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ELŻBIETA CHĄDZYŃSKA*

Analysis of Spatial Diversification of Economic Growth Level in Powiats of Dolnośląskie Voivodship

Abstract

Intensive economic and urban processes which take place in Polish urbanized area have a significant impact on the changes of structure of territorial units, their functional development and demographic processes. Development of individual units is dependent on many factors like the location, demographic potential and economics. In the area of one voivodship – there are powiats with a various potential of development.

As a subject of research powiats in the area of the Dolnośląskie Voivodship are selected. Taxonomic methods were used for the classification and grouping of powiats as a spatial objects tested in the multidimensional space of characteristics. The aim of the paper is to present the spatial variation in the level of development in the light of selected factors.

1. Introduction

Intensive economic and urban processes which take place in the Polish urbanized space from more than 20 years have a significant impact on the basic spheres of human activity: environment, social system and economy. Under the influence of these processes occur changes in the structure of territorial units, their functional development and demographic processes. Development of individual units is dependent on many factors. There are the factors associated

* Ph.D., Wroclaw University of Technology

with the location, demographic potential and economics. In the area of one voivodship – there are powiats with a various potential of economic development.

As a subject of research powiats and cities with powiat status in the area of the Dolnośląskie Voivodship are selected. Taxonomic methods was used for the classification and grouping of powiats as spatial objects tested in the multidimensional space of characteristics. The aim of the paper is to present the impact of selected factors on the spatial variation in the level of economic development.

2. The characteristics of the area under research

As a subject of research the area of Dolnośląskie Voivodship is selected. Taxonomic methods was used for the classification and grouping of powiats as spatial objects tested in the multidimensional space of characteristics.

Figure1. Location of dolnośląskie voivodship

Source: author's own.

According to nomenclature of NUTS-4 Dolnośląskie Voivodship were the 26 powiats and 3 cities with powiat status: Jelenia Góra, Legnica and Wrocław (as of 31 Dec. 2010). Dolnośląskie Voivodship is situated in the southwestern part of Poland and is bordered by three Voividships: Lubuskie, Wielkopolskie and Opolskie, and with the Czech Republic and Germany. As of 31 DEC. 2010 area of the Voivodship is 19947 km^2 (6,4% of the territory of the country; 7 place among provinces). The population of the Voivodship is 2877,8 persons,

representing 7.5% of the population of Poland. In terms of number of population dolnośląskie is located at the 5 spot in the country. In 2010, in Dolnośląskie Voivodship, in contrast to previous periods, there was a slight positive growth of population. This is largely an effect of migratory movements. The State belongs to the most urban area in Poland. Lower Silesian Voivodeship is the nature of the industrial-agricultural and well developed economy.

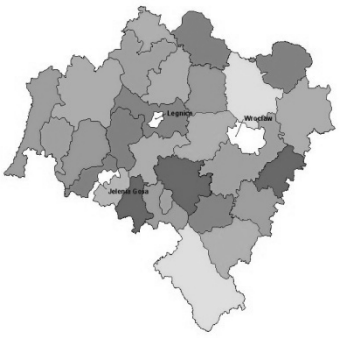
The level of economic development in the area of voivodship is determined in various ways. Influential is the position of the unit in the system of communications involving closer and further neighborhood (the availability of communication), which is linked directly to the quality of the infrastructure to develop the necessary contacts, population and age structure, investment attractiveness of individual units, the structure of employment and the characteristics of the labor market.

To examine the status of and prospects for economic development in the County, you need to select the set of features that characterize the best studied phenomenon. Area of Dolnośląskie Voivodship is highly diverse, both in terms of the size of individual units (provinces), their functional development, position in the hierarchy of administrative, rehabilitation of the environment and many others. Carried out numerous studies and analysis of opportunities for economic development and its determinants in the area of Dolnośląskie Voivodship evaluate three basic types of areas. They are: city districts – Wrocław, Legnica and Jelenia Góra, which have the strongest position during layout, with the most distinguished capital region - the city of Wrocław.

The second type of areas represent municipalities that make up the counties within the immediate vicinity of the listed cities, which benefit from the position in a broad-ranging contacts and areas located away from main roads, which to a large extent hinders their development (Chądzyńska, Iwaszko 2012, pp. 33 – 36, Litwińska 2007, Mlek, Zipser 2007).

The characteristics selected for testing the diversification level of economic development of powiats focus on topics concerning the demographic characteristics, infrastructure, income and expenditure and the labor market. These thematic areas are described using the characteristics, which figures in the form of indicators, which enables the comparison of territorial units of different sizes. Values of the indicators relate to the year 2010.

Figure 2. Poviats in dolnośląskie voivodship



Source: author's own.

Ratio of population density is one of the characteristics of the most commonly used in research. Lower Silesian Voivodship in 2010, it was an average of 144 persons per km^2, which is in fourth place in the country (average for Poland is 122 persons per km^2.) The coefficient of feminization (number of women per 100 men) amounted to 109, which gives a third place in the country. Natural growth for the Lower Silesian Voivodship was in 2010, negative and amounted to minus 172 people. According to data for 2009 the estimated value of the gross domestic product remained in the lower Silesian Voivodeship at 110448 million, representing an 8.2% of GDP in the country. This was the second, after the Masovian Voivodeship, largest value among the provinces. Expenditure on investments and investment purchases are the most important group of expenditure. They increase the potential of the region and foster the creation of advantageous conditions for development (Statistical Office in Wrocław 2012, report).

3. Course of analyze

Numeric Taxonomy provides the methods of grouping and classification of data in spatial studies. Taxonomic methods enable to order a collection of objects, the division into disjoint subsets, such as a group, the classes or concentrates containing elements similar, from the point of view of selected characteristics and simultaneously different elements of other subsets. As a result we get subsets of elements like inside the group and different from the other groups (Hellwig 1994, Mynarski 1992, pp. 117-146, Suchecki 2010, pp. 56-57). In comparative and classification studies the important is possibility to

compare the objects described by many variables. For this purpose, the most widely used taxonomic methods, which enable the analysis of objects in multidimensional space. In the taxonomic analysis decisive step is the selection of diagnostic variables.

The potential set of diagnostic features chosen as the characteristics of level of economical development of dolnośląskie powiats, included the following variables:

1. population density,
2. index of feminization (woman per 100 men),
3. natural increase per 1000 population,
4. non-working age population per 100 persons of working age,
5. quantity of roads (in km) per 100 km^2 of area,
6. revenue own per capita,
7. expenditure of investment per capita,
8. entities of the National Economy register per 1000 population,
9. population employed in agriculture,
10. population employed in industry,
11. population employed in services.

(as a % of total employed)

The vast majority of selected potential diagnostic variables are a stimulant. Only variable showing the number of persons in the not working age per 100 persons in working age is destimulant (for this characteristic negative values were taken). In order to reduce the number of diagnostic variables was verified, while the large variability, and the condition of weak correlate between variables. Assuming the value of the correlation coefficient equal to 0.65 as the threshold value, the final set of diagnostic characteristics contained the following variables:

1. population density,
2. natural increase per 1000 population,
3. non-working age population per 100 persons of working age,
4. expenditure of investment per capita,
5. population employed in agriculture,
6. population employed in industry,
7. population employed in services,

(as a % of total employed)

8. revenue own per capita.

The values of the coefficients of correlation between diagnostic variables, presents table 1.

Table 1. Coefficient of correlation between diagnostic variables

	1	2	3	4	5	6	7	8
1	1,000	-0,106	0,083	0,106	-0,465	-0,458	0,410	0,518
2	-0,106	1,000	0,478	0,354	0,136	0,450	-0,479	0,206
3	0,083	0,478	1,000	0,325	-0,172	0,198	-0,278	0,206
4	0,106	0,354	-0,325	1,000	-0,176	0,175	-0,304	0,616
5	-0,465	0,136	-0,172	-0,176	1,000	-0,115	0,144	-0,431
6	-0,458	0,450	0,198	0,175	-0,115	1,000	-0,950	0,057
7	0,410	-0,479	-0,278	-0,304	0,144	-0,950	1,000	-0,123
8	0,518	0,206	0,206	0,616	-0,431	0,057	-0,123	1,000

Source: Own calculations on the basis of Statistical Office in Wrocław, Wrocław 2011.

Because of different units of characteristics, the standardization of diagnostic variables was made in accordance with the rule:

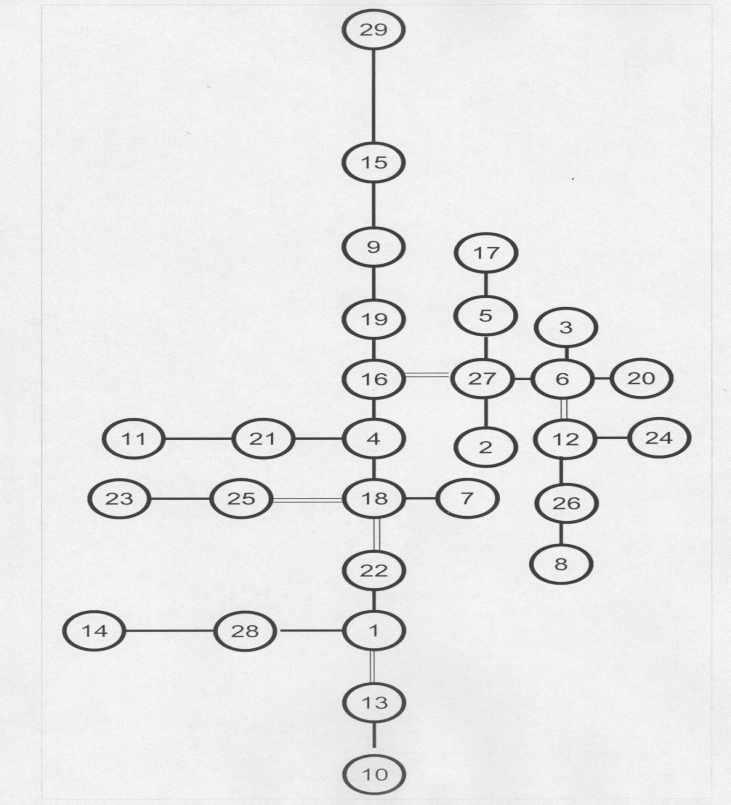
$$x_i^{'} = \frac{x_i - \bar{x}}{s} \tag{1}$$

i = 1, 2, …, n – number of individuals.

Table of distances was calculating with accordance of Euclidean distance. On the basis of this table "wrocławski" dendrite was constructed (Fig. 3). The focuses of the first row are marked by bold line, while the second-order focuses by double line.

Dendrite methods belong to the taxonomic hierarchical procedures using the concept in the theory of graphs, which are built based on the matrix of distance (D) between classified objects. At the stage of the construction of the graph they can be treated as the agglomeration procedures. Stage analysis leads to the procedures of subdivision (Mynarski 1992, pp. 140-143, Chądzyńska 2001, pp. 70 - 80).

Figure 3. "Wrocławski" dendrit of Dolnośląskie Powiats



Source: own drawing made by Autocad.

The concentrations are arranged by join each object with the nearest one. In this way we arrange separate groups containing minimum one element. Then we join each group of objects with the nearest group. The procedure is repeated until all objects are arranged into one group. We divide a set of objects into *k* parts by removing from the dendrite arrangement the *k* – 1 longest edge. The division into *k* parts above-mentioned has among all possible divisions into *k* parts the smallest total length of the shortest dendrite arrangements of particular parts (Steinhaus and others 1952, pp. 6-10).

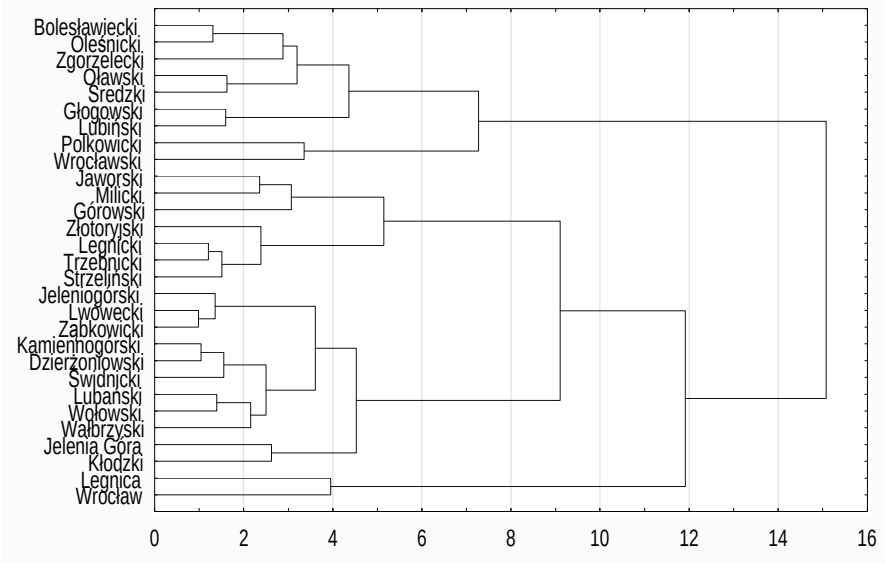
The number of groups was determined by calculating the successive quotients of adjacent elements in descending string of the edges of dendrite (d_i):

$$w_i = d_i/d_{i+1} \quad (i = 1, 2, ..., n\text{-}1). \tag{2}$$

The set of individuals dissolves in a "natural" into k elements if $w_k < w_{k+1}$.

In the analysis uses three methods: method of “wrocławski” dendrite (fig 3), the method of Ward (fig 4) and the method of full bindings (fig 5).The most clearly division of counties was obtained using the dendrite method and the method of Ward. These methods have allowed the arrangement of 9 groups of powiats - objects similar due to the level of economic development (as of 2010).

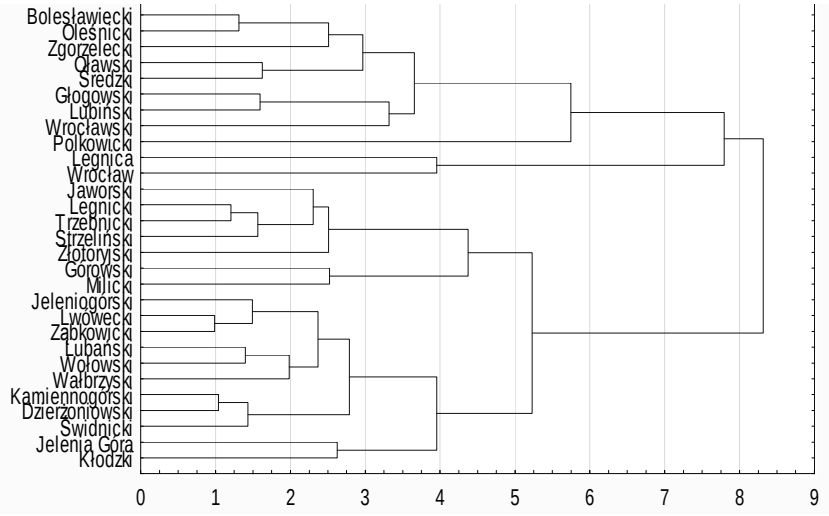
Figure 4. Classification made by Ward’s method. Distance of bindings



Source: Own elaborate in program Statistica.

As a result of the application of the method of Ward and the method of full bindings were obtained almost identical results, differing only in the classification of jaworski powiat. The method of "wrocławski" dendrite also shows a large coincidence with the results of both mentioned methods. Slight differences take place in some counties the "average" in terms of the level of economic development. The districts ' strengths ', city districts and counties "weak" show conformity of classification in all three methods. All of used methods gave a breakdown of the investigated objects on the 9 groups. Since the $w_8 < ... < w_9 < ... < w_7 < ...< w_{10}$ break into 9 groups is justified from the point of view of the natural breakdown.

Figure 5. Method of full bindings. Distance of bindings



Source: Own elaborate in program Statistica.

On the basis of the analysis of the Ward's chart you can say that the greatest similarity due to the tested characteristics can be observed in counties: lwówecki, ząbkowicki and kamiennogórski, dzierżoniowski. Finally, taking into account the received breakdown of the class the breaks as in table 2 of tested objects was accepted (the marks by the name means the number in dendrite).

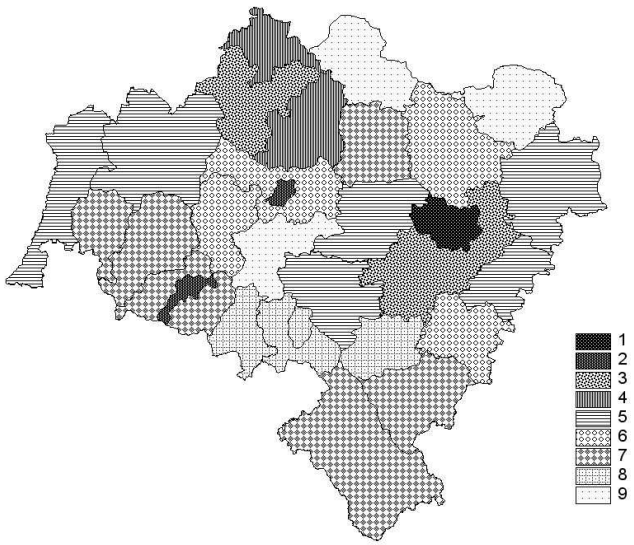
Table 2. Finally concentrations of powiats

Number of concentration	Powiats and cities with powiat status
1	Wrocław
2	Legnica
	Jelenia Góra
3	polkowicki
	wrocławski
4	lubiński
	głogowski
5	oławski
	oleśnicki
	średzki
	świdnicki
	zgorzelecki

	bolesławiecki
6	legnicki
	strzeliński
	trzebnicki
	złotoryjski
7	ząbkowicki
	lwówecki
	jeleniogórski
	lubański
	wołowski
	kłodzki
8	wałbrzyski
	kamiennogórski
	dzierżoniowski
9	górowski
	milicki
	jaworski

Source: Own elaboration on the base of mentioned above methods.

Figure 6. Spatial location of groups of poviats



Source: Own drawing made in Arcview.

4. Conclusions

The units (counties) the most distinguish in the detecting set – irrespective of the method used for grouping create identical groups. Make them the city districts where the level of economic development is relatively high and the counties of well-educated functions (powiats - lubiński, głogowski, polkowicki, wrocławski), and worse developed counties, as powiat górowski milicki and jaworski. Other units (with an average level of development) constitute a collection of diverse objects, as can be seen in some differences in assignment to groups using different methods. A lower level of economic development in counties confirmed the result obtained in many analyses show that counties less communicated, are develop slowly. Though account selected characteristics of economic development, such as expenditure on investment and employment in industry, polkowicki powiat creates in this case distinct quality.

The biggest differentiation among the adopted characteristics diagnostic show features: population density and investment expenditure. Broken down according to group terms adopted characteristics you can see the dependency from the position in the communications system and the neighborhood. The resulting classification of powiats is the reflection of the regional diversity of Dolnośląskie Voivodship.

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Streszczenie

ANALIZA PRZESTRZENNEGO ZRÓŻNICOWANIA POZIOMU ROZWOJU GOSPODARCZEGO POWIATÓW DOLNOŚLĄSKICH

Intensywne procesy gospodarcze oraz urbanizacyjne, które mają miejsce w polskiej przestrzeni zagospodarowanej od przeszło 20 lat, wywierają znaczący wpływ na podstawowe sfery działalności człowieka, tj. środowisko, system społeczny oraz gospodarkę. Pod wpływem tych procesów zachodzą zmiany w strukturze jednostek terytorialnych, ich rozwoju funkcjonalnym oraz demograficznym. Rozwój poszczególnych jednostek uwarunkowany jest wieloma czynnikami. Można tu wyróżnić czynniki związane z lokalizacją, potencjałem ludnościowym i ekonomicznym. W obszarze, jakim jest województwo występują gminy o zróżnicowanym potencjale rozwojowym.

Jako przedmiot badań wybrano powiaty leżące w obszarze województwa dolnośląskiego. Zastosowano taksonomiczne metody klasyfikacji i grupowania powiatów, jako obiektów przestrzennych badanych w wielowymiarowej przestrzeni cech. Celem referatu jest przedstawienie przestrzennego zróżnicowania poziomu rozwoju gospodarczego powiatów dolnośląskich w świetle wybranych czynników.