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# MULTIDIMENSIONAL ANALYSIS OF SOCIAL AND ECONOMIC DEVELOPMENT OF SOME COUNTIES IN MAZOVIA VOIVODESHIP

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**Abstract.** The work reports an application of standardised sums to assess the social and economic development of some counties in Mazovia Voivodeship in the year 2012. A total of 37 counties, belonging to 5 subregions according to the NUTS-3 classification, were included in the study. They represent the following subregions: Ciechanów-Płock, Ostrołęka-Siedlce, Radom, Warsaw East and Warsaw West. County towns/cities were excluded from the analysis. At the first stage, development of the counties located in these subregions was assessed in terms of population, economic and infrastructure development as well as standard of life of inhabitants. The second stage encompassed analysis of the counties in terms of all the criteria within these areas. The study demonstrated substantial socio-economic development disparities. Counties located in the proximity of the Warsaw agglomeration are highly developed in social and economic terms whereas those located at the voivodeship's boundary are poorly developed with respect to all the areas included in the study.

**Key words:** Mazovia Voivodeship, county, multidimensional method, zero unitarisation

## INTRODUCTION

Mazovia Voivodeship is the largest unit at the NUTS-2 level in Poland in terms of both area and population. Against the background of other NUTS-2 voivodeships, it is highly developed in social and economic terms but also characterised by the greatest development disparities between its counties [Kudełko 2002, Kołodziejczyk 2012, Wojewódzka-Wiewiórska 2013]. This is due to an increasing gap between the Warsaw agglomeration plus the counties surrounding the capital, and the remaining counties, particularly those located in rural areas [Grosse 2004, Przeglądy terytorialne OECD 2008]. Many counties located further away from the centre of the voivodeship or at the boundary with other voivodeships have been struggling with low activity in the labour market, a high

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percentage of permanently unemployed people and high unemployment rate. The disparities are historically rooted or result from development differences between cities and peripheral areas [Gorzelak 2002].

Social and economic growth is one of indicators of a region's development. It is a process of positive social changes including both the qualitative and quantitative increase which leads to enhanced welfare of the inhabitants [Parysek 2001, 2008, Parysek and Stryjkiewicz 2003, Szlachta and Woźniak 2007, Kamińska and Janulewicz 2009]. According to Hryniewicz [2000], socio-economic development is a sequence of economic and social phenomena which, when evaluated based on the available knowledge, can be classified as more beneficial to a given community than others. Kupiec [1995] has claimed that development should be looked at from the standpoint of the following eight interrelated aspects: social, economic, technical, technological, spatial, natural, aesthetic and temporal. Regional economy modernity, diversity and innovativeness, spatial planning quality, level of infrastructure development and human capital are the factors which may stimulate a region's development. Then, they are capable of generating offers which find recipients on international markets, too [Sokołowicz 2008].

Differences in the development of regions have become a very important research trend in present-day economic as well as geographical/economic studies [Gaczek 2000, Henley 2005, Malaga and Kliber 2007, Michałek 2007, Churski 2008, Wójcik 2008, Dolata 2009, Łaźniewska and Górecki 2012]. Various methods are applied to study this phenomenon taking into account its multidimensional character, in particular methods of multidimensional comparative analysis (MCA). The analysis yields a synthetic measure which replaces a multi-indicator description of objects with one synthetic variable, making it possible to precisely determine the level of development of individual administrative division units [Strahl 2003, Bombik and Marciniuk-Kluska 2010, Hydzik 2012].

The objective of this work was to classify Mazovia Voivodeship counties in terms of their social and economic development, and to rank the counties taking into account a set of traits describing them, using the multidimensional comparative analysis and applying zero unitarisation as a normalisation procedure.

## MATERIAL AND METHODS

Data for analysis was obtained from the Main Statistical Office (GUS) Regional Data Bank. The data describes Mazovia Voivodeship in 2012 according to four areas: population development, standard of life of inhabitants, economic development and technical infrastructure. County towns/cities (Warszawa, Siedlce, Płock, Radom and Ostrołęka) were excluded from analysis. A total of 37 counties representing 5 NUTS-3 subregions: Ciechanów-Płock, Ostrołęka-Siedlce, Radom, Warsaw East and Warsaw West, were examined. Diagnostic variables to describe the level of development of individual counties were chosen applying the following three basic criteria: technical – established based on literature on the subject [Strahl 1998, Broszkiewicz 1999, Strahl 2000, 2006, Pomianek 2010], formal – it was checked if the data was measurable, complete and available, and statistical – only variables with coefficients of variation greater than 10% or not significantly correlated were chosen. The final analysis included the following diagnostic traits representing individual areas:

- population development: $X_1$ – permanent migration rate of working age inhabitants per 10,000 working age persons, $X_2$ – number of working-age persons, $X_3$ – birth rate per 1,000 persons;
- standard of live of inhabitants: $X_4$ – average monthly earnings gross (PLN), $X_5$ – proportion of pre-school children in the total number of children aged of 3–5 (%), $X_6$ – number of GP surgeries per 10,000 inhabitants, $X_7$ – proportion of expenditures on public roads in the total expenditures (%), $X_8$ – residential floor surface per 1 person ($m^2$), $X_9$ – education expenditures (PLN per 1 inhabitant), $X_{10}$ – expenditures on culture (PLN per 1 inhabitant);
- economic development: $X_{11}$ – registered unemployment rate, $X_{12}$ – investment outlays per 1 working age inhabitants (PLN), $X_{13}$ – proportion of outlays invested in industry and construction in the total outlays (%), $X_{14}$ – proportion of outlays invested in trade, transportation, information and transport in the total outlays (%), $X_{15}$ – number of national economy subjects recently REGON registered per 10th working age persons;
- technical infrastructure: $X_{16}$ – public roads per 100 $km^2$ paved roads, measured in length, $X_{17}$ – proportion of people with access to sewer system per inhabitants in total (%), $X_{18}$ – proportion of people with access to gas per inhabitants in total (%).

The method of standardised sums was applied to examine the variation in the level of socio-economic development of Mazovia Voivodeship counties. The procedure belongs to a group of linear ordering methods which organise objects in a descending order from the best to the worst in terms of a given complex phenomenon. Prior to ordering, the data had to be normalised to make it comparable. The zero unitarisation method was applied to this end because, according to Kukuła [2012], this is the best procedure to normalise quantitative traits. The nature of the variables was determined using unemployment rate as a destimulant and the remaining variables as stimulants. Determination of stimulant and destimulant values was based on the following formulas [Kukuła 2000, Bal-Domańska and Wilk 2011]:

$$z_{ij} = \frac{1}{b_i - a_i}(x_{ij} - a_i) \text{ for the stimulants and}$$

$$z_{ij} = \frac{1}{b_i - a_i}(b_i - x_{ij}) \text{ for the destimulants,}$$

where: $z_{ij}$ – normalised value of the $i$-trait and $j$-county ($i = 1, ..., 18,\ j = 1, ..., 37$);
$x_{ij}$ – value of ith trait for the $j$-county ($i = 1, ..., 18,\ j = 1, ..., 37$);
$a_i$ – minimum value of the $i$-trait,
$b_i$ – maximum value of the $i$-trait.

The values of the normalised variables were used to calculate a synthetic measure (aggregated estimate) according to the formula:

$$q_i = \frac{1}{s}\sum_{i=1}^{s} z_{ij}$$

where: $s$ – number of variables included in analysis.

The values of the synthetic measure ($q_i$) were used to make a ranking of counties. Additionally, the counties were divided into four groups based on the arithmetic mean and ($\overline{q}$) and standard deviation ($s_q$), of the synthetic measures in the following way:

- Group 1: $q_i \geq \overline{q} + s_q$;
- Group 2: $\overline{q} \leq q_i < \overline{q} + s_q$;
- Group 3: $\overline{q} - s_q \leq q_i < \overline{q}$;
- Group 4: $q_j < \overline{q} - s_q$.

Groups 1 and 2 were assumed to be, respectively, very highly and highly developed counties. Group 3 characterised by an average level of development, which in Group 4 was the lowest thus reflecting the worse situation.

Analysis of the social and economic development of the counties was made using data for 2012. The analysis was carried out for each area and in terms of all the diagnostic variables to more fully present the issue in question.

## DISCUSSION

Mazovia Voivodeship counties were quite diversified in terms of the values of variables examined in 2012 (Table 1). The counties were most diversified with respect to the permanent migration rate and birth rate. The most people emigrated from Łosice County and birth rate was the lowest in Sokołów Podlaski County. The highest positive migration rate was for Piaseczno County and the greatest birth rate for Wołomin County. There were also substantial differences in expenditures on culture and investment as well as access to gas. The counties were most similar when it comes to average monthly earnings gross (from PLN 2,670 in Mława County to PLN 4,402 in Pruszków County), proportion of pre-school children (from 40.1% in Ostrołęka County to 84.2% in Piaseczno County) and residential floor area per 1 person (from 23.4 $m^2$ in Radom County to 39.1 $m^2$ in Warsaw West County).

Table 2 presents classification of the counties with respect to population development. Based on the synthetic variable, the following five counties were found to be the most developed: Wołomin, Piaseczno, Legionowo, Pruszków and Mińsk. They represent either the Warsaw East Subregion or the Warsaw West Subregion. The counties were characterised by a positive birth rate and a high permanent immigration rate. Values of these variables were much higher than their respective averages for the voivodeship.

The last group, with a low level of population development, comprised two counties: Lipno (Radom Subregion) and Łosice (Ostrołęka and Siedlce Subregion). Their birth rate was much lower than the average and their migration rate was negative and much higher than the average.

Piaseczno, Grójec and Pruszków, Grodzisk, Grójec and Warsaw West County, representing the Warsaw West Subregion, and Lipsk County from the Radom Subregion, were characterised by a high standard of life of their inhabitants (Table 3). Piaseczno County, which was ranked first, had the greatest average residential floor surface per 1 person (38 $m^2$) and the greatest percentage of pre-school children in the total number of children aged of 3–5 (84.2%). Pruszków County, which was ranked second, had the highest average monthly earnings gross (PLN 4,402), a high percentage of pre-school children

Table 1. Basic characteristics of the diagnostic variables included in analysis

| Variable | $\overline{x}$ | $x_{\min}$ | County | $x_{\max}$ | County | $V$ (%) |
|---|---|---|---|---|---|---|
| $X_1$ | 1.56 | –74.10 | Łosice | 139.80 | Piaseczno | 3 765.84 |
| $X_2$ | 56 063.81 | 21 046.00 | Łosice | 151 374.00 | Wołomin | 51.92 |
| $X_3$ | 63.00 | –181.00 | Sokołów Podlaski | 895.00 | Wołomin | 355.43 |
| $X_4$ | 3 324.32 | 2 670.07 | Mława | 4 402.16 | Pruszków | 12.49 |
| $X_5$ | 61.95 | 40.10 | Ostrołęka | 84.20 | Piaseczno | 18.38 |
| $X_6$ | 3.84 | 2.00 | Radom, Zwoleń | 6.00 | Łosice | 22.58 |
| $X_7$ | 6.11 | 2.60 | Legionowo | 14.30 | Ciechanów | 39.78 |
| $X_8$ | 27.64 | 23.40 | Radom | 39.10 | Warsaw West | 12.95 |
| $X_9$ | 289.50 | 41.45 | Siedlce | 589.28 | Przysucha | 39.52 |
| $X_{10}$ | 5.11 | 0.00 | Gostynin, Nowy Dwór Mazowiecki, Płońsk | 61.02 | Grójec | 208.64 |
| $X_{11}$ | 16.99 | 6.60 | Warsaw West | 38.00 | Szydłowiec | 40.39 |
| $X_{12}$ | 3 437.41 | 671.30 | Lipno | 8 638.40 | Nowy Dwór Mazowiecki | 66.63 |
| $X_{13}$ | 58.69 | 8.00 | Szydłowiec | 96.10 | Kozienice | 33.81 |
| $X_{14}$ | 30.78 | 1.30 | Kozienice | 84.70 | Szydłowiec | 65.00 |
| $X_{15}$ | 123.95 | 85.00 | Kozienice, Siedlce | 249.00 | Piaseczno | 30.42 |
| $X_{16}$ | 84.71 | 52.00 | Węgrów | 265.10 | Pruszków | 41.00 |
| $X_{17}$ | 42.78 | 21.30 | Legionów | 92.10 | Łosice | 35.42 |
| $X_{18}$ | 26.28 | 0.00 | Lipsko, Przasnysz, Żuromin | 84.10 | Pruszków | 96.52 |

For variables $X_1$ ..., $X_{18}$ see chapter Materials and Methods.
Source: Own calculations based on Main Statistical Office data.

Table 2. Grouping of counties in Mazovia Voivodeship in terms of their population development

| Development | Value of synthetic variable | Counties |
|---|---|---|
| Very high | $q_i \geq 0.501$ | Wołomin, Piaseczno, Legionów, Pruszków, Mińsk Mazowiecki |
| High | $0.283 \leq q_i < 0.501$ | Warsaw West, Radom, Otwock, Grodzisk Mazowiecki, Płock, Nowy Dwór Mazowiecki, Ostrołęka |
| Average | $0.064 \leq q_i < 0.283$ | Ciechanów, Garwolin, Gostynin, Grójec, Kozienice, Maków, Mława, Nowy Dwór Mazowiecki, Ostrołęka, Ostrów Mazowiecka, Płońsk, Przasnysz, Przysucha, Pułtusk, Siedlce, Sierpc, Sochaczew, Sokołów Podlaski, Szydłowiec, Węgrów, Wyszków, Zwoleń, Żuromin, Żyrardów |
| Low | $q_i < 0.064$ | Lipsko, Łosice |

Source: Own calculations.

(81.1%) and a higher-than-average residential floor surface per 1 person (32.7 $m^2$). However, education expenditures and expenditures on culture (in PLN per 1 inhabitant) were lower than the respective averages (149 and PLN 3.89, respectively). Of the counties with the highest standard of life of their inhabitants, Lipsk County had the highest education expenditures whereas Grójec County spent the most money on culture. The counties with the lowest standard of life included: Gostynin (Ciechanów-Płock Subregion), Ostrołęka

Table 3. Grouping of counties according to the standard of life of their inhabitants

| Development | Value of synthetic variable | Counties |
|---|---|---|
| Very high | $q_i \geq 0.460$ | Piaseczno, Pruszków, Lipsko, Grodzisk Mazowiecki, Grójec, Warsaw West |
| High | $0.351 \leq q_i < 0.460$ | Legionów, Kozienice, Łosice, Garwolin, Otwock, Sokołów Podlaski, Ciechanów, Białobrzegi, Mińsk Mazowiecki, Przysucha, Sochaczew |
| Average | $0.242 \leq q_i < 0.351$ | Maków, Węgrów, Wołomin, Pułtusk, Żyrardów, Nowy Dwór Mazowiecki, Przasnysz, Ostrów Mazowiecka, Mława, Wyszków, Sierpc, Płońsk, Siedlce, Żuromin, Płock |
| Low | $q_i < 0.242$ | Gostynin, Ostrołęka, Szydłowiec, Zwoleń, Radom |

Source: Own calculations.

(Ostrołęka-Siedlce Subregion) and Szydłowiec, Zwoleń and Radom (Radom Subregion). In most cases, the values of the diagnostic variables obtained for these counties were lower than the respective averages for their voivodeships. An exception to this rule was noted for education expenditures in Gostynin County (app. PLN 317) and proportion of expenditures on public roads in the total expenditures in Gostynin and Ostrołęka (7.7 and 7.9%, respectively).

Table 4 demonstrates counties classified according to the level of their economic development. The group of highly developed counties included the following four counties, representing the Warsaw West Subregion: Warsaw West, Grodzisk, Piaseczno and Pruszków, as well as two counties from the Warsaw East Subregion: Nowy Dwór Mazowiecki and Legionów. The most developed Warsaw West County had the lowest unemployment rate (6.6%), a large number of economic entities (app. 200) and high expenditures on investment per 1 inhabitant (PLN 7,686). The least economically developed counties included: Przysucha, Lipsko, Zwoleń and Radom Counties, located in the Radom Subregion, Maków County – in the Ostrołęka-Siedlce Subregion and Sierpc County – in the Ciechanów-Płock Subregion. The unemployment rate in these counties was much higher than the average for the voivodeship and the values of most diagnostic variables were lower than the average with an exception of expenditures on industry and construction, which was higher than the average in the following counties: Przysucha, Lipsko, Sierpc and Zwoleń.

Table 4. Grouping of counties according to the economic potential

| Development | Value of synthetic variable | Counties |
|---|---|---|
| Very high | $q_i \geq 0.557$ | Warsaw West, Grodzisk Mazowiecki, Piaseczno, Nowy Dwór Mazowiecki, Pruszków, Legionowo |
| High | $0.436 \leq q_i < 0.557$ | Otwock, Ciechanów, Mława, Grójec, Wołomin, Sochaczew, Sokołów Podlaski, Wyszków, Kozienice, Żyrardów, Mińsk Mazowiecki |
| Average | $0.316 \leq q_i < 0.436$ | Siedlce, Garwolin, Ostrów Mazowiecka, Łosice, Płońsk, Płock, Białobrzegi, Węgrów, Gostynin, Przasnysz, Ostrołęka, Żuromin, Pułtusk, Szydłowiec |
| Low | $q_i < 0.316$ | Przysucha, Lipsko, Maków Mazowiecki, Sierpc, Zwoleń, Radom |

Source: Own calculations.

Technical infrastructure was the most developed in the following counties representing either the Warsaw East Subregion or the Warsaw West Subregion: Pruszków, Wołomin, Otwock, Grodzisk and Warsaw West County. A low level of infrastructure development was found in Lipsko, Przysucha, Zwoleń (Radom Subregion), Płock (Ciechanów-Płock Subregion) and Sokołów Podlaski and Przasnysz (Ostrołęka-Siedlce Subregion) – Table 5. Pruszków County, which stands out against the remaining most developed counties, had the most developed technical infrastructure as the length of its local public roads per 100 km$^2$ paved road (265 km) and percentage of inhabitants with an access to gas (84%) were the highest. Values of the variables reflecting the development of technical infrastructure for Group 4 counties were much lower than the averages for the voivodeship.

Table 5. Grouping of counties according to the technical infrastructure

| Development | Value of synthetic variable | Counties |
|---|---|---|
| Very high | $q_i \geq 0.410$ | Pruszków, Wołomin, Otwock, Grodzisk Mazowiecki, Warsaw West |
| High | $0.259 \leq q_i < 0.410$ | Piaseczno, Żyrardów, Grójec, Płońsk, Łosice, Kozienice, Legionowo, Mława, Białobrzegi, Garwolin, Szydłowiec |
| Average | $0.107 \leq q_i < 0.259$ | Mińsk Mazowiecki, Ciechanów, Wyszków, Gostynin, Ostrów Mazowiecka, Żuromin, Radom, Sierpc, Węgrów, Nowy Dwór Mazowiecki, Pułtusk, Maków Mazowiecki, Sochaczew, Siedlce, Ostrołęka |
| Low | $q_i < 0.107$ | Lipsko, Przysucha, Płock, Zwoleń, Sokołów Podlaski, Przasnysz |

Source: Own calculations.

Key regional policy documents are drawn up at the national level. Such documents, e.g. the National Development Strategy 2007–2015 and the National Strategic Reference Framework 2007–2013, adopted in support of economic growth and jobs, put emphasis on differences in socio-economic development between the regions of a country. In Poland, disparities in the level of this development have been analysed by many authors [Gralak 2005, Iwańska and Bieńkowska 2010, Pomianek 2010, Bal-Domańska and Wilk 2011, Chrzanowska et al. 2013]. They usually applied multidimensional methods based mainly on linear ordering [Pomianek 2010, Adamowicz and Janulewicz 2012, Sampolska-Rzechuła 2013], cluster analysis [Migała-Warchoł 2012] or factorial analysis [Malina and Malina 2005].

The study discussed here, based on 37 Mazovia Voivodeship counties, demonstrated that the region is highly diverse in terms of population development, standard of life of the inhabitants, technical infrastructure and economic development. Population development can be described by a set of characteristics such as: birth rate, permanent migration rate of working age inhabitants per 10,000 working age persons, number of working-age persons. According to Murkowski [2012], the latter trait reflects labour resources which a territorial division unit has, and directly influences the unemployment rate. A high level of social and economic development was observed in counties with a high birth rate. Similar finding were reported by Jaworska and Luty [2009].

Of the analysed factors, education expenditures have been gaining importance as they condition completion of tasks set out by the Lisbon Strategy [Kompa 2009]. The present work has revealed that this variable does not directly affect the county's level of socio--economic development as exemplified by Przysucha County which, despite the highest education expenditures, was ranked almost the last. Social and economic development is directly linked to infrastructure development which defines regions' attractiveness for investment and stimulates further development. It was confirmed in the study discussed here that all the counties with a highly developed infrastructure were also highly developed in socio-economic terms. The work demonstrated that the following counties had the highest level of social and economic development: Piaseczno, Pruszków, Warsaw West, Grodzisk Mazowiecki, Wołomin, Legionów, Grójec and Otwock. The Mazovian Centre for Regional Surveys [2012] carried out a study to group counties of Mazovia Voivodeship and its neighbours into clusters characterised by a similar economic potential. The following counties were found to form one cluster of highly developed administrative units: Legionów, Grodzisk Mazowiecki, Piaseczno, Pruszków and Warsaw West. They had the highest birth rate, the highest average monthly earnings gross and a high positive migration rate. The unemployment rate for these counties was 1.8%. Moreover, the study revealed that peripheral areas of the Radom Subregion and Ostrołęka-Siedlce Subregion were the least developed because they were classified as belonging to Group 5 characterised by the least advantageous socio-economic situation, a negative birth rate (determined for this group only), a relatively high unemployment rate and a high percentage of the long-term unemployed.

## RESULTS

Social and economic development is fostered by a number of factors and is multi--sided in character. As a result, examination of this type of development often makes use of methods of multidimensional comparative analysis, especially taxonomic methods which seem to be particularly well suited. Taxonomic methods enable comparisons of a set of multi-trait objects in terms of a synthetic criterion which is a function of these traits [Kola-Bezka 2012].

The multidimensional analysis of the demographic potential of the counties ranked Wołomin, Piaseczno, Legionów, Pruszków and Mińsk Mazowiecki in the top place, Lipsk and Łosice in the last place. The standard of life was the highest in Piaseczno, Grójec, Pruszków, Grodzisk and Warsaw West, the lowest – in Płock, Gostynin, Ostrołęka, Szydłowiec, Zwoleń and Radom. The highest values of the synthetic variable reflecting the economic aspect were obtained for the Warsaw West and Warsaw East subregions. They were the lowest for the Radom Subregion. The leaders of technical infrastructure development were as follow: Pruszków, Wołomin, Otwock, Grodzisk and Warsaw West County.

The socio-economic situation of Mazovia is good compared with the rest of the country due to the effect of the capital city. However, the actual situation of the Mazovia Voivodeship seems to be blurred [Bombik and Marciniuk-Kluska 2010] as the counties located in the immediate neighbourhood of Warsaw remain in sharp contrast to the poorly

developed counties situated on the edge of the Voivodeship. This indicates that the social and economic development of Mazovia Voivodeship counties is influenced by their geographical location defined as the distance of a county from the Warsaw agglomeration. According to Iwańska and Bieńkowska [2010] as well as Pomianek [2010], cities, which are main economic centres, determine the local development of the counties located in their neighbourhood. Substantial disparities among counties in Mazovia Voivodeship substantiate an occurrence of spatial polarisation processes which make the development differences between wealthy and poor areas even worse [Bański and Czapiewski 2008]. Counties located in the proximity of the Warsaw agglomeration make use of their potential and economic situation and reach a high level of social and economic development. By contrast, more distant counties situated on the edge of the voivodeship stagnate despite the supportive national economic policy and the European Union cohesion policy.

Multidimensional comparative analysis, which takes into account many factors affecting development, may be a useful method helping to assess the effectiveness of the tools used to manage a region. Reduction of disparities between counties is a measure of efficiency of actions undertaken by local authorities. In contrast, strengthening or increasing disparities within a region are indicative of inefficiency of the management in the region.

## REFERENCES

Adamowicz M., Janulewicz P., 2012. Wykorzystanie metod wielowymiarowych w określeniu pozycji konkurencyjnej gminy na przykładzie województwa lubelskiego. [The use of multi-dimensional methods in defining the competitive position of the community on the example of Lubelskie Voivodeship]. Quantitative Methods in Economics XIII/1, 17–28.

Analiza potencjału ekonomicznego powiatów województwa mazowieckiego i powiatów województw sąsiadujących. [Analysis of economic potential of Mazovia Voivodeship counties and counties of the adjacent voivodeships]. Mazowiecki Ośrodek Badań Regionalnych (Mazovian Centre for Regional Surveys), Warsaw 2012.

Bal-Domańska B., Wilk J., 2011. Gospodarcze aspekty zrównoważonego rozwoju województw – wielowymiarowa analiza porównawcza. [Economic aspects of sustainable development in Polish Voivodeships – multivariate data analysis]. Statistical Review 3–4, 200–322.

Bański J., Czapiewski K.Ł., 2008. Ekspertyza. Identyfikacja i ocena czynników sukcesu społeczno-gospodarczego na obszarach wiejskich. [Expert opinion. Identification and assessment of factors behind social and economic success in rural areas]. Instytut Geografii i Przestrzennego Zagospodarowania. Polish Academy of Sciences (PAN), Warsaw.

Bombik A., Marciniuk-Kluska A., 2010. Wskaźniki w modelowaniu zrównoważonego rozwoju obszarów wiejskich. [Indicators in sustainable rural areas development modelling]. Acta. Sci. Pol. Oeconomia 9(1), 29–37.

Broszkiewicz R. (Ed.), 1999. Konkurencyjność miast i regionów Polski południowo-zachodniej. [Competitiveness of towns and regions in south-western Poland]. Papers of WUE 821, Wrocław.

Chrzanowska M., Drejerska N., Pomianek I., 2013. An attempt to determine the functional area of Warsaw with the use of the measure of relative development level and Hellwig's measure. Acta Sci. Pol. Oeconomia 12(1), 5–15.

Churski P., 2008. Czynniki rozwoju regionalnego i polityka regionalna w Polsce w okresie integracji europejskiej. [Factors behind regional development and regional policy during

the European integration period]. Publishing House of Adam Mickiewicz University, Poznań.

Dolata M., 2009. Wewnętrzne zróżnicowanie poziomu rozwoju gospodarczego województwa wielkopolskiego. [Internal diversity of the level of economic development of Wielkopolskie Voivodeship]. In: T. Czyż (Ed.) Charakter regionalny województwa wielkopolskiego. [Regional nature of Wielkopolskie Voivodeship]. Bulletin of the AMU Institute of Socio-Economic Geography and Spatial Management, Regional Development and Regional Policy Series 9, 63–76.

Gaczek W.M., 2000. Zróżnicowanie wewnętrzne Wielkopolski. Możliwości i potrzeba wyrównywania różnic rozwoju społeczno-gospodarczego. [Internal diversity of Greater Poland. Possibilities and need to level the differences in socio-economic development]. In: S. Ciok, D. Ilnicki (Eds) Przekształcenia regionalnych struktur funkcjonalno-przestrzennych. [Transformations of regional functional and spatial structures]. IV. Institute of Geography, Wrocław University, Wrocław, 103–112.

Gorzelak G., 2002. Polskie regiony w procesie integracji europejskiej. [Polish regions in the European integration process]. Studia Regionalne i Lokalne 9(2–3), 55–73.

Gralak A., 2005. Poziom konkurencyjności wschodnich regionów Polski na tle zróżnicowań międzyregionalnych. [Competitiveness level of Polish eastern regions against the background of international diversity]. Acta Sci. Pol. Oeconomia 4(1), 71–83.

Grosse T.G., 2004. Polityka regionalna Unii Europejskiej. Przykład Grecji, Włoch, Irlandii i Polski. [European Union regional policy. A case study of Greece, Italy, Ireland and Poland]. Institute of Public Affairs (ISP), Warsaw.

Henley A., 2005. On regional growth convergence in Great Britain. Regional Studies 39(9) 1245––1260.

Hryniewicz J., 2000. Endo- i egzogenne czynniki rozwoju gospodarczego gmin i regionów. [Endogenous and exogenous factors behind economic growth of communes and regions]. Studia Regionalne i Lokalne 2(2), 53–77.

Hydzik P., 2012. Zastosowanie metod taksonomicznych do oceny poziomu rozwoju społeczno-ekonomicznego powiatów województwa podkarpackiego. [Application of taxonomic methods to assess the level of social and economic growth of Podkarpackie Voivodeship counties]. Zesz. Nauk. Politechniki Rzeszowskiej, Ekonomia i Nauki Humanistyczne 286(19), 17–31.

Iwańska M., Bieńkowska W., 2010. Zróżnicowanie wskaźnika przedsiębiorczości w gminach wiejskich województwa mazowieckiego w układzie przestrzennym. [Spatial diversification of entrepreneurship indication values for Mazovia Voivodeship rural communes]. Acta. Sci. Pol. Oeconomia 9(3), 119–127.

Jaworska M., Luty L., 2009. Ocena rozwoju społeczno-gospodarczego powiatów województwa małopolskiego. [Social-economic development estimation of Małopolskie Voivodeship's poviats]. Acta Sci. Pol. Oeconomia 8(3), 37–44.

Kamińska A., Janulewicz P., 2009. Klasyfikacja gmin wiejskich woj. lubelskiego na podstawie rozwoju społeczno-gospodarczego. [The Lubelskie Voivodship rural local communities classification according to their social and economic development level]. Folia Pomer. Univ. Technol. Stetin., Oeconomica 275(57), 31–42.

Kamińska A., Janulewicz P., 2009. Klasyfikacja gmin wiejskich województwa lubelskiego na podstawie rozwoju społeczno-gospodarczego. [Classification of Lublin Voivodeship rural communes according to the level of their social and economic development]. Folia Pomer. Univ. Technol. Stetin., Oeconomica 275(57), 31–42.

Kola-Bezka M., 2012. Wielowymiarowa analiza porównawcza jako narzędzie zarządzania regionem na przykładzie województwa kujawsko-pomorskiego. [Multidimensional compartive analysis as a region management tool – a case study of Kujawsko-Pomorskie Voivodeship]. Studia i Materiały. Miscellanea Oeconomicae 16(2), 51–64.

Kołodziejczyk D., 2012. Polityka przestrzenna w rozwoju wiejskich obszarów peryferyjnych na przykładzie województwa mazowieckiego. [Spatial policy in the development of peripheral rural areas – a case study of Mazovian Voivodeship]. Rocz. Nauk. SERiA XIV(3),187–192.

Kompa K., 2009. Budowa mierników agregatowych do oceny poziomu społeczno-gospodarczego. [Construction of the aggregated indicators for the socio-economic development level evaluation]. Ekonomika i Organizacja Gospodarki Żywnościowej 74, 5–26.

Kudełko J., 2002. Poziom rozwoju gospodarczego województwa podkarpackiego na tle kraju w świetle Produktu Krajowego Brutto w 1998 roku. [Level of Podkarpackie Voivodeship economic development versus Poland as a whole in terms of Gross National Product in 1998]. In: Problemy transformacji struktur regionalnych i konkurencyjności regionów w procesie integracji europejskiej. [Problems of regional structure transformation and region competitiveness in the process of European integration]. Eds. A. Klasik, Z. Zioło. Publishing House of the University of Information Technology and Management, Rzeszów, 133−134.

Kukuła K., 2000. Metoda unitaryzacji zerowanej. [Zero unitarisation method]. Polish Scientific Publishers (PWN), Warsaw.

Kukuła K., 2012. Propozycja budowy rankingu obiektów z wykorzystaniem cech ilościowych oraz jakościowych. [Proposal of object ranking construction on the basis of quantitative and qualitative variables]. Quantitative Methods in Economics XIII/1, 5–16.

Kupiec L., 1995. Rozwój społeczno-gospodarczy. [Social and economic development]. Publishing House of Białystok Branch of Warsaw University, Warsaw.

Łaźniewska E., Górecki T., 2012. Analiza konwergencji podregionów za pomocą łańcuchów Markowa. [Convergence analysis of subregions by means of Markov chains]. Statistical News 5, 1–9.

Malaga K., Kliber P., 2007. Konwergencja i nierówności regionalne w Polsce w świetle neoklasycznych modeli wzrostu. [Convergence and regional inequalities in Poland in the light of neoclassical growth models.] Publishing House of Poznań University of Economics, Poznań.

Malina A., Malina P., 2005. Determinanty rozwoju regionalnego Polski. [Determinants of regional development of Poland]. Statistical News 10, 68–79.

Michałek J.J., 2007. Polska w Unii Europejskiej. Dynamika konwergencji ekonomicznej. [Poland in the European Union. Dynamics of economic convergence]. Polish Scientific Publishers (PWN), Warsaw.

Migała-Warchoł A., 2012. Wykorzystanie analizy skupień do klasyfikacji powiatów województwa podkarpackiego według wybranych wskaźników rozwoju społeczno-gospodarczego. [The usage of cluster analysis to classification of districts of Podkarpackie Voivodeship according to selected socio-economic development indicators]. Quantitative Methods in Economics XII/2, 249–258.

Murkowski R., 2012. Obciążenie demograficzne w Polsce. [Demographic dependency ratio in Poland]. Statistical News 5, 9–26.

Parysek J.J., 2001. Podstawy gospodarki lokalnej. [Rudiments of local economy]. UAM Press, Poznań.

Parysek J.J., 2008. Polityka regionalna i planowanie regionalne w Polsce. [Regional policy and regional planning in Poland]. In: T. Stryjakiewicz, T. Czyż (Eds) O nowy kształt badań regionalnych w geografii i gospodarce przestrzennej. [Towards a new form of regional studies in geography and spatial planning]. Bulletin of the Committee for Spatial Economy and Regional Planning, Polish Academy of Sciences (PAN) 237, 9–35.

Parysek J.J., Stryjakiewicz T. (Eds), 2003. Region społeczno-ekonomiczny i rozwój regionalny. [The socio-economic region and regional development]. Bogucki Publishing House, Poznań.

Pomianek I., 2010. Poziom rozwoju społeczno-gospodarczego obszarów wiejskich województwa warmińsko-mazurskiego. [Socio-economic development level of rural areas of Warmia and Mazury province]. Acta Sci. Pol. Oeconomia 9(3), 227–239.
Przeglądy terytorialne OECD, 2008. Poland, Ministerstwo Rozwoju Regionalnego OECD, 40–45.
Royuela V., Artis M., 2006. Convergence analysis in terms of quality of life in the urban system of Barcelona Province, 1991–2000. Regional Studies 40(5), 485–492.
Sampolska-Rzechuła A., 2013. Zastosowanie miar pozycyjnych do porządkowania liniowego województw Polski ze względu na poziom jakości życia. [The use of positional measures in linear ordering of Voivodeships in Poland in terms of quality of life]. Statistical Review 4, 523–538.
Sokołowicz M., 2008. W kierunku nowej polityki regionalnej? Rozważania nad przyszłym kształtem polityki regionalnej w Polsce. [Towards a new regional policy? Deliberations on the future form of regional policy in Poland]. In: Polityka spójności – ocena i wyzwania. [Cohesion policy – evaluation and challenges]. Conference proceedings of the Ministry of Regional Development, Warsaw, 7–22.
Strahl D., 2000. Możliwości wykorzystania miar agregatowych do oceny konkurencyjności regionów. [Possibilities of using aggregated measures to evaluate region competitiveness]. In: Papers of WUE 860, Local Economy in Theory and Practice, Wrocław.
Strahl D., 2003. Wykorzystanie metod klasyfikacji do identyfikacji poziomu rozwoju regionalnego. [Use of classification methods to identify the level of regional development]. In: Gospodarka lokalna w teorii i praktyce. [The theory and practice of local economy]. Ed. D. Strahl. Wrocław University of Economics in Wrocław, Wrocław.
Strahl D. (Ed.) 1998. Taksonomia struktur w badaniach regionalnych. [Taxonomy of structures in regional studies]. Papers of WUE, Wrocław.
Strahl D. (Ed.), 2006. Metody oceny rozwoju regionalnego. [Methods of regional development evaluation]. WUE Press in Wrocław, Wrocław.
Szlachta J., Woźniak J. (Eds), 2007. Rozwój regionalny Polski w warunkach reformy europejskiej polityki spójności w latach 2007–2013. [Regional development of Poland under conditions of European reform in 2007-2013]. Bulletin of the Committee for Spatial Economy and Regional Planning, Polish Academy of Sciences (PAN), Warsaw.
Wojewódzka-Wiewiórska A., 2013. Typologia gmin województwa mazowieckiego ze względu na absorpcję środków z budżetu unii europejskiej i poziom rozwoju społeczno-ekonomicznego. [Typology of Mazovia Voivodeship communities according to the level of absorption of European Union budget means and the level of social and economic development]. Rocz. Ekonomii Rolnictwa i Rozwoju Obszarów Wiejskich 100 (2), 15–24.
Wójcik, P., 2008. Dywergencja czy konwergencja: dynamika rozwoju polskich regionów. [Divergence or convergence: development dynamics of Polish regions]. Studia Regionalne i Lokalne 32(2), 41–60.

## WIELOWYMIAROWA ANALIZA SPOŁECZNO-EKONOMICZNEGO ROZWOJU WYBRANYCH GMIN W WOJEWÓDZTWIE MAZOWIECKIM

**Streszczenie.** W pracy przedstawiono zastosowanie metody sum standaryzowanych do oceny rozwoju społeczno-gospodarczego powiatów województwa mazowieckiego. Badaniem objęto 37 powiatów należących do pięciu podregionów: ciechanowsko-płockiego, ostrołęcko-siedleckiego, radomskiego, warszawskiego wschodniego i warszawskiego zachodniego. W pierwszym etapie dokonano oceny rozwoju powiatów pod względem: rozwoju społeczno-gospodarczego, infrastruktury i poziomu życia mieszkańców. Następnie przeanalizowano rozwój powiatów z uwzględnieniem wszystkich obszarów. Badania wy-

kazały, że między powiatami występują dość znaczące dysproporcje w rozwoju społeczno-gospodarczym. Powiaty leżące blisko aglomeracji warszawskiej osiągają wysoki stopień rozwoju społeczno-gospodarczego, zaś powiaty ościenne, leżące na granicy województwa, charakteryzują się niskim poziomem rozwoju we wszystkich badanych obszarach.

**Słowa kluczowe:** województwo mazowieckie, powiat, metoda wielowymiarowa, unitaryzacja zerowana

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