was carried out only for clustering by expenditure structure, the amounts of education expenditure were standardized),
- conducting clustering by the Ward method and determining the optimal number of clusters,
- carrying out clustering using the k-means method,
- describe and label the clusters.

Ward's cluster analysis determined the optimal number of country groupings based on the structure of education expenditures. The dendrogram revealed a distinct jump at the 2297 level, leading to the formation of six clusters of countries. Subsequently, the k-means method was applied, adopting an alpha level of 0.05.

Ward's hierarchical method, widely used for its effectiveness (Migdał-Najman, Najman, 2013), employs a variance analysis approach to minimize deviations within clusters and maximize diversity between clusters. The dendrogram visually represents this method. The k-means method, a non-hierarchical approach, aims to minimize variability within clusters and maximize it between clusters (Wolynski, Górecki, 2013). This study utilized 11 variables to classify countries based on the share of education spending in total household spending from 2011 to 2021. Standardization was applied for clustering by expenditure structure.

This approach allowed for the identification of typical characteristics in the context of education spending, providing valuable insights into the patterns of expenditure among European countries (Pietrzykowski, Kobus, 2006).

The GSI silhouette index measure was used to evaluate the results of the cluster analysis. The formula for calculating this index is as follows:

$$GSI = \frac{1}{g}\sum_{l=1}^{g} S(s_l) \tag{1}$$

where:
GSI – total silhouette index,
g – number of clusters that resulted from clustering,
s_l – l-th cluster, where l = 1,2,3,….,g,
$S(s_l)$ – partial silhouette index determined for cluster s_l.

Silhouette index values are in the range [-1;1]. According to Kaufman and Rosseeuw (Kaufman, Rousseeuw, 2005), the GSI is interpreted for:
- GSI ≤ 0.25 – there are no clusters in the given set,
- 0.50 ≥ GSI >0.25 – poor structure of received groups,
- 0.70 ≥ 0.50 – correct clustering structure,
- GSI > 0.70 – strong clustering structure,
Statistical analysis was carried out using Statistica 13.3 and Excel.

4. RESULTS OF THE STUDY AND DISCUSSION OF THE FINDINGS

4.1. Distribution of education spending among European households

The purpose of this section is to show the distribution of education spending among European households. The share of private spending on education in 2021 in the European Union countries is shown in Figure 1. Based on the data, it is shown that there is significant variation in the mentioned category of spending between European countries. Households from Cyprus spent the most of their income (3.5%), which significantly distinguishes this country from the rest of the European Union. Both public and private schools are operated in Cyprus. Public institutions operate mainly on a self-financing basis, which contributes to setting high tuition fees for students (European Commission, 2023b). In 2021, the country's state budget allocation to education as a share of GDP was 5.5%, which is average compared to the rest of the European Union (Eurostat, 2023b).

The country with the lowest level of private educational spending is Sweden. In 2021, households spent an average of 0.3% of their income on this purpose. In Sweden, elementary school attendance is free, which applies to both public and private institutions. Books, educational materials, textbooks and school supplies for students are also free. What's more, meals, the cost of excursions and outings to cultural institutions that take place during classes are financed by the schools. Transportation to school activities is also free. Education spending as a percentage of GDP in Sweden is among the highest in the EU (European Commission, 2023c). In 2021, the share of public spending on education as a share of GDP in the country was 6.6%, taking the highest value compared to the rest of the European Union (Eurostat, 2023b). Due to the high share of public spending on education, there is no need to allocate a large portion of private income.

Between Cyprus and Sweden, the difference in the share of spending is 3.2 p.p. In Cyprus, private educational spending is more than 11 times higher than the data recorded for Sweden. As the chart shows, the average for the European Union is 0.9%, the same share was observed among four communities: German, Croatian, Italian and Luxembourg.

In Poland, on the other hand, it was reported in 2021 that private money spent on education as a proportion of total spending stood at 0.7%. This is therefore 0.2 percentage points lower than the average for the European Union. Eight EU countries have a smaller share of this spending category than Poland, while eighteen countries have a larger share. Poland reached a similar share of spending to Lithuania, Denmark and the Netherlands in 2021.
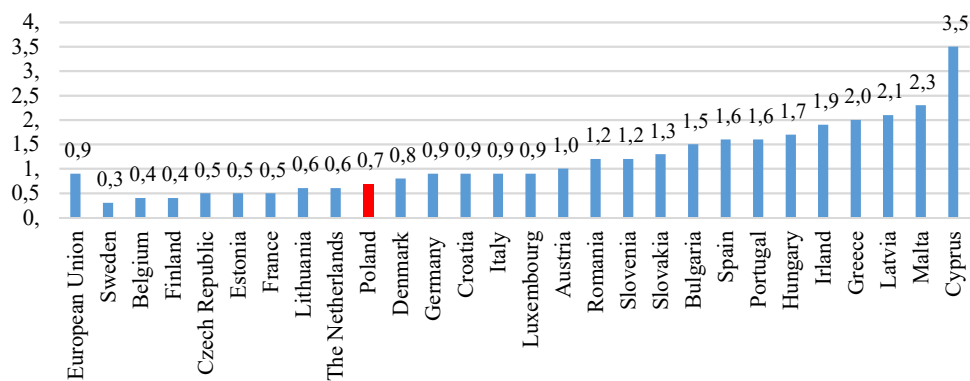
Figure 1. Share of education spending in total spending in European households in 2021 (in %)

Source: Authors' own compilation, based on (Eurostat, 2023d).

A comparison of education spending in the 27 European Union countries as a proportion of total spending in 2011–2021 made it possible to show that their average share in the period under study oscillated between 1.12% and 1.23% (Table 1). The lowest was at 0.3% and in all years concerned Sweden. On the other hand, the highest was observed in 2020 for households from Cyprus (3.9%), which was 2.7 p.p. higher than the average expenses counted for all European Union countries.

To compare the data, the standard deviation, mean, coefficient of variation, skewness and kurtosis were used, the values of which are shown in Table 1. The standard deviation shows by how much all units of a given collective on average deviate from the arithmetic mean of the variable under study (Luszniewicz, Słaby, 2008). The level of standard deviation takes on values in the range of 0.62–0.80. In 2017, private educational expenditures in total expenditures differed on average from the arithmetic mean by about 0.62. In 2020, on the other hand, there were the largest deviations from the mean, averaging 0.8.

The coefficient of variation calculated for private education spending between countries indicates the presence of strong variation. Its values in 2011–2021 oscillated between 54.74% and 65.59%. It reached its highest level in 2020, taking a value close to 65.59%. The year 2020 was the time after the outbreak of the COVID-19 pandemic, at which time many states began remote learning, which may have contributed to increased private spending on adapting students to the new mode of learning, and thus to greater disparities in the level of such spending (Wesoła, 2022).

The skewness coefficient is used to accurately assess the strength and direction of asymmetry (Major, Niezgoda, 2003). The values of this coefficient observed in Table 1 indicate the presence of distribution asymmetry. In all years, the skewness was positive, which proves the right-sided asymmetry of the distribution of the variable "private spending on education as a % of total spending", so most of the results were below the mean. The skewness, like the coefficient of variation, reached its highest value in 2020, when its level was 1.54, the greatest asymmetry of the distribution occurred then.

Analyzing kurtosis, it can be noted that values in the range <-3;3> occurred in most cases, representing moderate kurtosis. Only in 2020 was the coefficient greater than 3

(3.30), thus indicating significant pointedness of the distribution (Luszniewicz, Słaby, 2008). Positive values inform that there is a high concentration of results around the mean value. Thus, the percentage of education spending in EU countries is similar in many countries.

Table 1. Statistical measures for education spending in European households from 2011 to 2021

Specification	Average expenses (as % of total)	Standard deviation	Coefficient of variation	Skewness	Kurtosis
2011	1.15	0.63	54.73	0.78	0.08
2012	1.14	0.63	55.74	0.79	0.13
2013	1.20	0.67	56.29	0.64	-0.39
2014	1.19	0.70	58.69	0.79	-0.18
2015	1.16	0.66	56.39	0.83	0.29
2016	1.17	0.65	55.87	0.70	-0.06
2017	1.12	0.62	55.23	0.83	0.41
2018	1.14	0.65	57.00	0.98	0.98
2019	1.14	0.67	58.75	1.09	1.27
2020	1.23	0.80	65.59	1.54	3.30
2021	1.18	0.74	62.72	1.32	2.24

Source: Authors' own compilation based on (Eurostat, 2023d).

4.2. Changes in education spending among European households

The purpose of this section is to show the changes that have taken place in the level and share of education spending in European households between 2002 and 2021. When considering changes in the share of education spending over the mentioned period, it can be seen that in most European countries there has been an increase in the category in question in total household spending. The percentage of education spending increased the most in households from Cyprus (by 1.54 p.p. between 2002 and 2021), followed by households from Ireland (by 0.89 p.p.), Malta (0.81 p.p.) and Slovakia (0.52 p.p.) (Table 2).

Turning to the level of spending on education, it should be noted that in Eurostat databases, this spending is available in national currencies. It was decided to examine whether the level of these expenditures has undergone a statistically significant increase/decrease over the twenty-year period analyzed, without taking into account the level of inflation.

Between 2002 and 2021, in most of the analyzed European countries, the level of education expenditures experienced a statistically significant increase ($p<0.05$ at $\alpha=0.05$). The exceptions were households from Estonia, Greece and Sweden, where no statistically significant changes ($p>0.05$ at $\alpha=0.05$) were observed over the period.

Based on the calculated R^2 values, it can be concluded that the estimated models were able to explain from about 31.0% in Finland to 96.6% in Iceland of the variation in the original dependent variable, the level of education spending.

Between 2002 and 2021, most of the European countries analyzed saw an increase in the percentage of education spending in total spending. Poland and Estonia saw a decrease in the share of education spending, by 0.6 p.p. and 0.7 p.p., respectively. In the Czech Republic, Lithuania and Croatia, a relative stabilization of these expenditures was noted. Cyprus households have the largest share of education spending in household expenditures. In 2021, education spending consumed 3.5% of total expenditures, an increase of 1.5 percentage points compared to 2002. A relatively high share of education spending is also recorded in Maltese households, in 2021 it accounted for 2.3% and was 0.9 p.p. higher than in 2002. Latvians ranked third in terms of the share of education spending in European households. Latvian households spent 2.1% of total expenditures on education, and this share increased by 0.2 p.p. compared to 2021.

Table 2. Share and changes in the level of education expenditures in total expenditures in European households from 2002 to 2021

Specification	2002	2021	Changes in pp	Directional coefficient of the trend	R^2	p
Austria	0.8	1	0.2	5.50	0.883	0.0000
Belgium	0.4	0.4	0.0	1.10	0.786	0.0000
Bulgaria	1.0	1.5	0.5	6.10	0.865	0.0000
Croatia	0.9	0.9	0.0	2.62	0.756	0.0000
Cyprus	2.0	3.5	1.5	15.50	0.953	0.0000
Czechia	0.6	0.5	-0.1	17.40	0.361	0.0051
Denmark	0.8	0.9	0.1	34.40	0.948	0.0000
Estonia	1.2	0.5	-0.7	0.01	0.000	0.9472
Finland	0.5	0.4	-0.1	-0.003	0.310	0.0051
Germany	0.7	0.9	0.2	4.80	0.942	0.0000
Greece	1.7	2.0	0.3	-1.52	0.036	0.4224
Hungary	1.7	1.7	0.0	1459	0.848	0.0000
Iceland	1.3	1.0	-0.3	1453	0.966	0.0000
Ireland	1.1	2.0	0.9	10.50	0.949	0.0000
Italy	0.9	0.9	0.0	1.53	0.543	0.0002
Latvia	1.9	2.1	0.2	6.20	0.840	0.0000
Lithuania	0.6	0.6	0.0	1.65	0.723	0.0000
Luxembourg	0.6	0.9	0.3	9.70	0.782	0.0000
Malta	1.4	2.3	0.9	11.10	0.859	0.0000
Netherlands	0.7	0.6	-0.1	1.74	0.779	0.0000
Poland	1.3	0.7	-0.6	4.60	0.467	0.0009
Portugal	1.4	1.6	0.2	4.86	0.796	0.0000
Romania	0.9	1.2	0.3	18.00	0.627	0.0000
Slovakia	0.8	1.3	0.5	4.86	0.831	0.0000
Slovenia	0.9	1.2	0.3	4.38	0.831	0.0000
Sweden	0.0	0.3	0.3	0.00	0.090	0.0994
Spain	1.5	1.6	0.1	4.38	0.872	0.0000

Comment: when calculating the directional coefficient of the trend, education spending was the dependent variable and the year of the survey was the independent variable.

Source: Authors' own calculations, based on (Eurostat, 2023c).

4.3. Clustering of countries by private spending on education

The next section of the study groups countries based on a similar share of educational expenses in total expenses for 27 European households. In this, the Ward method and the k-means method were used.

The results of Ward's hierarchical method made it possible to create four clusters of countries, as the tree was cut at height 16. The left side of the dendrogram contained two clusters of 1 and 9 countries, while the right side created two clusters of 10 and seven elements (Figure 2).
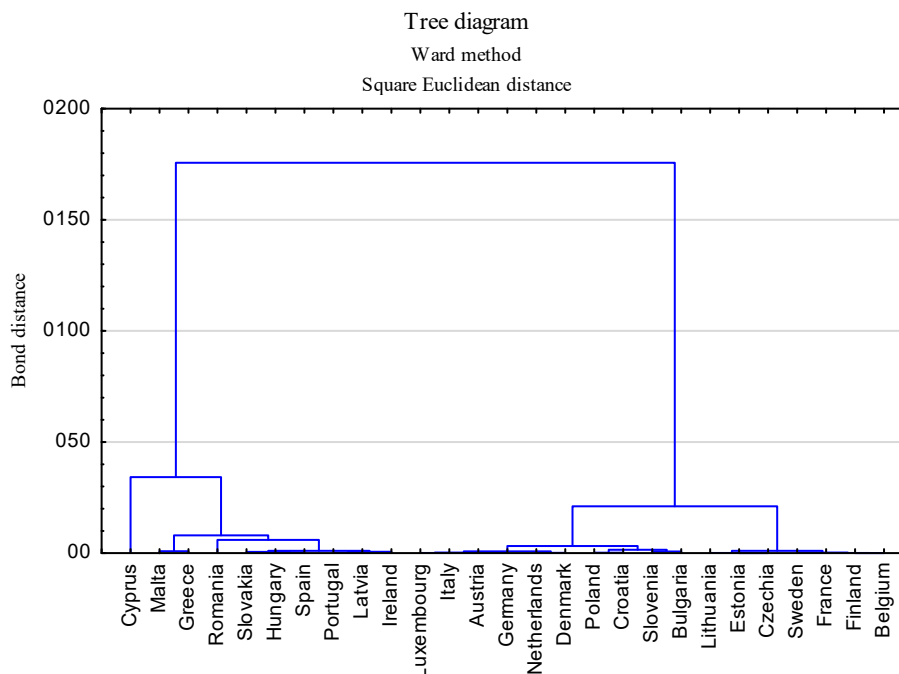

Figure 2. Membership in clusters of European Union countries by share of private spending on education as a result of Ward clustering

Source: Authors' own calculations, based (Eurostat, 2023d).

Cluster I included one country, Cyprus, in which the share of expenditures stood out significantly from the rest of the EU. On average, households in this country spent 3.0% of their income on education between 2011 and 2021. This cluster is characterized by the highest share of educational spending.

Cluster II included: Ireland, Greece, Spain, Latvia, Hungary, Malta, Portugal, Romania and Slovakia, countries with relatively high educational spending. Countries in this cluster on average spent 1.8% of funds on education, Romania and Slovakia spent the least (1.5% on average), while Malta and Greece spent the most at 2.1%.

Cluster III consisted of 7 countries, which included: Belgium, the Czech Republic, Estonia, France, Lithuania, Finland and Sweden. These were the countries with the lowest share of spending on fulfilling educational needs compared to other EU countries, the

average in this cluster was 0.5%. In this group of countries, the lowest value was recorded for Sweden 0.3% with the highest for Estonia 0.6%.

Cluster IV contained the largest number of countries. Included here were: Bulgaria, Denmark, Germany, Croatia, Italy, Luxembourg, the Netherlands, Austria, Poland, and Slovenia. The average share of educational expenditures was 0.9%, and was comparable or higher in each country compared to Cluster III. Netherlands households allocated the smallest percentage of their income to meet educational needs at 0.7%, while Slovenia's households had the highest, allocating an average of 1.2% of income. Poland was also in this group, with private educational spending averaging 1%.

Clustering using the non-hierarchical k-means method resulted in four clusters, similar to Ward's hierarchical method. The results are similar, however, one country that was assigned to a different cluster is the Netherlands. In the Ward method, it was placed in the group of countries allocating a higher percentage of their income to education, while in the k-means method it was placed in the group of countries with a lower share of this spending category. In the author's opinion, the better assignment of the Netherlands came from the Ward method. In this method, the assignment of countries to clusters was as follows:

- I cluster – Cyprus,
- II cluster – Ireland, Greece, Spain, Latvia, Hungary, Malta, Portugal, Romania, Slovakia,
- III cluster – Belgium, Czech Republic, Estonia, France, Lithuania, Finland, Sweden, Netherlands,
- IV cluster – Bulgaria, Denmark, Germany, Croatia, Italy, Luxembourg, Austria, Poland, Slovenia.
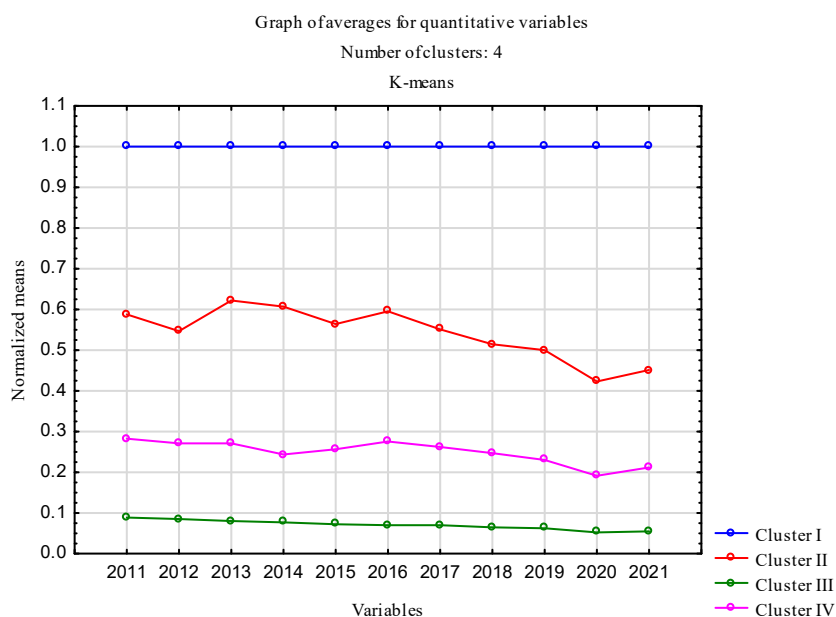

Figure 3. Membership of clusters of European Union countries by share of private spending on education as a result of the k-means method

Source: Authors' own calculations, based on (Eurostat, 2023d).

For the division of the community into four groups, the value of the silhouette index was 0.7, which indicates a correct grouping structure (Błażejczyk-Majka, 2018).

4.4. Identification of European household types by education expenditure structure

The study aimed to analyze and categorize European countries based on the structure of household education spending. The focus was on identifying similarities and differences in spending patterns across selected countries. The analysis considered categories such as pre-primary and primary education, secondary education, post-secondary non-tertiary education, tertiary education, and education not definable by level. The clustering method used was Ward's, resulting in the grouping of countries into six clusters. The analysis was limited to EU countries with available data for calculating the structure of education spending.
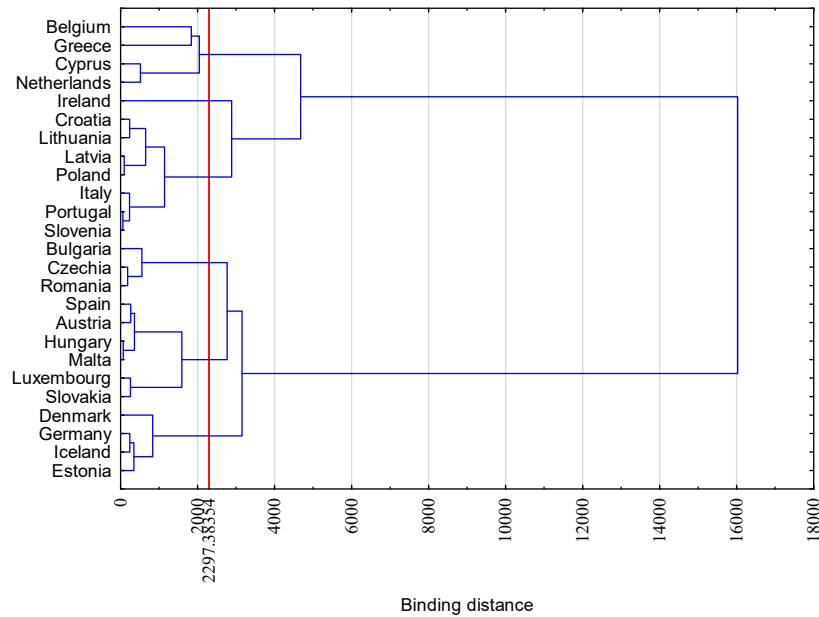

Figure 4. Distribution of European Union countries by structure of private spending on education according to Ward's method

Source: Authors' own calculations, based on (Eurostat, 2023c).

The countries were then divided into six clusters using k-means cluster analysis. The clusters created ranged from 2 to 5 countries.

The share of spending on most education-related categories in European households differed by the country of origin of the household. Thus, the share of expenditures on pre-primary and primary education, secondary education, tertiary education and education not definable by level differed statistically significantly ($p \leq 0.05$) between the distinguished groups (clusters) of countries.
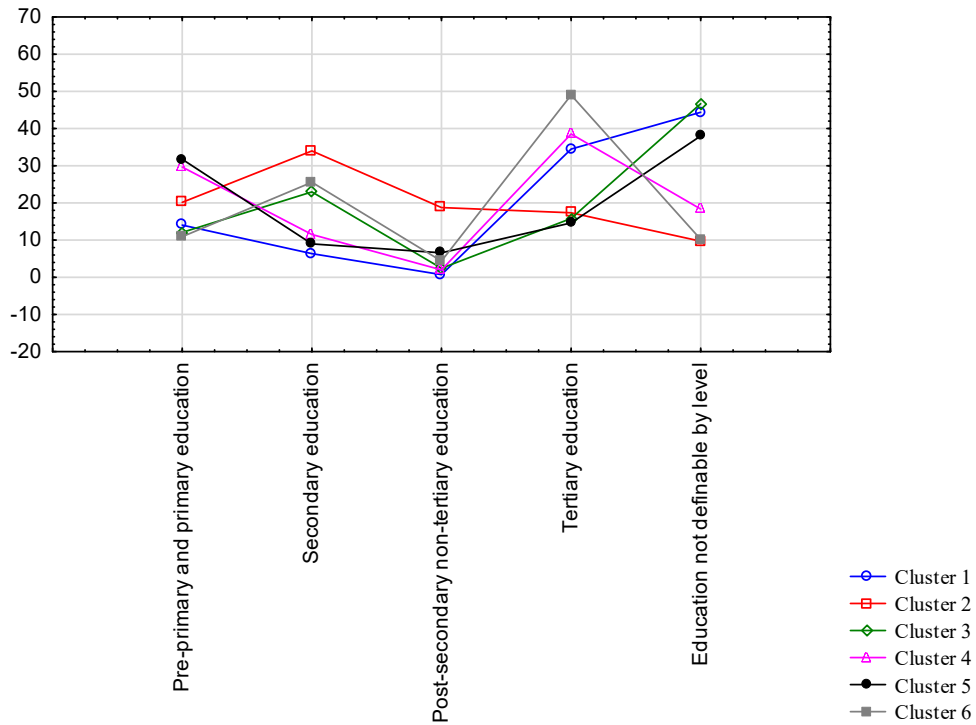
Figure 5. Membership of clusters of European Union countries by the structure of private spending on education as a result of the k-means method

Source: Authors' own calculations, based on (Eurostat, 2023c).

Table 3. Results of analysis of variance for clustering of European Union countries by share of private spending on education using the k-means method.

Specification	Intergroup SS	df	Intra-object SS	df	F	Significance p
Pre-primary and primary education	1877.3	5.0	740.4	19.0	9.6	0.0001
Secondary education	1979.9	5.0	1321.3	19.0	5.7	0.0023
Post-secondary non-tertiary education	533.5	5.0	841.5	19.0	2.4	0.0748
Tertiary education	4524.4	5.0	1702.0	19.0	10.1	0.0001
Education not de-finable by level	5919.1	5.0	1092.0	19.0	20.6	0.0000

Source: Authors' own calculations, based on (Eurostat, 2023c).

Clusters one and two differed significantly in the distribution of spending on different levels of education. Cluster one (Bulgaria, Czech Republic, Spain, Romania) had the lowest share of spending on secondary and post-secondary non-tertiary education, while cluster two (Belgium, Greece) had the highest share in these categories. Notably, Spain and Romania exhibited similarities in both the level and structure of household education spending, placing them in the same clusters in both groupings.

Cluster three (Luxembourg, Hungary, Malta, Austria, Slovakia) showed a relatively low share of spending on tertiary education and the highest share on education not definable by level. Luxembourg and Austria shared similarities in both the level and structure of education spending.

Cluster four (Croatia, Italy, Lithuania, Portugal, Slovenia) was characterized by relatively high percentages of spending on pre-primary and primary education. Croatia, Italy, and Slovenia were grouped together in both share and structure of education spending.

Cluster five (Denmark, Germany, Estonia, Iceland) had the highest percentage of spending on pre-primary and primary education among all clusters and the lowest on tertiary education. Denmark and Germany shared clusters in both share and structure of private spending on education.

The last cluster (Ireland, Cyprus, Latvia, Netherlands, Poland) had the lowest percentage of spending on pre-primary and primary education and almost the lowest on education not definable by level. However, it had the highest spending on tertiary education. Ireland and Latvia shared a cluster in terms of the share of household spending on education.

Table 4. Consumption patterns of educational services by country groups

k-means	Number of countries in the cluster	Pre-primary and primary education	Secondary education	Post-secondary tertiary educ.	Tertiary education	Education not definable by level
1	4	14.05	6.38	0.70	34.47	44.40
2	2	20.15	34.00	18.75	17.35	9.70
3	5	12.08	22.96	2.44	15.82	46.70
4	5	29.64	11.50	2.00	38.54	18.36
5	4	31.75	9.00	6.57	14.62	38.03
6	5	10.92	25.56	4.36	49.02	10.20
Overall	-	19.47	17.18	4.42	29.92	29.02

Source: Authors' own calculations, based on (Eurostat, 2023c).

4.5. Education spending versus characteristics of Polish households

Polish households spend a smaller percentage of their income on education than the average household in the European Union. Based on data from the 2021 household budget survey, published by the Central Statistical Office, a comparison of educational expenses in Poland in various households was made:
- by socio-economic groups,
- by quintile groups
- by class of place of residence.

First, the monthly per capita education expenditure by socioeconomic group was analyzed. As can be seen from Figure 6, the highest level and share of educational spending is characterized by the households of the self-employed. In 2021, they allocated PLN 35.07 for this purpose, which accounted for 2.4% of their spending. Another group that incurred quite high educational expenses are workers in non-manual positions, who spent PLN 25.29 per person per month, or 1.7% of the total expenditure. Groups with the lowest level and at the same time share of this category of expenses include farmers – PLN 3.22, and retirees and pensioners – PLN 1.48 per person.
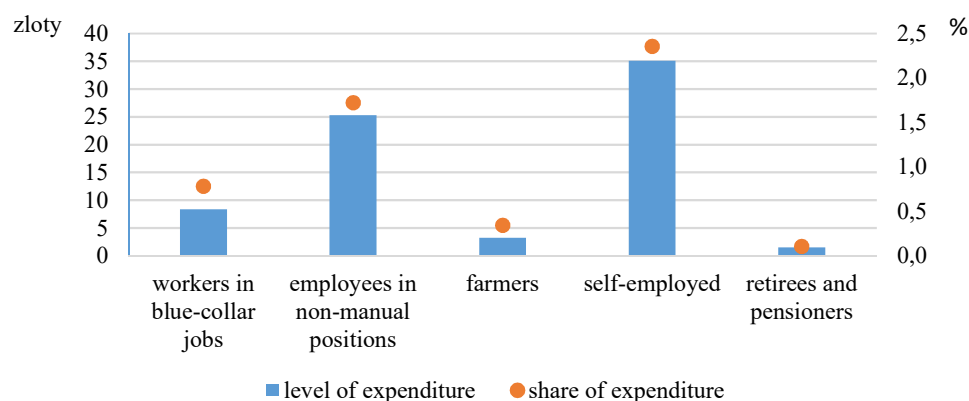

Figure 6. Monthly expenditure on education per person in households by socio-economic groups in 2021

Source: Authors' own study, based on (Główny Urząd Statystyczny, 2022).

Based on the amount of disposable income and expenses, households are assigned to appropriate quintile groups. There are five such groups. The designation "I" is assigned to households with the lowest income, while the number "V" is assigned to groups with the highest income (Central Statistical Office, 2011). The quintile group is another variable that differentiates the level and share of household expenditure on education. It was noted that the level of the mentioned category of expenses is the lowest for the II quintile group - PLN 8.67 per person, which constituted 0.9% of the expenses, while the highest level and share were observed in households belonging to the V quintile group – 29.91 PLN, 1.4% of the total value (Figure 7). Group V includes 20% of people with the highest income.

Another variable that differentiates education expenditure is the class of place of residence. As the class of place of residence decreased, there was a decline in education expenditure. Households from cities with over 500,000 inhabitants inhabitants in 2021 spent an average of PLN 41.46 per person per month, which constituted 2.35% of the total expenditure. In cities below 20 thousand inhabitants, much lower educational expenses were observed, which per person amounted to PLN 11.06 (0.87% of total expenses), while the lowest, at the level of PLN 7.45, was recorded in villages, which constituted 0.67% of total expenses (Figure 8).
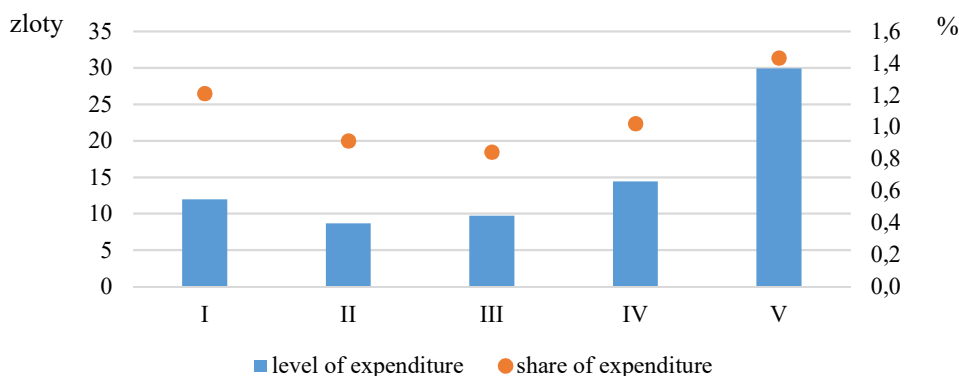
Figure 7. Monthly education expenditure per person in households by quintile groups in 2021

Source: Authors' own study, based on: (Główny Urząd Statystyczny, 2022).
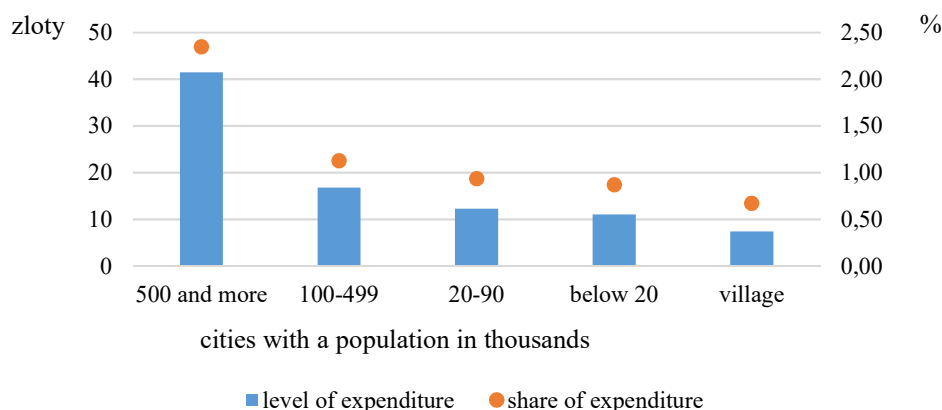
Figure 8. Monthly education expenses per person in households by class of place of residence in 2021

Source: Authors' own study, based on (Główny Urząd Statystyczny, 2022).

5. DISCUSSION OF THE RESULTS

The results of the analysis of the share of private spending on education in European Union countries in 2021 show significant differences between countries, which is an important area of interest for educational policy and socio-economic comparative research. The greatest differences in private spending on education were observed between Cypriots and Swedes. Sweden had the lowest level of private education expenditure (0.3% of education expenditure) and Cyprus had the highest level (3.5% of consumption expenditure compared to the EU average of 0.9%). Low household expenditure on education in Sweden can be attributed to the high share of public expenditure (6.6% of GDP) on education, as this expenditure may, to some extent, eliminate the need for significant private expenditure. It is worth noting, that in Cyprus, compared to other European countries, public expenditure on education is also not low, as it amounts to 5.5% of GDP (Eurostat, 2023b). The high share of private spending in Southern European countries, including Cyprus, has

been emphasized for many years (Bray, 2011). A 2003 survey of over 1,100 college students in Cyprus found that 86.4% had received private tutoring in high school (Stylianou, Savva, Vraka, Serghiou, 2004). Meanwhile, a household survey conducted in 2008 (Cyprus, 2010) found that tutoring accounted for 52.9% of Cypriot household expenditure on secondary education. However, when it comes to Northern Europe, including Sweden, these countries maintain strong traditions of schools that adequately meet the needs of students. Students in Scandinavia receive additional lessons, both to support slow learners and to extend the learning process of high achievers. However, much of this work occurs within public education (Bray, 2011).

In the European context, Poland shows a moderate level of private spending on education (0.7%), being below the EU average (0.9%). The aforementioned expenses in Poland are lower than the EU average by 0.2 pp. This suggests that Polish households are less burdened by education costs compared to some EU countries. However, changes in spending over time indicate that Poland is seeing a decline in the share of private spending on education. Already in a study (Piekut, 2016) conducted on data for 2000-2014, a successive decrease in the share of education spending in consumption expenditures was visible, as well as a stabilization of the level of this category of goods.

An analysis of changes in the share of education spending between 2002 and 2021 shows that most countries increased the spending in question, with the largest increase in Cyprus. On the one hand, it is pointed out that it is the policy of each government to ensure equal access to quality education for all students regardless of gender, background, socioeconomic or cultural status, i.e. it must not prevent them from developing their knowledge and skills to their full potential (Angelov, 2019), but on the other hand, there is an increasing private financing of education. The results of a study conducted in Russia showed that private tutoring services are in high demand and the reasons for this are the insufficient level of public/private education acquired and the inconsistency of the knowledge acquired with the requirements of the national and international labor market (Glotova, Samoylenko, Zharko, Georgiadi, Shevchenko, 2023). It is pointed out that private education in the form of tutoring can have a double impact on individuals, as well as on the nation. On the one hand, the opportunity for students to participate in supplementary education leads to an increase in the level of knowledge and can, in the long run, contribute to economic and social growth in the country. On the other hand, the risk may be that increased supplementary education opportunities will contribute to undue pressure on individual students and greater social disparities in society (Zhang, Bray, 2017).

Of great importance for education spending was the COVID-19 pandemic. The COVID-19 pandemic caused a crisis in education systems, including the Polish system, especially in terms of the quality of educational services provided. The main cause of this crisis was technological lag within the traditional process of formal education. The need for physical social isolation forced rapid adaptation to new conditions, which was manifested in the transfer of important areas of daily life, including education and the economy, to the online world (Świątek, 2022). The year 2020, associated with the COVID-19 pandemic, showed the largest deviation in education spending from the average. Between 2019 and 2020, education spending decreased (Korzeniowska, 2023).

The method of grouping countries allowed the creation of clusters of countries, showing similarities and differences in approaches to the private payment of educational goods. The clusters differ in both the level of spending and the structure of spending on different levels of education, which may be due to national education systems and socioeconomic policies.

Poland, by share of spending, was placed with selected countries from Western Europe and Southeastern Europe, while in clustering by spending structure Poland was placed in a cluster with Ireland, the Netherlands, Cyprus and Latvia. An earlier study (Piekut, 2014) on the similarity of the level and share of private spending on education among European countries found that Poland showed the greatest similarity with other Central and Eastern European countries, such as Hungary, Lithuania, Latvia, Estonia, Slovakia, the Czech Republic, Romania and Bulgaria. These countries had the lowest level of private spending on education in 2011 compared to other European Union countries, but also had the highest growth between 1995 and 2011.

The analysis made it possible to determine the characteristics of households determining the amount of private spending on education. It was found that the largest share of education expenditures was spent by the self-employed, the wealthiest and those from metropolitan centers. Households of pensioners, those belonging to the second quintile group and residents of rural areas were characterized by the lowest share of educational expenditures. Research on the relationship of household characteristics conducted in India shows that students whose parents are better educated and those living in urban households with higher per capita expenditures are more likely to use private tutoring, which is included in private educational expenditures (Azam, 2016). German studies similarly indicate that there are correlations between the amount of private education spending and household income and parental education (Schroeder, Spieß, Storck, 2015). In contrast, when it comes to Cypriot households, in addition to household income, parental education, labor force status and the number of children attending school, region of residence and the age of the household head are also important determinants of the level of private education spending (Andreou, 2012).

6. SUMMARY

There are significant disparities in private household spending in EU member states. However, this is related to various phenomena, including depending on the level of public funding for education. In the future, however, it would be useful to analyze how these expenditures have changed over the years and determine whether these disparities are widening.

On the basis of the analysis, it can be concluded that there were significant disparities among EU countries in the share of private education spending in total consumption spending. Cypriot households spent the largest share of their disposable income on education, while Swedish households spent the smallest share. Sweden, where the share of public spending on education is high, could be an inspiration for countries that want to focus on public funding. The balancing act between public and private funding is worth considering.

An analysis of private education spending by household socioeconomic variables, such as employment status, income, and place of residence, shows that the households of the self-employed, the wealthiest and those living in the largest cities have the highest education costs, while retirees and farmers and poorer people show lower spending.

In Poland, despite the operation of public funding for education, private spending on education plays an important role in the development of human capital. Analysis of this category of spending reveals which types of households in Poland allocate the lowest level of their resources to acquiring education. This study brings value to the field of economics. It outlines what should come to the attention of governing bodies, as it is possible that due

to low private educational spending in the groups with the lowest levels of spending, there is limited access to acquiring education and greater educational inequalities emerge. Policymakers should take steps to ensure equal access to education for all social groups. Financial support programs for lower-income families can be an effective tool.

The results suggest the need for a balanced approach to education financing, taking into account both public and private resources. Differences between countries may result from different educational models, social policies and access to public funds.

REFERENCES

Andreou, S.N. (2012). *Analysis of household expenditure on education in Cyprus. "Cyprus Economic Policy Review",* 6(2).

Angelov, A. (2019). *Public expenditure on education in the EU member states: a cluster analysis.* "Народностопански архив", 1.

Azam, M. (2016). *Private tutoring: evidence from India.* "Review of Development Economics", 20(4).

Bergan, S., Deca, L. (2018). *Twenty years of Bologna and a decade of EHEA: What is next?.* "European higher education area: The impact of past and future policies".

Bray, T.M. (2011). *The challenge of shadow education Private tutoring and its implications for policy makers in the European Union*. European Comission.

Brożek, K., Poteralska, B., Łabędzka, J. (2022). *Analiza kapitału ludzkiego w kontekście innowacyjności gospodarek V4 i UE-27. „Zeszyty Naukowe Politechniki Częstochowskiej"*.

Bywalec, C. (2010). *Konsumpcja a rozwój gospodarczy i społeczny*. Warszawa: CH Beck.

Corradi, S. (2015). *Student Mobility in Higher Education: Erasmus and Erasmus Plus*. Laboratory of Lifelong Learning, Department of Education and Training, Roma Tre State University.

Cyprus, Ministry of Education and Culture (2010). *Private Expenditure on Education by Type of Educational Institution and Level of Education, 2008* [Table 120 in Statistical Tables]. Nicosia: Ministry of Education and Culture.

Dean, S.N., Elliott, S. (2022). *Urgency, Equity, and Agency: An Assemblage of Global Concerns and Interests in Early Childhood Education for Sustainability.* "International Journal of Early Childhood Environmental Education", 9(2).

Díaz-Méndez, M., Gummesson, E. (2012). *Value co-creation and University teaching quality: consequences for the European higher education area (EHEA).* "Journal of Service Management", 23(4).

Eurostat (2023a). *Annual national accounts (nama10). Eurostat metadata* [Access: 18.10.2023]. Access on the internet: https://ec.europa.eu/eurostat/cache/metadata/en/nama10_esms.htm.

—— (2023b). *General government expenditure by function (COFOG)* [gov_10a_exp__custom_8008323]. Eurostat database [Access: 22.10.2023]. Access on the internet: https://ec.europa.eu/eurostat/databrowser/view/gov_10a_exp__custom_8008323/default/table?lang=en.

—— (2023c). *Final consumption expenditure of households by consumption purpose (COICOP 3 digit)* [Access: 18.10.2023]. Access on the internet: https://ec.europa.eu/eurostat/databrowser/view/NAMA_10_CO3_P3__custom_7098388/default/table?lang=en.

—— (2023d). *Final consumption expenditure of households by consumption purpose (COICOP 3 digit)* [access: 29.10.2023]. Access on the internet: https://ec.europa.eu/eurostat/ databrowser/view/NAMA_10_CO3_P3__custom_7098388/default/table?lang=en.

Glotova, A., Samoylenko, N., Zharko, L., Georgiadi, A., Shevchenko, M. (2023). *Shadow education: Shapes of private tutoring in e-learning environment. "E-Learning and Digital Media",* 20(4).

Główny Urząd Statystyczny (2011). *Metodologia badania budżetów gospodarstw domowych, Departament Warunków Życia.* Warszawa.

Główny Urząd Statystyczny (2022). *Budżety gospodarstw domowych w 2021 r.* Warszawa.

Hoedl, E. (2011). *Strategia Europa 2020 i Europejska Odbudowa. „Problemy Ekorozwoju",* 6(2).

Kaufman, L., Rousseeuw, P.J. (2009). *Finding groups in data: an introduction to cluster analysis.* John Wiley & Sons [in] Błażejczyk-Majka, L. (2018). *Zastosowanie analizy skupień w przypadku zmiennych wyrażonych na skali porządkowej.*

Komisja Europejska, Eurydice (2023a). *Finansowanie wczesnej edukacji i opieki (ECEC) oraz edukacji szkolnej* [Access: 16.09.2023]. Access on the internet: https://eurydice. eacea.ec.europa.eu/pl/national-education-systems/poland/finansowanie-wczesnej-edukacji-i-opieki-ecec-oraz-edukacji.

—— (2023b). *Systemy edukacji w Europie – Cypr* [Access: 16.09.2023]. Access on the internet: https://eurydice.org.pl/systemy-edukacji-w-europie/cypr.

—— (2023c). *Systemy edukacji w Europie – Szwecja* [Access: 16.09.2023]. Access on the internet: https://eurydice.org.pl/systemy-edukacji-w-europie/szwecja.

Korzeniowska, A.M., Rutecka-Góra, J., Swach-Lech, M., Waliszewski, K. (2023). *Wpływ pandemii Covid-19 na finanse osobiste.* Wrocław: Wydawnictwo Uniwersytetu Ekonomicznego we Wrocławiu.

Kula, E., Pękowska, M. (2022). *Kształcenie całożyciowe w perspektywie Europejskiego programu na rzecz umiejętności. „Edukacja Dorosłych",* 87(2).

Luszniewicz, A., Słaby, T. (2008), *Statystyka z pakietem komputerowym STATISTICA PL: teoria i zastosowania.* Warszawa: CH Beck.

Major, M., Niezgoda, J. (2003). *Elementy statystyki.* Część I: *Statystyka opisowa,* Kraków: Oficyna Wydawnicza AFM.

Michelsen, G., Wells, P. J. (2017). *A Decade of progress on education for sustainable development: reflections from the UNESCO Chairs Programme.* UNESCO Publishing.

Migdał-Najman, K., Najman, K. (2013). *Analiza porównawcza wybranych metod analizy skupień w grupowaniu jednostek o złożonej strukturze grupowej. „Zarządzanie i finanse",* 11(3, cz. 2).

Pasimeni, F., Pasimeni, P. (2016). *An institutional analysis of the Europe 2020 strategy. "Social Indicators Research",* 127.

Piekut, M. (2014). *Nierówności w wydatkach na edukację w europejskich gospodarstwach domowych. Nierówności społeczne a wzrost gospodarczy. „Rzeszów: Social Inequalities and Economic Growth",* 39.

—— (2016). *Obciążenia budżetów domowych wydatkami na edukację. „Konsumpcja i Rozwój",* 3(16).

Pietrzykowski, R., Kobus. P. (2006). *Zastosowanie modyfikacji metody k-średnich w analizie portfelowej. „Ekonomika i Organizacja Gospodarki Żywnościowej",* 60.

Prus, B., Król, K. (2017). *Ocena zastosowania wybranych metod taksonomicznych do klasyfikacji zjawisk społeczno-gospodarczych. „Acta Scientiarum Polonorum: Formio Circumiectus”,* 16(2).

Schroeder, C., Spieß, C.K., Storck, J. (2015). *Private spending on children's education: low-income families pay relatively more. "DIW Economic Bulletin",* 5(8).

Southgate, D. (2009). *Determinants of Shadow Education: A Cross-National Analysis.* PhD dissertation. USA: The Ohio State University.

Stylianou, V., Savva, A., Vraka, M., Serghiou, A. (2004*). Information and Communication Technology: First-Aid to the Private Tutoring Problem?. "Information and communication technology".*

Sztanderska, U., ed. (2013). *Koszty edukacji od przedszkola do gimnazjum.* Warszawa: Instytut Badań Edukacyjnych.

Świętek, A. (2022). *Usługi edukacyjne w Polsce w dobie pandemii COVID-19. „Prace Komisji Geografii Przemysłu Polskiego Towarzystwa Geograficznego”,* 36(2).

United Nations (2018). *Classification of individual consumption according to purpose (COICOP) 2018. "Statistical Papers. Department of Economic and Social Affairs. Statistics Division",* 265.

Wagenaar, R. (2019). *A History of ECTS, 1989–2019: Developing a World Standard for Credit Transfer and Accumulation in Higher Education.* International Tuning Academy, 17, Dec. 2019.

Wesoła, B. (2022). *Edukacja w czasach pandemii koronawirusa w Europie i na świecie. Nauka zdalna ostatecznością. W szkołach reżim sanitarny na różnym poziomie* [Access: 22.10.2023]. Access on the internet: https://strefaedukacji.pl/edukacja-w-czasach-pandemii-koronawirusa-w-europie-i-na-swiecie-nauka-zdalna-ostatecznoscia-w-szkolach-rezim-sanitarny-na/ar/c5-16012997.

Wołyński, W., Górecki, T. (2013). *Analiza skupień.* Poznań: Wydział Matematyki i Informatyki UAM.

Vare, P., Lausselet, N., Rieckmann, M. (2022). *Competences in Education for Sustainable Development.* Springer International Publishing.

Violano, A., Sotiropoulou, A., Triantis, E. (2018). *Teaching and research: the erasmus plus experience* [In:] *INTED2018 Proceedings,* IATED Academy.

Zafar, M.W., Shahbaz, M., Sinha, A., Sengupta, T., Qin, Q. (2020). *How renewable energy consumption contribute to environmental quality? The role of education in OECD countries. "Journal of Cleaner Production",* 268.

Zhang, W., Bray, M. (2017). *Micro-neoliberalism in China: Public-private Interactions at the Confluence of Mainstream and Shadow Education. "Journal of Education Policy",* 32(1).