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COMPARATIVE ANALYSIS OF POLISH NUTS 2 LEVEL REGIONS IN TERMS OF THEIR USE OF EU GRANTS IN 2007–2013

ANALIZA PORÓWNAWCZA POLSKICH REGIONÓW SZCZEBŁA NUTS 2 ZE WZGLĘDU NA WYKORZYSTANIE FUNDUSZY UNIJNYCH W LATACH 2007–2013

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Summary: The main aim of the paper is to present a comparative analysis of Polish regions NUTS 2 level with respect to the use of EU funds in the period 2007–2013 in the funds allocated for the implementation of the operational programs of Human Capital, Innovative Economy and Infrastructure and Environment. The basis of the analysis is statistical data taken from the websites of the institutions associated with the implementation of a common European policy and the CSO. The study population consists of 16 Polish voivodships. The research covers a period from the first half of 2007 to the first half of 2013. Polish NUTS 2 regions are grouped due to the cumulative value of grants obtained from the EU operational programs under consideration. A comparative analysis of Polish regions NUTS 2 level is performed by means of positional classification and correspondence analysis.

Keywords: EU budget, region, operational program, positional classification, correspondence analysis.

Streszczenie: Głównym celem artykułu jest prezentacja statystycznej analizy polskich regionów szczebla NUTS 2 pod względem wykorzystania środków pozyskanych z Unii Europejskiej w latach 2007–2013 na realizację programów operacyjnych Kapitał Ludzki, Innowacyjna Gospodarka oraz Infrastruktura i Środowisko. Podstawą badań są dane statystyczne pochodzące ze stron internetowych instytucji związanych z realizacją wspólnej polityki europejskiej oraz GUS. Badana populacja składa się z 16 województw, badania obejmują okres od pierwszej połowy 2007 r. do pierwszej połowy 2013 r. Polskie regiony szczebla NUTS 2 zostały pogrupowane ze względu na skumulowaną wartość dotacji otrzymanych ze wspomnianych trzech programów operacyjnych. Analizę porównawczą województw Polski przeprowadzono z wykorzystaniem klasyfikacji pozycyjnej i analizy korespondencji.

Słowa kluczowe: budżet UE, region, program operacyjny, klasyfikacja pozycyjna, analiza korespondencji.

1. Introduction

The EU budget is a financial plan estimating EU's revenues and expenditure. Such plans are put forward annually as part of multiannual plans. The current plan covers the 2014–2020 period, the previous one ran from 2007 to 2013. The budget set caps on individual items of expenditure, at the same time taking into account EU's priorities. These priorities are related to the accepted principles of EU's regional, cohesion and structural policies and aim to narrow the economic disparities among regions of the European Union and ultimately their inhabitants' standard of living.

The EU budget in 2007–2013 allocated huge funds to the implementation of a common policy aimed at improving citizens' quality of life. Regional policy is aimed at regulating the proportion of inter-regional development – increasing economic and social cohesion across the European Union. The policy is grounded in three key objectives: convergence (cohesion), improving regional competitiveness and employment and territorial cooperation in Europe and involves financial aid for regions.

For Poland EU grants are one of the main manifestations of the benefits of EU membership. They constitute an important source of funds for the modernization and improvement of the competitiveness of the Polish economy.

The system of implementation of EU funds in Poland is realized with three main operational programs: Human Capital, Innovative Economy, Infrastructure and Environment.

The main objective of the Operational Program Human Capital is to increase employment and social cohesion, which contribute to better utilization of labor resources and increased competitiveness of the economy. Its strategic objectives include: increasing the level of economic activity and employability of the unemployed and economically inactive, reducing areas of social exclusion, improving workers' and enterprises' adaptability to changing economic conditions, disseminating public education at all educational levels while increasing the quality of educational services and their stronger correlation with the needs of a knowledge-based economy, strengthening the capacity of public administration to develop policies and provide high quality services and strengthening partnership mechanisms, increasing territorial cohesion.

The Operational Program Innovative Economy aims to encourage innovation by streamlining direct aid to enterprises, institutions, business environment and scientific institutions and providing companies with high quality services and systemic support ensuring development of the institutional environment of innovative enterprises. Under the program investments are made to increase enterprises' innovativeness, promote increased competitiveness of Polish science and increase the role of science in economic development, extending the share of innovative Polish products in the international market, creating lasting and better jobs resulting in an increase in the use of ICT in the economy.

The Operational Program Infrastructure and Environment aims to improve Poland's and its regions' attractiveness for investors by developing technological

infrastructure while protecting and improving the environment, health, preserving cultural identity and developing territorial cohesion. It supports the implementation of major infrastructural projects in the field of environment, transport, energy, culture and national heritage, healthcare and higher education.

2. Research purpose and methodology

The study aims to conduct a comparative analysis of Polish NUTS level 2 regions in terms of their use of EU grants allocated as part of the funds targeting the implementation of common EU policies in 2007–2013. The analysis focuses on EU grants obtained under operational programs named Human Capital (HC), Innovative Economy (IE) and Infrastructure and Environment (I&E). The paper draws on the cumulative values of EU grants awarded as public funds allocated for projects in the subsequent half-years starting from the first half of 2007 until the first half of 2013.

To accomplish the above tasks, the authors deployed positional classification [Markowska, Strahl 2009] and correspondence analysis allowing for the analysis of data measured on the weak scale [Greenacre 1984; Stanimir 2005; Walesiak, Gatnar (eds.) 2009]. Correspondence analysis can graphically present, within a reduced data set, a relationships between measured features. It falls then to the researcher to identify and assign objects to clusters and interpret so described a fragment of reality. The analysis is based on statistical data sourced out from websites run by the CSO and those dedicated to European funds (*European Funds Portal* run by the Ministry of Regional Development). The research population comprises Poland's 16 voivodeships (16 Polish NUTS 2 level regions). The research period is related to the current multi-annual EU financial plan and covers the period between the first half of 2007 and the first half of 2013. The year 2007 features no EU grants acquired by Polish voivodeships under the 2007–2013 financial plan. Hence the analysis was conducted for a period starting in the first half of 2008. The last year for which data are available (at the time of calculations) was the first half of 2013.

3. EU grants under the HC, IE and I&E programs

The authors collected information on the size of public funding originating in the EU grants awarded since the launch of the Human Capital, Innovative Economy and Infrastructure and the Environment Operational Programs between the first half of 2007 and the first half of 2013 (see Table 1).

The voivodeships which in terms of EU grants obtained under the Human Capital Operational Program until the end of the first half of 2013 proved to be per head of population according to the 2007 headcount: the best – Świętokrzyskie, Warmińsko-Mazurskie; the weakest – Śląskie, Mazowieckie.

However, calculated per million PLN of the voivodeship's 2007 GDP: the best – Świętokrzyskie, Warmińsko-Mazurskie, Podkarpackie, Lubelskie; the

weakest – Mazowieckie, Śląskie. In the second variant of the analysis the group of the best voivodeships was joined by Podkarpackie and Lubelskie voivodeships.

The voivodeships which in terms of EU grants obtained under the Innovative Economy Operational Program until the end of the first half of 2013 proved to be per head of population according to the 2007 headcount: the best – Mazowieckie, Małopolskie, Dolnośląskie, Podkarpackie; the weakest – Warmińsko-Mazurskie, Zachodniopomorskie.

Calculated per million PLN of the voivodeship's 2007 GDP: the best – Podkarpackie, Małopolskie; the weakest – Warmińsko-Mazurskie, Zachodniopomorskie. In the second variant of the analysis, the group of the best voivodeships does not feature Mazowieckie and Dolnośląskie voivodeships.

Table 1. The value of public funding originating in EU grants awarded since the launch of the HC, IE and I&E Operational Programs between the first half of 2007 and the first half of 2013

Voivodeship	Grants per head of population (PLN)			Grants per million PLN worth of GDP (PLN)		
	HC OP	IE OP	I&E OP	HC OP	IE OP	I&E OP
Dolnośląskie	596.56	787.73	2,061.33	17,802.17	23,507.16	61,513.34
Kujawsko-Pomorskie	694.68	467.95	1,210.43	25,904.43	17,449.70	45,136.71
Lubelskie	818.01	464.43	1,895.87	39,042.16	22,166.55	90,486.45
Lubuskie	601.84	443.99	3,286.65	22,116.05	16,315.46	120,776.93
Łódzkie	699.84	623.81	3,275.84	24,503.81	21,841.78	114,699.28
Małopolskie	639.43	820.05	2,088.82	23,999.12	30,778.00	78,397.18
Mazowieckie	569.62	971.55	3,875.10	11,548.35	19,696.90	78,562.49
Opolskie	721.03	624.97	1,185.21	28,198.82	24,441.98	46,352.21
Podkarpackie	824.85	693.10	3,352.65	39,647.98	33,315.33	161,152.15
Podlaskie	759.53	466.86	1,531.88	33,248.55	20,437.02	67,058.36
Pomorskie	609.35	533.62	3,843.62	20,084.85	17,588.64	126,689.27
Śląskie	513.91	456.63	2,311.23	15,631.29	13,888.82	70,298.66
Świętokrzyskie	953.23	445.97	1,921.24	40,191.68	18,803.75	81,006.75
Warmińsko-Mazurskie	906.97	243.08	3,470.00	39,653.68	10,627.64	151,712.10
Wielkopolskie	604.59	579.75	1,635.28	18,759.77	17,988.86	50,740.67
Zachodniopomorskie	812.32	312.16	2,804.37	29,515.95	11,342.37	101,897.37
Median	697.26	500.78	2,200.02	25,204.12	19,250.33	79,784.62

Source: authors' own calculations (based on <http://www.funduszeuropejskie.gov.pl/>, <http://stat.gov.pl/>).

The voivodeships which in terms of EU grants obtained under the Infrastructure and Environment Operational Program until the end of the first half of 2013 proved to be per head of population according to 2007 headcount: the best – Mazowieckie, Pomorskie; the weakest – Opolskie, Kujawsko-Pomorskie.

However, calculated per million PLN of the voivodeship's 2007 GDP: the best – Podkarpackie, Warmińsko-Mazurskie; the weakest – Kujawsko-Pomorskie, Opolskie. In the second variant of the analysis in the group of the best voivodeships Mazowieckie and Pomorskie voivodeships were replaced by Podkarpackie and Warmińsko-Mazurskie.

In order to identify voivodeships that revealed the greatest ability to acquire EU grants positional classification was performed (based on the data presented in Table 1) separately for EU grants calculated per head of population according to the 2007 headcount (region's population potential) and per million PLN worth of 2007 GDP (region's economic potential). The results of this classification are shown in Table 2.

Table 2. Breakdown of voivodeships into groups according to the value of public funding awarded since the launch of the HR, IE and I&E Operational Programs corresponding to EU grants between the first half of 2007 and the first half of 2013

Voivodeship	Grants per head of population	Grants per million PLN of GDP
Dolnośląskie	G_3	G_3
Kujawsko-Pomorskie	G_4	G_3
Lubelskie	G_3	G_1
Lubuskie	G_3	G_3
Łódzkie	G_1	G_2
Małopolskie	G_3	G_3
Mazowieckie	G_2	G_3
Opolskie	G_2	G_2
Podkarpackie	G_1	G_1
Podlaskie	G_3	G_2
Pomorskie	G_2	G_3
Śląskie	G_3	G_4
Świętokrzyskie	G_3	G_2
Warmińsko-Mazurskie	G_2	G_2
Wielkopolskie	G_3	G_4
Zachodniopomorskie	G_2	G_2

Source: authors' own calculations.

A positional classification helped to assign each of the voivodeships to the appropriate group. The k number of group G_k ($k = 1, \dots, 4$) indicates that in a given voivodeship the value of that portion of public funding which originates in EU aid did not exceed the value of the median of funding for $k-1$ operational programs since the launch of the HC, IE and I&E operational programs (in current prices per head of voivodeship's population in 2007). For example, the G_1 symbol (the best group) indicates that the value of the median was exceeded in all three programs, G_3 implies

that the value of the median was not exceeded for two operational programs, whereas G_4 indicates that the value was not exceeded for any of the them.

In both variants of the analysis (i.e. EU grants calculated per head of population according to the 2007 headcount and in million PLN of 2007 GDP), the leading group always features Podkarpackie voivodeship, while the lowest place is occupied by Kujawsko-Pomorskie (G_4 and G_3), Śląskie (G_3 and G_4) and Wielkopolskie (G_3 and G_4) voivodeships.

Correspondence analysis was carried out for the value of EU grants per head (GDP) of population (POP). A combined contingency table was compiled, in which in addition to a variable that identifies a voivodeship use was made of dummy variables indicating whether a given voivodeship acquired EU grants under a given operational program (HC, IE, I&E) whose amount exceeds or did not exceed the value of the median (yes, no). The results are presented graphically in Figure 1.

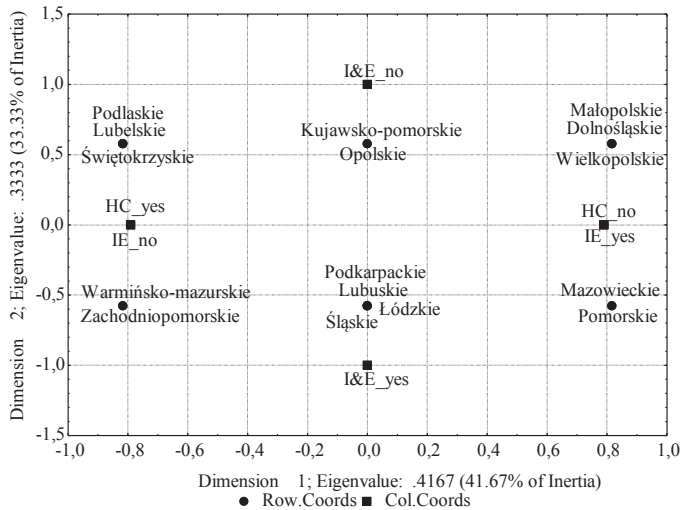


Figure 1. Correspondence analysis of EU grants per head of population according to 2007 headcount

Source: authors' own research.

The analysis of Figure 1 highlights the fact that the two dimensions account for about 75% of the total inertia. The horizontal axis defines voivodeships divided in terms of EU grants received under the Human Capital Operational Program and Innovative Economy Operational Program. The vertical axis, in turn, defines a division of voivodeships in terms of EU grants received under the Infrastructure and Environment Operational Program. By looking at the right and left sides of the horizontal axis, one can see that the voivodeships characterized by a high level of economic development or its growth claimed substantial EU grants under the IE OP and smaller ones under the HC OP than did the voivodeships with low *per capita* GDP in 2007, or a low rate of change in GDP over the 2007–2010 period.

Among the voivodeships several groups can be pointed out, namely:

- Małopolskie, Dolnośląskie, Wielkopolskie;
- Mazowieckie, Pomorskie;
- Podkarpackie, Lubuskie, Łódzkie, Śląskie;
- Warmińsko-Mazurskie, Zachodniopomorskie;
- Podlaskie, Lubelskie, Świętokrzyskie;
- Kujawsko-Pomorskie, Opolskie.

A similar analysis based on the data presented in Table 1 was carried out for the variant in which the EU grants have been calculated in million PLN of 2007 GDP. The results of the correspondence analysis are presented in Figure 2.

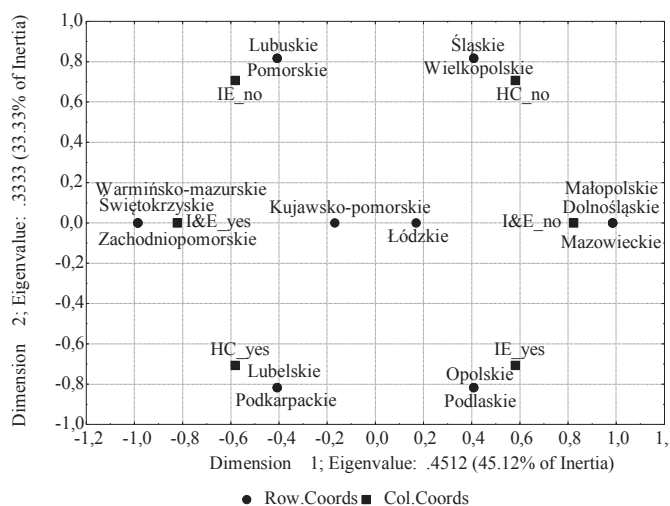


Figure 2. Correspondence analysis for EU grants per million PLN of 2007 GDP

Source: authors' own research.

Both dimensions account for over 78% of the total inertia. In this case, the horizontal axis defines a division of the voivodeships in terms of EU grants received under the Infrastructure and Environment Operational Program. At the same time, the vertical axis defines the “yes” and “no” options for the HC and IE operational programs.

In the present case the voivodeships can be grouped as follows:

- Małopolskie, Dolnośląskie, Mazowieckie;
- Opolskie, Podlaskie;
- Lubelskie, Podkarpackie;
- Warmińsko-Mazurskie, Świętokrzyskie, Zachodniopomorskie;
- Lubuskie, Pomorskie;
- Śląskie, Wielkopolskie;
- Kujawsko-Pomorskie and Łódzkie, which resemble the average profile the most closely.

Correspondence analysis was also performed jointly for the two options considered. The results are shown in Figure 3.

Both dimensions account for about 66.62% of the total inertia. In this case, the horizontal axis division defines the voivodeships according to EU grants raised under the Human Capital Operational Program. The vertical axis defines a division of the voivodeships according to EU grants received under the Infrastructure and Environment Operational Program in the variant involving the population headcount.

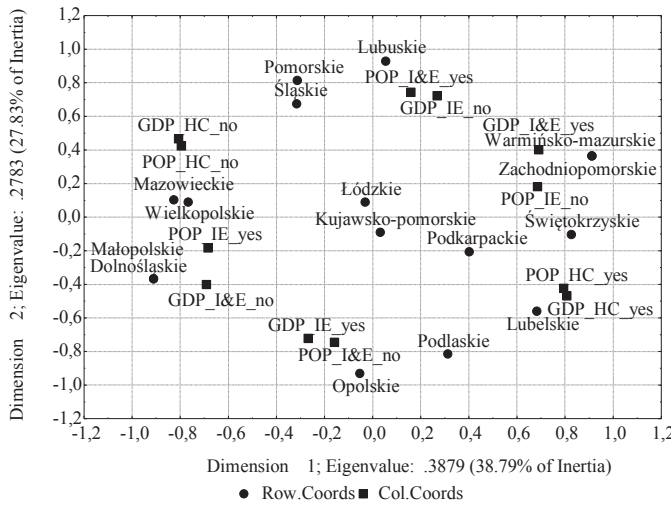


Figure 3. Correspondence analysis for EU grants per head of population and per million PLN of 2007 GDP

Source: authors' own research.

Based on Figure 3, the following groups of voivodeships can be identified:

- Warmińsko-Mazurskie, Zachodniopomorskie, Świętokrzyskie, Podkarpackie, Lubelskie,
- Małopolskie, Dolnośląskie, Mazowieckie, Wielkopolskie,
- Lubuskie, Pomorskie, Śląskie,
- Opolskie, Podlaskie,
- the Kujawsko-Pomorskie and Łódzkie voivodeships resembling the average profile the most closely.

4. Conclusions

Based on the results of the study, it can be concluded that:

- 1) There is an apparent similarity in respect to HC_yes regardless of whether the EU grants are *per capita* or per million PLN of 2007 GDP.

2) There is an apparent similarity between the IE_yes and I&E_no and the IE_no and I&E_yes categories. What follows from this is that in respect of the criterion of the level of economic development (measured by GDP) EU grants were obtained either from the IE OP or the I&E OP.

The results of the study indicate the diversity of Polish NUTS 2 level regions in terms of the European funds obtained under the main operational programs. In further research, the authors intend to attempt to assess the relationship between the size and type of EU support and the level of regional development of Polish voivodeships.

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