Paweł Dziekański, Adrian Lipa, Urszula Karpinska. Assessment and spatial diversity of the competitiveness of communes of the Świętokrzyskie province.

The commune is the basic local government unit. It has a certain range of freedom in deciding on the path of development and property. The commune’s process of activity takes place in a space that is entirely filled by the natural and economic environment, and its specific, individual features of the economy, society and resources. The aim of the article is to analyze the spatial disproportions in the competitiveness of poviat of the Świętokrzyskie Voivodeship using a synthetic measure. As the source material, data from the Regional Accounting Chamber (Kielce branch) and Local Database of the Central Statistical Office for 2009, 2011 and 2017 were used. The competitiveness of the local economy is largely dependent on the processes taking place in the so-called development centers and the availability of endogenous resources. The center can get rich at the expense of peripheral areas (e.g. by attracting human capital). Włoszczowski, Kielecki and Buski poviats were high in the ranking. At the other end of the ranking were Pińczowski, Skarżyski, Kazimierski. The synthetic measure in 2017 ranged from 0.52 (Włoszczowski) to 0.73 (Kazimierski), in 2009 0.53 (Staszowski) to 0.79 (Kazimierski) respectively. No position stability was observed in the ranking, the level of the indicator is influenced by: the economic nature of the unit and the function of the area (industrial, tourist, residential), economic potential, financial situation, natural environment and infrastructure. Therefore, the assessment should take into account local specificities in various structural and functional conditions.

Key words: competitiveness, synthetic measure, commune, Świętokrzyskie Province.

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Наукові записки Національного університету «Острозька академія», серія «Економіка», № 15(43), грудень, 2019 р.
ОЦЕНКА И ПРОСТРАНСТВЕННОЕ МНОГООБРАЗИЕ
КОНКУРЕНТОСПОСОБНОСТИ КОММУН В СВЕНТОКШИСКОМ ВОЄВОДСТВЕ

Коммуна является основной единицей местного самоуправления. Она обладает определенной степенью свободы при выборе пути развития и собственности. Процесс деятельности коммуны происходит в пространстве, которое полностью занято природной и экономической средой и ее специфическими индивидуальными особенностями экономики, общества и ресурсов. Целью статьи является анализ пространственных диспропорций в конкурентоспособности повятов Свентокшишского воеводства с использованием синтетической меры. В качестве исходного материала использованы данные из Региональной Счетной палаты (Кельцинский филиал) и Локальной базы данных Центрального статистического управления за 2009, 2011 и 2017 гг. Конкурентоспособность местной экономики в значительной степени зависит от процессов, происходящих в так называемых центрах развития и наличие эндогенных ресурсов. Центр может разбогатеть за счет периферийных районов (например, путем привлечения человеческого капитала). Włoszczowski, Кельцкий и Буски повяты были высочайшими в рейтинге. На другом конце рейтинга были Пиньчув, Казимеж, Пазынь. Синтетический показатель в 2017 году варьировался от 0,52 (Влоцлавек) до 0,73 (Казимеж), в 2009 году – 0,53 (Сташовский) до 0,79 (Казимеж) соответственно. Стабильности позиции в рейтинге не наблюдалось, на уровень индикатора влияют: экономический характер объекта и функции района (промышленный, туристический, жилой), экономический потенциал, финансовое положение, природная среда и инфраструктура. Поэтому при оценке следует учитывать местные особенности в различных структурных и функциональных условиях.

Ключевые слова: Конкурентоспособность, синтетическая мера, коммуна, Свентокшишское воеводство

Introduction

The commune is the basic local government unit. Has a certain range of freedom in deciding on the path of development, property. It implements the scope of public tasks, in particular in the aspect of technical infrastructure, social infrastructure, protection and public security as well as spatial and ecological order. The environment and the economy form a network of interconnections in which tasks are carried out. Endogenous resources, acting for the benefit of the community, are interdependent and should be considered together. Today, communes have become the subjects of economic processes. They pursue the interests of given communities, taking into account local resources. Their actions depend on both endogenous and exogenous factors. The commune’s process of activity takes place in a space that is fully filled by the natural and economic environment, and its specific, individual features of the economy, society and resources.

Building the region’s competitiveness requires stimulating its various determinants (environmental, social and economic). The activity of these units is focused on the use of available endogenous resources, e.g. raw materials, economic, social and natural capital, finances and human resources. The competitive advantage of municipalities is not determined by the region’s ability to configure various tangible and intangible resources, as a result of which new values are created. Competitiveness (development) of communes is a complex phenomenon, difficult to clearly and objectively assess from the point of view of the examined aspect of the structure, which cannot be measured and expressed by means of one feature. The problem with assessing the operation of municipalities...
is the relatively large amount of information that creates information noise. It impedes the analyzes carried out, increases the research effort, and also makes it more difficult to make clear decisions. Support in the decision-making process can be the creation of synthetic measures with high information capacity or leaving those measures that have the greatest information value⁸.

**Aim and research method**

The aim of the article is to analyze the spatial disproportions in the competitiveness of poviat of the Świętokrzyskie Voivodeship using a synthetic measure (a synthetic measure based on distance in real space with Euclidean metrics). As the source material, data from the Regional Accounting Chamber (Kielce branch) and Local Database of the Central Statistical Office for 2009, 2011 and 2017 were used.

In order to determine the measure of synthetic competitiveness, the following procedure was used⁹:

1. The variables describing competitiveness were selected. The ones with low spatial variability and high correlation of variables were removed from the set of variables (according to the inverted matrix method)¹⁰.

2. The variables were subjected to the zero unitarisation procedure using the following formulas:

   for stimulants  
   \[ z_{ij} = \frac{x_{ij} - \min x_{ij}}{\max x_{ij} - \min x_{ij}}, \quad \text{gdy} \quad x_i \in S \]  

   \[ (1) \]

   for destimulants  
   \[ z_{ij} = \frac{\max x_{ij} - x_{ij}}{\max x_{ij} - \min x_{ij}}, \quad \text{gdy} \quad x_i \in D \]

   \[ (2) \]

   where: S-stimulant, D-destimulant; i=1, 2...n; j=1, 2...n, xij – means the value of the j-t feature for the tested unit, max – the maximum value of the j-t feature, min – the minimum value of the j-t feature¹¹.

3. A synthetic measure based on distance in real space was calculated with Euclidean metric according to the formula:

   \[ \mathcal{B}_d = \frac{1}{n^2} \sum_{i=1}^{n} \left(1 - z_{ij}\right)^2 \]

   \[ (3) \]

   where: i=1, 2...N; j=1, 2..., p (N is the number of objects (poviats), and p – number of features), zij – is the value of the j-th feature for the unit being tested¹². The synthetic measure allows measuring measured to the interval [0; 1]. A measure value of 0 means the maximum positive value of each stimulant tested¹³.

4. The studied area of rural communes in the Świętokrzyskie voivodship was divided into 4 quartile groups.

**The essence of the region’s competitiveness**

K. Kuciński defines the competitiveness of the region as a resultant of possessed resources and their distribution, development to date, conscious activities of public authorities aiming at shaping the face of the region¹⁵. T. Markowski defines the competitiveness of regions in the objective sense, indicating that it is the ability of regions to meet the needs and demand for services and goods from local and global markets. This should provide regions with a sustainable income opportunity¹⁶. In turn, A. Klasik treats the region’s competitiveness as a result of the attractiveness of the service offer, the region’s strengths, export strength, and productivity¹⁷.

The competitiveness of regions is their ability to produce sustainable growth in value added. It is based on the efficient and effective use of resources and management of economic processes in the regional economy. The
element shaping competitiveness is the use of an appropriate combination of internal and external growth factors, directed among others to shape the region’s attractiveness for foreign investors and to stimulate the creativity and aggressiveness of local investors18.

The competitiveness of regions is determined by factors that can be classified as spatial, social and organizational. All competitiveness factors of the region fall into the category of development factors of the region19. It is shaped to the greatest extent by endogenous factors, otherwise known as local opportunities and development needs (demographic resources, infrastructure and economy). The features related to access and quality of individual factors from this group are important. Exogenous (external) factors refer to changes in macro-environment, which result, among others, from changing macroeconomic conditions, system changes in the state. An important factor is also the financial resources that are essential for the optimal functioning of local governments20.

The basis of the regions’ competitiveness is the high efficiency of the local economy. It ensures that the public enjoys a high and growing standard of living and a high employment rate. Regions often do not form a compact whole, and their elements develop at different rates and with different intensities. The consequence of this is the process of flow of resources from local to central centers. On the one hand, the captain is looking for areas with a higher rate of return, lower investment risk, an efficient institutional environment and highly qualified employees. On the other hand, a qualified workforce migrates in search of employment, ensuring better conditions for development21.

The multidimensionality of the functioning of local government units is demonstrated by the directions of action and the benefits achieved in the spatial, social, economic aspects, etc. The scope and effectiveness of the influence of local authorities on local and regional development are determined by income and expenditure instruments. They can be used by local authorities depending on the division of competences and powers between government and local institutions22. These activities are usually focused around goals, among which should be distinguished long-term development, increase in income of residents and the budget, development of entrepreneurship23.

**Intra-regional diversification of the competitiveness of poviats of the Świętokrzyskie voivodship**

The Świętokrzyskie Voivodship belongs to the ecologically cleanest areas of Poland. The region has an industrial and agricultural character with a high concentration of industry sectors related to the production and processing of metals, mining and processing of mineral resources and the production of foodstuffs.

The main industries of the Świętokrzyskie region are: metallurgical (Ostrowiec Świętokrzyski), metal (Skarżysko-Kamienna), machine (Starachowice), building materials (Kielce), ceramic, foundry (Końskie), food (Pińczów, Kielce). The economy of the Świętokrzyskie region is based on the mining industry in the field of building materials (limestone, dolomite, marl, gypsum, sandstone), thanks to which the voivodship became the capital of Polish construction. The agricultural south is the base for the production of organic food (table 1)24.

| Poviats       | Characteristic                                    |
|---------------|--------------------------------------------------|
| Kielec        | Food and construction industry                   |
| Kielecki      | Mining and processing industry for mineral raw materials, food production |
| Konecki       | Foundry, construction, trade, hotel industry, transport |
| Ostrowiecki   | Iron metallurgy, trade, services                  |
| Skarżyski     | Metal industry, agriculture, trade and services, construction |
| Starachowicki | Machine and metal industry                        |
| Buski         | Agriculture (vegetables, orchards), agrotourism, spas |

Table 1.

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18 J. Chądzyński, A. Nowakowska, Z. Przygodzki, 2007, Region i jego rozwój w warunkach globalizacji, Wyd. CeDeWu, Warszawa, p. 106.
19 W. Kosiedowski, 2008, Zarządzanie rozwojem regionalnym i lokalnym [In:] Gospodarka regionalna i lokalna, red. Z. Strzelecki, PWN, Warszawa, p. 232 i n.
20 Z. Oplotnik, B. Brzoznik, 2004, Financing local government in Slovenia, Post-Communist Economies, Volume 16, Issue 4.
21 T. Kudlacz, 2001, Rozwój regionalny Polski lat 90. – ocena dominujących procesów oraz spodziewanych tendencji [In:] Polityka regionalna państwa pośród uwikłań instytucjonalno-regulacyjnych, red. Szomburg J., IBnGR, Gdańsk, p. 30; T. Markowski, 2001, Stymulowanie i regulowanie konkurencyjności w świetle procesów globalizacji gospodarki, Samorząd Terytorialny, nr 3, p. 30.
22 L. Patrzalek, 2010, Finanse samorządu terytorialnego a koncepcje rozwoju lokalnego i regionalnego, Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu 112, Finanse publiczne, p. 549-556
23 P. Dziękasiński, 2018, Ocena efektywności funkcjonowania gmin województwa świętokrzyskiego w świetle ekonomii instytucjonalnej (analiza wielowymiarowa), Uniwersytet Jana Kochanowskiego w Kielcach, Kielce
24 M.A. Jóźwiak, M. Jóźwiak, M. Strzyż, 2010, Predyspozycje naturalne regionu świętokrzyskiego do rozwoju turystyki, Krajobraz a Turystyka, Prace Komisji Krajobrazu Kulturowego Nr 14, Komisja Krajobrazu Kulturowego PTG, Sosnowiec.
The value of the synthetic measure allowed dividing the communes of the Świętokrzyskie Province into 4 groups. Small groups in time and space can be observed between the groups. Włoszczowski, Kielecki and Buski poviat were high in the ranking. At the other end of the ranking were Pińczowski, Skarżyski, Kazimierski. The synthetic measure in 2017 ranged from 0.52 (Włoszczowski poviat, best unit) to 0.73 (Kazimierski, the weakest unit), in 2009 0.53 (Staszowski) to 0.79 (Kazimierski) respectively.

Table 2.

| Quartile groups measures of synthetic competitiveness (OE) of poviat of the Świętokrzyskie Voivodship in 2009, 2011, 2017 |
|---------------------------------------------------------------|
| A staszowski 0.53 staszowski 0.5 włoszczowski 0.52 | B kielecki 0.59 jędrezejowski 0.62 opatowski 0.62 buski 0.63 | włoszczowski kielecki 0.54 buski 0.55 jędrezejowski 0.55 | staszowski kielecki 0.57 sandomierski 0.63 |
| C włoszczowski konecki 0.65 ostrowiecki 0.66 sandomierski 0.66 | sandomierski konecki 0.64 | opatowski starachowicki 0.64 ostrowiecki 0.66 |
| D pińczowski starachowicki 0.72 skarżyski 0.75 kazimierski 0.79 | ostrowiecki 0.68 pińczowski 0.68 opatowski 0.71 starachowicki 0.74 skarżyski 0.74 kazimierski 0.78 | pińczowski skarżyski 0.71 kazimierski 0.73 |

Source: own calculations of the authors based on the data from the Local Data Bank of Statistics Poland and Central Statistical Office

In the ranking, no position stability was observed, the level of the indicator is affected by: the economic nature of the unit and the function of the area (industrial, tourist, residential), economic potential, financial situation, natural environment and infrastructure (location rent). Therefore, the assessment should take into account local specificities in various structural and functional conditions.

Measures of spatial diversity indicate the relative stability of poviat in terms of competitiveness. In 2017, compared to 2009, the results show stability according to the standard deviation (0.07-0.07). The classic coefficient of variation (0.11-0.11) also indicates the stability of diversity. The values of the range 0.26 (2009) and 0.21 (2017) indicate slight changes in the area under study, a decrease in the diversity of poviat.

Table 3.

| Measures of diversification of the measure of synthetic competitiveness (OE) of poviat of the Świętokrzyskie Voivodship in 2009, 2011, 2017 |
|---------------------------------------------------------------|
| 2009 2011 2017 |
| average 0.66 0.65 0.61 |
| median 0.65 0.66 0.63 |
| standard deviation 0.07 0.07 0.07 |
| quarter (quartile) deviation 0.67 0.65 0.61 |
The Pearson correlation coefficient between the value of the synthetic measure of development in 2009 and 2011 was –0.893, in the case of the 2011–2017 relation –0.856 (Figure 1). We observe convergence in the area of poviat competitiveness. It can be assumed that the spatial diversity of the studied area was quite stable, and the units reacted similarly to changes in the economy.

Figure 1. Scatter chart of the ratio of synthetic competitiveness measures year to year by poviats Świętokrzyskie voivodship

Regression analysis allows you to create a linear model. When creating it, decide which variables will be the explained variable and which variables will be the explanatory one. The regression model describing the dependence of variables takes the form:

\[ f(OE \text{ competitiveness}) = \sum(\text{employed in agriculture, employed in industry, entities entered in the register per 1000 population, persons conducting professional, scientific and technical activities per 1000 inhabitants, unemployment rate, total migration balance for permanent residence per 1000 inhabitants, sold production of industry per capita, investment outlays in enterprises per capita, gross value of fixed assets in enterprises per capita, poviat own income of poviats, poviat investment expenditure per capita, total forest land area}). \]

The results of the regression analysis for the synthetic measure show that the presented regression model allows explaining \( R = 0.949 \) variable variations. The high values of the \( F \) statistics (52.31) and the corresponding level of probability \( p \) confirm the statistical significance of the linear model. The t-Student statistic value for the \( p \) parameter means that all parameters are statistically significant. The value of the determination coefficient (\( R^2 = 0.931 \)) indicates a good fit of the regression model to the data (Table 5).

Table 5.

| Rate      | Standard error | t-Student’s | p-value |
|-----------|----------------|-------------|---------|
| constant  | 1.34107        | 0.136661    | 9.813   | <0.0001 *** |
| working in agriculture | -0.523235 | 0.121484  | -4.307  | 0.0002 *** |
| working in industry     | -0.398506    | 0.133569    | -2.984  | 0.0059 *** |
Summary

The competitiveness of the local economy is highly dependent on the processes taking place in the so-called development centers and the availability of endogenous resources. The center can get rich at the expense of peripheral areas (e.g. by attracting human capital).

The activities of povias are of a multi-criteria category, their level of effectiveness is affected by location rents, finances, economic and infrastructural potential, natural resources, etc. A characteristic feature of them is the effect of leaching, e.g. human capital, social or economic potential.

The presented methods allow the identification of areas with a higher/lower level of performance effectiveness, and then programming their support from public funds under regional policy. It can be a helpful tool for local authorities assessing the accuracy of past decisions and the effectiveness of regional management instruments used in the past.

The value of the synthetic measure allowed dividing the communes of the Świętokrzyskie Province into 4 groups. Small groups in time and space can be observed between the groups. Włoszczowski, Kielcki and Buski povias were high in the ranking. At the other end of the ranking were Pińczowski, Skarżyski, Kazimierski.

The synthetic measure in 2017 ranged from 0.52 (Włoszczowski poviat, the best unit) to 0.73 (Kazimierski, the weakest unit), in 2009 0.53 (Staszowski) to 0.79 (Kazimierski) respectively.

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