

ЕКОНОМІКА ТА УПРАВЛІННЯ НАЦІОНАЛЬНИМ ГОСПОДАРСТВОМ

UDC 352.07:33.012.334(438)]311.314

УДК 352.07:33.012.334(438)]311.314

P. Dziekański, Doctor of Economics

П. Дзієканські, д. е. н.

**THE GRAVITATIONAL EFFECT
AND THE SPATIAL DIVERSIFICATION
OF THE COMPETITIVENESS
OF THE COMMUNES
OF THE ŚWIĘTOKRZYSKIE VOIVODESHIP****ГРАВІТАЦІЙНИЙ ЕФЕКТ
І ПРОСТОРОВА ДИВЕРСИФІКАЦІЯ
КОНКУРЕНТОСПРОМОЖНОСТІ КОМУН
СВЕНТОКШИСЬКОГО ВОЄВОДСТВА**

Urgency of the research. The commune's tasks can be divided into such categories as technical infrastructure, social infrastructure, public order and security, spatial order and ecological order.

Target setting. Competitiveness assessment should be focused on the use of endogenous potential. Variables should be chosen so as to describe the phenomenon studied in a comprehensive manner.

Actual scientific researches and issues analysis. The scientific work of P. Dziekański, K. Kuciński, Z. Szymła, T. Markowski, J. J. Parysek, R. Brol indicate the competitiveness of local self-government and the measures to evaluate it.

Uninvestigated parts of general matters defining. The competitiveness of the region is the result of the resources possessed and their deployment as well as the current development. It also means an advantage over other regions due to its material resources and intellectual potential.

The research objective. The aim of the article is a statistical analysis of the impact of the so-called gravitational effect on the development of competitive potential. The analyzes were carried out in the system of 102 communes of the Świętokrzyskie Province.

The statement of basic materials. The value of the synthetic measure (according to the model-free method) in 2008 was in the range from 0.30 to 0.57, and in 2015 from 0.30 to 0.59, respectively. The measure of competitiveness is based on the distance in real space with the Euclidean metric being within the range from 0.52 to 0.79 and in 2015 from 0.51 to 0.78. Kielce, Busko-Zdrój, Morawica and Sitkówka-Nowiny were very high.

Conclusions. The indicated method provides information about the category of objects considered. The value of the measure depends on the economic nature of the region, as well as on financial autonomy, own income level, local taxes or infrastructure. Meters obtained depend on the number and type of accepted variables to be tested.

Keywords: gravitational effect; competitiveness; synthetic measure; municipalities; Świętokrzyskie province.

DOI: 10.25140/2410-9576-2019-1(17)-33-40

Urgency of the research. The commune is a community of local residents of a specific territory. It performs functions aimed at satisfying the needs of residents [1, p. 11]. The municipality's tasks can be divided into certain categories: technical infrastructure, social infrastructure, public order and security, spatial and ecological order. The location of municipalities in a given space determines the search for endogenous determinants shaping the processes of raising competitiveness. Proper use of re-

Актуальність теми дослідження. Завдання комуни можна розділити на категорії: технічна інфраструктура, соціальна інфраструктура, громадський порядок і безпека, просторовий порядок і екологічний порядок.

Постановка проблеми. Оцінка конкурентоспроможності має бути зосереджена на використанні ендегенного потенціалу. Змінні слід вибирати таким чином, щоб описати вивчене явище комплексно.

Аналіз останніх досліджень і публікацій. Наукова робота П. Дзієканського, К. Куцінського, З. Шимли, Т. Марковського, Дж. Дж. Парисек, Р. Брол вказують на конкурентоспроможність місцевого самоврядування та заходи щодо його оцінки.

Виділення недосліджених частин загальної проблеми. Конкурентоспроможність регіону є результатом використання ресурсів та їхнього розгортання, а також поточного розвитку. Це також означає перевагу над іншими регіонами завдяки своїм матеріальним ресурсам та інтелектуальному потенціалу.

Постановка завдання. Метою статті є статистичний аналіз впливу так званого гравітаційного впливу на розвиток конкурентного потенціалу. Аналіз проводиться в системі 102 комуни Свентокшиського воєводства.

Виклад основного матеріалу. Значення синтетичного показника (за методом без моделі) у 2008 році знаходилося в діапазоні від 0,30 до 0,57, а в 2015 році - від 0,30 до 0,59 відповідно. Міра конкурентоспроможності ґрунтується на відстані в реальному просторі з евклідовою метрикою в межах від 0,52 до 0,79, а в 2015 році з 0,51 до 0,78. Кельце, Буско-Здруй, Моравіца і Сітківка-Новини були дуже високі.

Висновки. Зазначений спосіб надає інформацію про розглянутий категорії об'єктів. Значення цього заходу залежить від економічної природи регіону, а також від фінансової автономії, рівня власних доходів, місцевих податків або інфраструктури. Отримані лічильники залежать від кількості та типу прийнятих змінних, що підлягають перевірці.

Ключові слова: гравітаційний ефект; конкурентоспроможність; синтетичний захід; муніципалітети; Свентокшиське воєводство.

ЕКОНОМІКА ТА УПРАВЛІННЯ НАЦІОНАЛЬНИМ ГОСПОДАРСТВОМ

sources can be a lever for competitive advantage over other units. The potential of municipalities is assessed in the context of four components: economic, social, technical and ecological [2].

Local economic development or competitiveness should be stimulated by local government, because it can meet important local needs. These divisions create new values to which - in the scale of the local economy - one should include: new types of economic, social, administrative and service activities, new companies and institutions, new jobs, attractive location offers, high quality of life, availability of various services [4]. Due to competitiveness, location and settlement network, as well as measurable benefits (eg. infrastructure) resulting from the location of a given unit in space (the so-called rent position) are particularly important [3]. An important factor in the development or strengthening of competitiveness is the so-called economic base of individual units (endogenous resources of the unit, eg. own income, infrastructure capital or human capital) [6].

Target setting. K. Kuciński defines the competitiveness of the region as a resultant of the resources possessed and their deployment as well as the current development [8]. According to Z. Szymel, the competitiveness of the regions may mean an advantage over other regions due to their material resources as well as intellectual potential [9]. T. Markowski defines the competitiveness of the regions in the subjective and objective sense. It is the ability of regions to meet the needs and demand for services and goods from local markets. Competitiveness of regions in the subjective sense may be manifested in relations between public authorities and municipal and regional authorities [10].

J.J. Parysek as the factors of local development (competitiveness) provides, inter alia, the needs of the local community, available resources and values of the natural environment, economic, scientific and technical potential [6]. R. Brol divides these factors into endogenous (demographic resources, infrastructure and economy), exogenous (referring to macroenvironment). The factors affecting the competitiveness of regions are: the level of equipping them with infrastructure, human capital, scientific research and technological progress, as well as interest of foreign capital [11, p. 16]. However, it should be accepted that all factors of the region's competitiveness fall into the category of regional development factors, but not every one of them is a factor of competitiveness.

The use of the indicated variables to describe the level of the studied phenomenon depends on their availability at the municipal level, which affects the final level of the measure. Variables should be chosen so as to describe the phenomenon studied in a comprehensive manner.

The assessment of the competitiveness of communes depends on system solutions enabling independence in undertaking activities, financial resources, the natural environment, infrastructure, entrepreneurship, etc. The complexity of phenomena is increasing, their uncertainty increases, which results in the increasing dependence of decisions on the quality of information. Measuring competitiveness can be a tool to strengthen the accountability and transparency of local authorities. It narrows the view to the resources used and the processes implemented [5]. The assessment of the commune's competitiveness, due to the variety of undertakings that shape it, can be made using various tools, i.e. one-dimensional or aggregate measures. It should also provide the local authorities with information on the use of public resources or the possibility of making operational or investment decisions. Information on the status of the commune, resources and their use is essential for both diagnosis and its strategic operation [7].

Actual scientific researches and issues analysis. A wide spectrum of social, economic and spatial phenomena and processes contribute to the activities of municipalities. Analyzes conducted by Churski and co-authors (2013) [13], Rosner (2007) [14] and Stanna (2013) [15] show that local finance is the most important factor for development (competitiveness). As Dziekański (2017, 2018) points out in his analyzes, economic variables, infrastructure, and natural environment are also important [16, p. 79-91] [17].

Scientific works of P. Dziekański, K. Kuciński, Z. Szymła, T. Markowski, J.J. Parysek, R. Brol, A. Klasik, F. Kuźnik indicate the competitiveness of local self-government. They refer to the internal and external characteristics.

Uninvestigated parts of general matters defining. The constant growth of public tasks at the level of the commune, with limited resources, caused interest in the efficiency of using public finances. Local self-governments should strive for financial efficiency. The lack of budgetary mechanisms binding public spending on their effects is often one of the main weaknesses in public finances. Therefore,

ЕКОНОМІКА ТА УПРАВЛІННЯ НАЦІОНАЛЬНИМ ГОСПОДАРСТВОМ

efforts are desirable to measure the effects of public tasks and to construct their records, which are often immaterial [12].

Competitiveness of regions is their ability to compete on a national and international scale. It is the ability to adapt to ever-changing conditions, considered in terms of maintaining or improving competitive position between regions. It is determined by factors that can be classified as spatial, economic, social and organizational [18, p. 52].

Building the region's competitiveness requires stimulation of its various determinants (environmental, social, economic, and infrastructural). The region's competitive advantage is not determined by individual resources, but by the region's ability to set up various tangible and intangible assets. Therefore, the region's competitiveness depends to a large extent on its institutional and organizational capacity [19, p. 91].

The research objective. The aim of the article is a statistical analysis of the impact of the so-called gravitational effect on the development of competitive potential. The analyzes were carried out in the system of 102 communes of the Świętokrzyskie Province. As the source material, data from the Local Data Base of the Central Statistical Office for the years 2008-2015 were used. The initial set of statistical variables proposed in the analysis of the area of the Świętokrzyskie Voivodeship includes features defining their internal demographic, economic and socio-technical (infrastructure), financial and natural environment potential.

The assessment of the spatial diversity of communes began with the determination of the substantive, territorial and temporal scope. The selected variables, based on statistical criteria or data availability, are stimulant and destimulant [20, p. 22; 21]. The variables were eliminated from the study due to the variability index and overly correlated (according to the inverted matrix method of correlation coefficients and diagonal value) [22, pp. 96-97]. Mutual comparability of selected variables was obtained by using the zeroed univalent method.

On the basis of normalized variables, intermediate synthetic measures in the area of finance, infrastructure, demography, economy and the comprehensive measure of competitiveness were determined. The first synthetic measure is based on a non-standard method, which takes the value from the range [0,1]. The values of the synthetic measure closer to 1 indicate a high level of the studied phenomenon, and 0 indicate a worse object [23] [16]. The measure of competitiveness is based on the distance in the real space with the Euclidean metric included in the range [0; 1]. If the value of the indicator was equal to 0, then the given commune would have the maximum value of each of the analyzed variables. A value closer to 1 indicates a poorer situation of the commune [24].

After determining the synthetic measures, they were presented on the scatterplot, which allowed to show the outliers in the studied area and allowed to assess the quality of the results [29].

The gravitational effect connecting two municipalities is directly proportional to the product of the potential of these communes and inversely proportional to the square of the geographical distance between these units. High-potential objects located close to each other interact more strongly. Individual gravitational effects between the i-th and j-th communes are described by the following equation:

$$g_{ijt} = \frac{p_{it} p_{jt}}{d_{ij}^2} \tag{1},$$

where: p_{it} , p_{jt} - value of the internal potential in the commune in the studied area, d_{ij} - the distance connecting the capital of the commune and the capital of the commune j [25].

The total gravitational effect is defined as the geometric mean of individual gravitational effects:

$$G_{it} = \sqrt[101]{\prod_{j=1}^{101} \wedge_{j \neq i} (g_{ijt})} \tag{2},$$

$$G_{it} = \frac{p_{it} \sqrt[101]{\prod_{j=1}^{101} \wedge_{j \neq i} (p_{jt})}}{d_i^2} \tag{3},$$

ЕКОНОМІКА ТА УПРАВЛІННЯ НАЦІОНАЛЬНИМ ГОСПОДАРСТВОМ

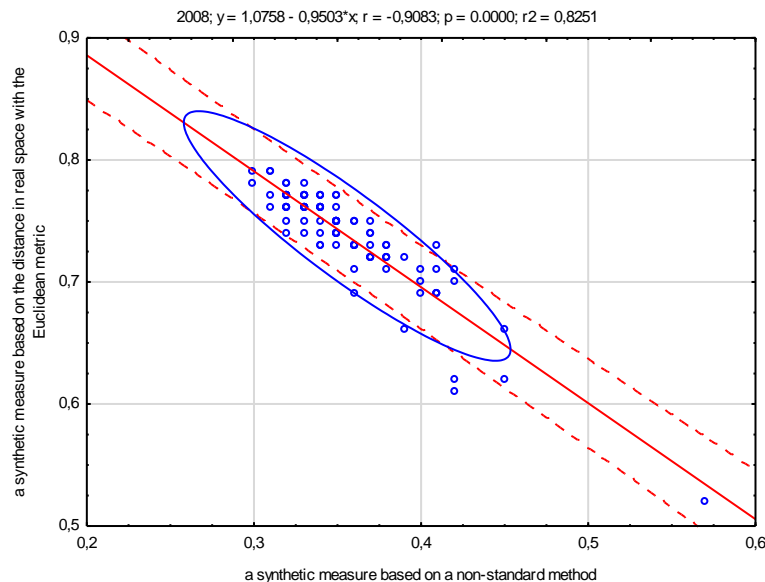
where $d_i = \sqrt[101]{\prod_{j=1 \wedge j \neq i}^{101} d_{ij}}$ is the geometric mean from the distance of the capital i-th of the commune from the capitals of the remaining communes [26; 27].

The analyzed model assumes that the strength with which the regions interact is a function of both their sectoral economic potentials and the distance between them. The gravitational effect can be both a catalyst leading to a high level of development, and (in the case of areas with poor gravity potential) can lead to even greater periphery in the level of economic development.

The statement of basic materials. Świętokrzyskie Voivodeship is an industrial and agricultural region. The main branches of industry in the Świętokrzyskie region are: metallurgical, metal, machine, building materials, ceramics, foundry, food. The economy of the Świętokrzyskie region is based on the mining industry in the field of building materials. The agricultural south provides facilities for organic food production.

The value of synthetic measure according to the model-free method in 2008 was in the range from 0.30 (Łubnice, rural commune, the weakest unit) to 0.57 (Kielce, urban commune, best unit), and in 2015 respondentially 0.30 (Iwaniska, rural commune) to 0.59 (Kielce). The measure of competitiveness is based on the distance in real space with the Euclidean metric included in the range of 0.52 (Kielce, the best unit) to 0.79 (Radków, rural commune, the weakest unit) and in 2015 from 0.51 (Kielce) to 0.78 (Łubnice). Regardless of the method of aggregation of the synthetic measure, Kielce, Busko-Zdrój, Morawica and Sitkówka-Nowiny were highly ranked. At the other end of the ranking were Łubnice, Iwaniska, and Radków. The level of the indicator is influenced by: the economic character of the unit and the function of the area (industrial, tourist, residential), economic potential, financial situation, natural environment and infrastructure (location rent).

The obtained measures of correlation (in 2008 $r = -0.908 / r^2 = 0.825$ and in 2015 $r = -0.907 / r^2 = 0.823$) indicate a similar classification of the level of communes and a small spatial diversification of competitiveness. Distinctive units are Skarżysko-Kamienna, Ostrowiec Św., Starachowice, Sandomierz, Kielce, (these are the cities of the Świętokrzyskie region with a strong industrial function) and Połaniec (a city with one of the largest thermal power plants in Poland).



ЕКОНОМІКА ТА УПРАВЛІННЯ НАЦІОНАЛЬНИМ ГОСПОДАРСТВОМ

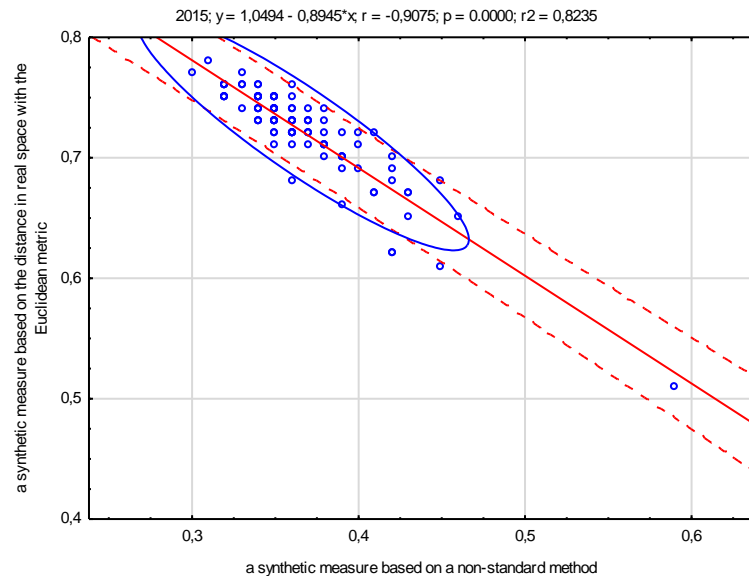
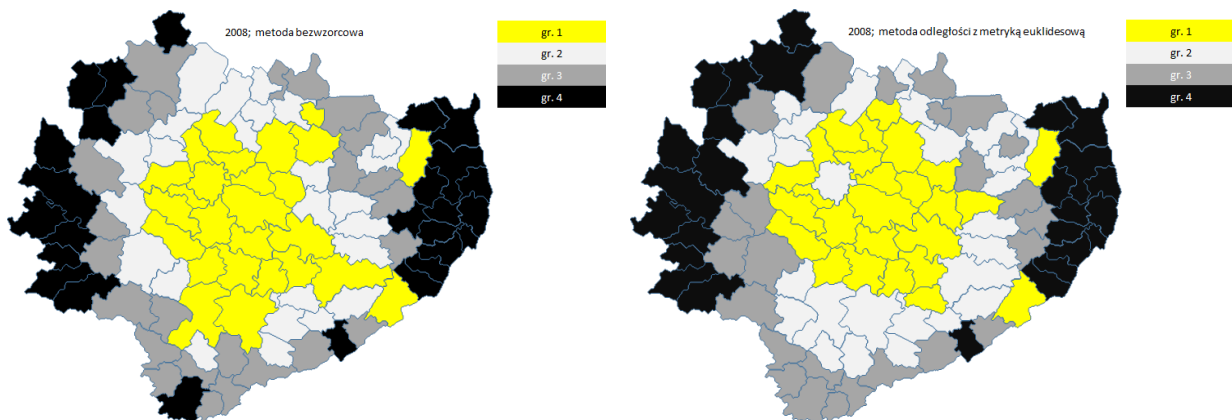


Fig. 1. Diagram of the dispersion of the measure integrated effectiveness of the communes of the Świętokrzyskie Voivodeship in 2008 and 2015

Source: own study based on CSO BDL data

The gravitational effect connecting two municipalities is directly proportional to the product of the competitive potential of these communes and inversely proportional to the square of the geographical distance between these regions. That is why municipalities with high competitive potential located close to each other more strongly interact with each other than those located far from each other. This makes it possible to evaluate between the gravitational potential and the spatial diversity of the level of competitiveness of the communes.

The obtained results of the gravitational effect are enhanced by the results obtained using a synthetic measure. The analysis allowed to divide the communes into 4 groups in 2015. The first group for the measure S_i form central communes, with the highest efficiency potential (26 units, including Kielce, Starachowice, Busko-Zdrój, Staszów, Morawica, Sitkówka-Nowiny, Szydłów; municipalities with a predominance of industrial function, their level is determined by the geographical location of the voivodeship capital). The second group is 26 units, the third - 24 units. The weakest fourth group is 26 peripheral units (including Sandomierz, Ożarów, Włoszczowa, Łoniów, Bałtów, Wilczyce, Słupia, and Dwikozy).



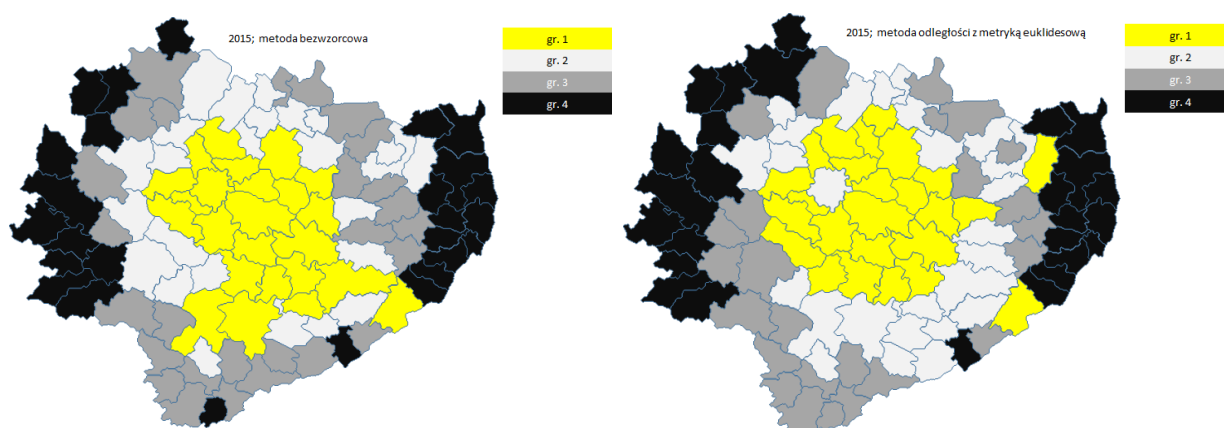
ЕКОНОМІКА ТА УПРАВЛІННЯ НАЦІОНАЛЬНИМ ГОСПОДАРСТВОМ

Fig. 2. Analysis of the gravitational effect in the area of performance evaluation for the communes of the Świętokrzyskie Voivodeship in 2008, 2015

Source: own study based on CSO BDL data

In the case of the analysis of the gravitational effect for the OEit measure, 26 units were distinguished in the first group (including Działoszyce, Chmielnik, Bodzentyn, Morawica, Zagnańsk, Sitkówka-Nowiny, spatially concentrated in the central region of the voivodeship). The units in it are of industrial, spa or tourist character. In the second group there were 25 units with an agricultural predominance. In the next third group there were 23 peripheral units with a predominance of agricultural function. In the last fourth group there were 26 peripheral units.

The reasons for differentiation result from the internal potential of individuals, geographic location (location rent) or financial resources. Interpretation of the results achieved in individual years is not clear, eg due to loans taken, EU funds raised, investments (which are settled over several years). In addition, units differ in terms of social, economic, natural and infrastructural potential [28].

Conclusions. Municipalities play a dominant role in local government in Poland, they play the role of an active owner, striving to stimulate competitiveness or local socio-economic development. The competitiveness of the region depends on the processes taking place in development centers. A comparison of the spatial distribution of competitiveness of communes indicates the increase of communes with a high level of development around the region's capital. What is characteristic of them is the effect of attracting, for example, human capital, social or economic potential.

Competitiveness of municipalities is multidimensional. It is shaped by many different elements that make up the demographic, economic aspect, finances and environment, as well as the links between these elements of the multi-dimensional space of the object.

Competitiveness assessment should be focused on the use of endogenous potential. The results of the analysis should enable the identification of peripheral areas or key activities.

The model of potential gravity indicates that there is a relationship between the occurrence of cents of regional development and the spatial distribution of the potential of the environment. A strong center is in functional interaction with its surroundings. Communes located on the outskirts have high values of destimulants (eg unemployment rate). The center can get richer at the expense of peripheral areas (eg by attracting human capital).

The indicated method provides information about the category of objects considered. It is the basis for assessing the effectiveness of the instruments used by the municipality in the past.

ЕКОНОМІКА ТА УПРАВЛІННЯ НАЦІОНАЛЬНИМ ГОСПОДАРСТВОМ**References**

1. Milczarek, T. (1999). *Samorząd gminy: status prawny, organy, kompetencje, mienie, finanse*. Warszawa: Wydawnictwo Prawno-Ekonomiczne INFOR [in Polish].
2. Skowron, S. (2012). Rola kapitału rodzimego i obcego w stymulowaniu rozwoju jednostek lokalnych w województwie lubelskim. *ZN Politechniki Rzeszowskiej*, 286, 19(3) [in Polish].
3. Ossowska, L., Poczta, W. (2009). *Endogenne uwarunkowania rozwoju społeczno – gospodarczego obszarów wiejskich Pomorza Środkowego*. Poznań: Wyd. UP w Poznaniu [in Polish].
4. Korenik, S. (2003). Expenditure of the commune as a manifestation of its independence in shaping local development. *Zeszyty Naukowe*, 15. Wrocław: Wyd. WSZiF [in Polish].
5. Jajuga, K. (1993). *Statistical multidimensional analysis*. Warszawa: Wyd. Naukowe PWN [in Polish].
6. Parysek, J.J., (2001). *Basics of the local economy*. Poznań: Wyd. Naukowe UAM [in Polish].
7. Dziekański, P. (2018) *Assessment of the effectiveness of the communes in the Świętokrzyskie Voivodeship in the light of institutional economics (multidimensional analysis)*. Kielce: UJK w Kielcach [in Polish].
8. Kuciński, K. (1997). *Competitiveness as a regional issue*. Warszawa: IFGN, Szkoła Główna Handlowa [in Polish].
9. Szymła, Z. (2000). *Determinants of regional development*, Zakład Narodowy im. Ossolińskich, Wrocław [in Polish].
10. Markowski, T. (2005). *Subjective and objective competitiveness of regions*. T. Czyż, H. Rogacki (Eds.). *Contemporary problems and theoretical concepts of spatio-economic research*, 219, 28-30 [in Polish].
11. Brol, R. (2006). Factors of regional development. D. Strahl (Eds.). *Methods for assessing regional development*. Wrocław: Wyd. Akademii Ekonomicznej [in Polish].
12. Misiąg, W. (2004). Measuring the quantity and quality of public services. *Kontrola Państwowa*, 1. [in Polish].
13. Churski, P., et al. (2013). *Growth factors for growth areas and areas of economic stagnation in Poland*. Poznań: Uniwersytet im. AM [in Polish].
14. Rosner, A., Stanny, M. (2014). *Monitoring of rural development. Etap I. Fundacja Europejski Fundusz Rozwoju Wsi Polskiej*. Warszawa: RRWiR PAN [in Polish].
15. Stanny, M. (2013). *Spatial diversification of rural development in Poland*. Warszawa: IRWiR PAN [in Polish].
16. Dziekański, P. (2016). Spatial Differentiation of the Financial Condition of the Świętokrzyskie Voivodeship Counties. *Barometr Regionalny*, 14(3), 79-91 [in English].
17. Dziekański, P. (2017). Diversification synthetic indicator for evaluating the financial capacity of local government. *The case of polish voivodeships, Acta Universitatis Agriculturae Et Silviculturae Mendelianae Brunensis*, 65 (2) [in English].
18. Klasik, A., Kuźnik, F. (2001). *Competitive development of regions in Europe. Competitiveness of cities and regions*. Z. Szymala (Eds.). Kraków [in Polish].
19. Markowski, T., Stawasz, D. (Eds.). (2001). *Economic and environmental aspects of urban and regional development management*. Łódź [in Polish].
20. Grabiński, T., Wydymus, S., Zeliaś, A. (1989). *Methods of numerical taxonomy in modeling socio-economic phenomena*. Warszawa: PWN [in Polish].
21. Zeliaś, A., Malina, A. (1997). On the construction of a taxonomic measure of the quality of life. The synthetic measure of development is a tool of statistical comparative analysis.

Література

1. Milczarek, T. (1999). *Samorząd gminy: status prawny, organy, kompetencje, mienie, finanse*. Wydawnictwo Prawno-Ekonomiczne INFOR, Warszawa [in Polish].
2. Skowron, S. (2012). Rola kapitału rodzimego i obcego w stymulowaniu rozwoju jednostek lokalnych w województwie lubelskim, *ZN Politechniki Rzeszowskiej*, nr 286, z. 19 (3) [in Polish].
3. Ossowska, L., Poczta, W., (2009). *Endogenne uwarunkowania rozwoju społeczno – gospodarczego obszarów wiejskich Pomorza Środkowego*. Wyd. UP w Poznaniu, Poznań [in Polish].
4. Korenik, S. (2003). Wydatki gminy jako przejaw jej samodzielności w kształtowaniu rozwoju lokalnego, *Zeszyty Naukowe nr 15*, Wyd. WSZiF Wrocław [in Polish].
5. Jajuga, K. (1993). *Statystyczna analiza wielowymiarowa*, Wyd. Naukowe PWN, Warszawa [in Polish].
6. Parysek, J.J., (2001). *Podstawy gospodarki lokalnej*. Wyd. Naukowe UAM, Poznań [in Polish].
7. Dziekański, P. (2018) *Ocena efektywności funkcjonowania gmin województwa świętokrzyskiego w świetle ekonomii instytucjonalnej (analiza wielowymiarowa)*, UJK w Kielcach, Kielce [in Polish].
8. Kuciński, K. (1997). *Konkurencyjność jako zagadnienie regionalne*, IFGN, Szkoła Główna Handlowa, Warszawa [in Polish].
9. Szymła, Z. (2000). *Determinanty rozwoju regionalnego*, Zakład Narodowy im. Ossolińskich, Wrocław [in Polish].
10. Markowski, T. (2005). *Przedmiotowa i podmiotowa konkurencyjność regionów*, In: T. Czyż, H. Rogacki (red.), *Współczesne problemy i koncepcje teoretyczne badań przestrzenno-ekonomicznych*, z. 219, PAN KPZK, Warszawa, s. 28-30 [in Polish].
11. Brol, R. (2006). *Czynniki rozwoju regionalnego*, In: D. Strahl (ed.) *Metody oceny rozwoju regionalnego*, Wyd. Akademii Ekonomicznej, Wrocław, s. 16 [in Polish].
12. Misiąg, W. (2004). Mierzenie ilości i jakości usług publicznych, *Kontrola Państwowa*, nr 1 specjalny, NIK, Warszawa [in Polish].
13. Churski, P., and others (2013). *Czynniki rozwoju obszarów wzrostu i obszarów stagnacji gospodarczej w Polsce*, Uniwersytet im. AM, Poznań [in Polish].
14. Rosner, A., Stanny, M. (2014). *Monitoring rozwoju obszarów wiejskich. Etap I. Fundacja Europejski Fundusz Rozwoju Wsi Polskiej*, RRWiR PAN, Warszawa [in Polish].
15. Stanny, M. (2013). *Przestrzenne zróżnicowanie rozwoju obszarów wiejskich w Polsce*, IRWiR PAN, Warszawa [in Polish].
16. Dziekański, P. (2016). Spatial Differentiation of the Financial Condition of the Świętokrzyskie Voivodeship Counties, *Barometr Regionalny*, Tom 14 nr 3, s. 79-91 [in English].
17. Dziekański, P. (2017). Diversification synthetic indicator for evaluating the financial capacity of local government. The case of polish voivodeships, *Acta Universitatis Agriculturae Et Silviculturae Mendelianae Brunensis* Volume 65 Number 2 [in English].
18. Klasik, A., Kuźnik, F. (2001). *Konkurencyjny rozwój regionów w Europie*, In: Konkurencyjność miast i regionów, ed. Z. Szymala, Kraków, s. 52 [in Polish].
19. Markowski, T., Stawasz, D. (red.). (2001). *Ekonomiczne i środowiskowe aspekty zarządzania*

ЕКОНОМІКА ТА УПРАВЛІННЯ НАЦІОНАЛЬНИМ ГОСПОДАРСТВОМ

Taksonomia, 4 [in Polish].

22. Malina, A. (2004). *Multidimensional analysis of the spatial diversity of the structure of the Polish economy by voivodships* (pp. 96-97). Kraków: Wyd. Akademii Ekonomicznej w Krakowie [in Polish].

23. Wysocki, F., Lira, J. (2005). *Descriptive statistics*. Poznań: Wyd. AR [in Polish].

24. Tokarski, T. (2005). *Statistical analysis of the regional diversification of productivity, employment and unemployment in Poland*. Warszawa; Wyd. PTE [in Polish].

25. Mroczek, K., Tokarski, T., Trojak, M. (2014). Gravitational model of diversification of economic development of voivodships. *Gospodarka Narodowa*, 3 [in Polish].

26. Filipowicz, K., Tokarski, T. (2015a). Influence of gravitational effect on spatial diversity of economic development of poviats. *Wiadomości Statystyczne*, 5 [in Polish].

27. Filipowicz, K., Tokarski, T. (2015b). Influence of the gravitational effect on spatial diversity of economic development in poviats of Eastern Poland. *Studia i Materiały Miscellanea Oeconomicae*, 4(1) [in Polish].

28. Satoła, Ł. (2013). Diversity of the use of European Union funds in the center system – periphery. *Scientific works of the University of Economics in Wrocław*, 320, 180-184 [in Polish].

29. Dziekański, P. (2017). Economic effectiveness of the activities of local self-government units in the light of the municipality financial resources. *Scientific bulletin of Polissia*, 3(11), 76-82 [in English].

rozwojem miast i regionów, Łódź, s. 91 [in Polish].

20. Grabiński, T., Wydymus, S., Zeliaś, A. (1989). *Metody taksonomii numerycznej w modelowaniu zjawisk społeczno - gospodarczych*, PWN, Warszawa, s. 22 [in Polish].

21. Zeliaś, A., Malina, A. (1997). *O budowie taksonomicznej miary jakości życia. Syntetyczna miara rozwoju jest narzędziem statystycznej analizy porównawczej*. *Taksonomia* z. 4 [in Polish].

22. Malina, A. (2004). *Wielowymiarowa analiza przestrzennego zróżnicowania struktury gospodarki Polski według województw*, Wyd. Akademii Ekonomicznej w Krakowie, Kraków s. 96-97. [in Polish].

23. Wysocki, F., Lira, J. (2005). *Statystyka opisowa*, Wyd. AR, Poznań [in Polish].

24. Tokarski, T. (2005). *Statystyczna analiza regionalnego zróżnicowania wydajności, zatrudnienia i bezrobocia w Polsce*, Wyd. PTE, Warszawa [in Polish].

25. Mroczek, K., Tokarski, T., Trojak, M. (2014). Gravitacyjny model zróżnicowania rozwoju ekonomicznego województw, *Gospodarka Narodowa* nr 3 [in Polish].

26. Filipowicz, K., Tokarski, T. (2015a). Wpływ efektu grawitacyjnego na przestrzenne zróżnicowanie rozwoju ekonomicznego powiatów. *Wiadomości Statystyczne*, nr 5 [in Polish].

27. Filipowicz, K., Tokarski, T. (2015b). Wpływ efektu grawitacyjnego na przestrzenne zróżnicowanie rozwoju ekonomicznego powiatów Polski Wschodniej. *Studia i Materiały Miscellanea Oeconomicae*, nr 4, tom I [in Polish].

28. Satoła, Ł. (2013). Zróżnicowanie wykorzystania funduszy Unii Europejskiej w układzie centrum – peryferia, *Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu*, Nr 320 s. 180-184 [in Polish].

29. Dziekański, P. (2017). Economic effectiveness of the activities of local self-government units in the light of the municipality financial resources, *Scientific bulletin of Polissia*, № 3 (11), 76-82[in English].

Received for publication 18.01.2019

Бібліографічний опис для цитування :

Dziekański, P. The gravitational effect and the spatial diversification of the competitiveness of the communes of the Świętokrzyskie voivodeship / P Dziekański // Науковий вісник Полісся. – 2019. - № 1 (17). – С. 33-40.

- Павел Дзієканський** доктор економічних наук, доцент (науковий співробітник і викладач), кафедра підприємництва та інновацій, Ян Кохановський університет;
<https://orcid.org/0000-0003-4065-0043>;
 ResearcherID: H-4658-2016;
 E-mail: pdziekan@interia.eu;
- Paweł Dziekański** Doctor of Economics, Associate professor (researcher and lecturer), Department of Entrepreneurship and Innovations, Jan Kochanowski University;
<https://orcid.org/0000-0003-4065-0043>;
 ResearcherID: H-4658-2016;
 E-mail: pdziekan@interia.eu.