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Changes in the Level of Socio-Economic Development of Communes in the Lubelskie Voivodship

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Abstract

The paper presents an attempt of determination of changes in the level of socio-economic development of communes in the Lubelskie Voivodship. The variability of socio-economic development for 2005 and 2015 was determined based on the measure of development proposed by Hellwig. The research covered 193 communes, including 166 rural communes and 27 urban-rural communes. The source material was data for the local level (i.e., communes) obtained from the Local Data Bank of the Central Statistical Office. The research showed that the Lubelskie Voivodship is characterized by relatively high internal socio-economic variability. High level of development was usually obtained for urban-rural communes and communes neighboring on urban communes. The lowest level was determined for communes characterized by peripheral location. The large majority of communes represented a moderate level of socio-economic development. An increase in the general level of socio-economic development was observed in 2015 in comparison to 2005 in the majority of communes of the Lubelskie Voivodship.

Keywords: level of socio-economic development, the Hellwig development pattern method, Lubelskie Voivodship, rural and urban-rural communes

JEL: O18, R10

Introduction

The territory of Poland is spatially diverse in economic, social, and cultural terms. Disproportions in the development of particular areas are caused by a number of factors. Part of them stem from the history of the country. This results from differences between particular partitions in the times of occupation, mass post-war migrations, or the change of the economic system — the transition from the system of the centrally-planned economy to a market economy. Other disproportions result from geographic location — i.e., location in relation to the main centers of development, transportation routes, or national border. Others can be related to the natural, social, technical, and economic conditions (Rosner 1999).

Simultaneous, long-term, and variable effects of external and internal factors on particular parts of the country led to the strengthening of differences between them. This in turn contributed to the appearance of developed and underdeveloped areas. Areas with accumulated negative phenomena hindering their proper development are called problem areas. They are one of the primary issues

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discussed in regional policy of the country and the European Union. For the purpose of equalizing opportunities, assistance programmes are developed. Moreover, the least developed areas obtain support in the form of subsidies preventing their further marginalization and strengthening of negative phenomena (Bański 1999, 2008).

According to the National Regional Development Strategy 2010–2020: Regions, Cities, Rural Areas[1] and the Draft Expert Concept for a Polish Spatial Organization Policy by 2033([2]), the Lubelskie Voivodship is included among problem areas with national importance — with the lowest level of socio-economic development, and near-border problem areas (not only as the national border, but also the external border of the European Union). Bański (1999, 2008) also points to East Poland including the Lubelskie Voivodship as problem areas in the context of population and agriculture.

The term socio-economic development is defined as the "process of positive quantitative and qualitative changes (involving the strengthening and improvement of the existing and development of new phenomena) in the area of all economic, cultural, and social activity and social-production and political system relations." Particular components of this term should be implemented together, because they remain in close mutual relationships and dependencies. These socio-economic needs become the driving force of various activities contributing to their fulfilment. Thus, the obtained level of socio-economic development is the beginning of the process of satisfying known needs and the appearance of new ones (Kupiec 1993).

Therefore, it seems justified to analyses and present changes in the level of socio-economic development of the communes of the Lubelskie Voivodship that occurred in 2015 in comparison to 2005. These differences were determined based on the selection of relevant diagnostic variables, application of the Hellwig development pattern method (Hellwig 1968). This method is based on the theory of development pattern and allows the presentation of the classification of particular units in terms of level of development in the analyzed years.

1 Research Method

The objective of the analysis is to present changes in the socio-economic development of the analyzed units of the Lubelskie Voivodship. The research covered 166 rural and 27 urban-rural communes of the Lubelskie Voivodship (state as of 2015). The analysis excluded all urban communes that due to their character would be difficult to compare with the remaining units and could lead to the distortion of results. The analysis is based on generally available data obtained from the Local Data Bank of the Central Statistical Office.[3] The information referred to the level of communes for 2005 and 2015.

The determination of the level of socio-economic development of particular objects requires the application of specific measures allowing for a comprehensive evaluation of the analyzed phenomenon. This research used one of the methods of multidimensional statistics, namely the Hellwig development pattern method. The method is also called Hellwig's measure (derived from its creator's last name). It was first proposed in 1968. It was selected based on the fact that it is very often and effectively applied in socio-economic research (e.g., Adamowicz and Janulewicz 2012; Bujanowicz-Haras et al. 2015; Pomianek 2012; Stec 2011) and the fact that it allows the designation of one aggregated measure replacing a relatively extensive set of variables describing the socio-economic situation of a given unit. The method permits the evaluation of particular objects and their hierarchical ordering. According to the ordering rule, an increase in the values of the index is accompanied by an increase in the level of development of the analyzed unit. A situation can also happen where the measure adopts negative values (Pomianek, Chrzanowska, and Bórawski 2013).

1. See: Krajowa Strategia Rozwoju Regionalnego 2010–2020: regiony, miasta, obszary wiejskie [National Regional Development Strategy 2010–2020: Regions, Cities, Rural Areas]. Ministerstwo Rozwoju Regionalnego, Warszawa 2010.

2. See: Ekspercki Projekt Koncepcji Przestrzennego Zagospodarowania Kraju [Draft Expert Concept for a Polish Spatial Organization Policy]. Ministerstwo Rozwoju Regionalnego, Warszawa, 2008.

3. https://bdl.stat.gov.pl/BDL/start.

1.1 Selection of diagnostic variables

Each multidimensional comparative analysis begins with the designation of comparative objects and selection of a list of diagnostic variables comprehensibly reflecting properties of the objects. The selection of diagnostic variables depends on the objective and scope of the analysis. It is a very important stage of research, because incorrect selection of diagnostic variables can lead to false results. The selection can occur by means of substantive, formal, and statistical criteria. A procedure using all three criteria seems the most justified (Panek 2009).

The first stage of works related to the selection of variables was of a substantive character, and involved a literature review in the scope of measurements of development of units of territorial government. It provided the basis for the designation of 30 potential diagnostic variables that were ascribed to four areas describing socio-economic development. The application of formal criteria boiled down to the verification of whether the adopted potential diagnostic variables are measurable, available, and complete. Not all variables met the criteria, because the Local Data Bank of the Central Statistical Office does not collect such data at the level of communes, or such data are incomplete. Therefore, part of the substantively significant variables could not be included in further analysis, substantially reducing their number to 23 (tab. 1).

In additional in table 1 the type of each variable was specified. Should a variable positively affect the analyzed phenomenon, then its higher values indicated a higher level of socio-economic development, and it was considered a stimulant. In the opposite case, when lower values of a variable

Tab. 1. Substantive variables for which data were available

Symbol and name of variable		Type of var.
Demography		
X_1	Marriages per 1 000 population	Stimulant
X_2	Net migration per 1 000 population	Stimulant
X_3	Population density	Stimulant
X_4	Deaths per 1 000 population	Destimulant
X_5	Natural increase per 1 000 population	Stimulant
X_6	The share of the population at pre-working age in percent of total population	Stimulant
X_7	Women per 100 men	Stimulant
Economy		
X_8	Total revenues of the commune budget per 1 resident in PLN	Stimulant
X_9	Total expenditures of the commune budget per 1 resident in PLN	Stimulant
X_{10}	Entities entered in the REGON register per 10 000 population	Stimulant
X_{11}	Natural persons conducting economic activity per 1 000 population	Stimulant
X_{12}	Relation of the unemployed in the population of productive age	Destimulant
Social and technical infrastructure		
X_{13}	Average useful floor area per 1 person	Stimulant
X_{14}	Percent of population using water supply installation	Stimulant
X_{15}	Percent of population using sewage installation	Stimulant
X_{16}	Population per 1 library	Destimulant
X_{17}	Lendings at public libraries in volumes per 1 reader	Stimulant
X_{18}	Population per 1 commonly accessible pharmacy	Destimulant
X_{19}	Percent of expenditures of the commune budget for transport and communication	Stimulant
Natural environment		
X_{20}	Mixed waste collected during the year total per 1 resident	Destimulant
X_{21}	Forest cover	Stimulant
X_{22}	Water use per 1 resident	Stimulant
X_{23}	Percent of expenditures of the commune budget for municipal management and environmental protection	Stimulant

were more beneficial, it was considered a destimulant. This provided the basis for the designation of 18 stimulants and 5 destimulants.

The last stage was the application of statistical criteria. This stage involved the verification of variables in terms of their discriminating ability (variability) and information capacity (degree of correlation with the remaining variables). First, quasi-constant variables were eliminated from the set of variables—i.e., variables that contributed no significant information on the analyzed phenomenon, and those with no discrimination properties. For this purpose, the classic coefficient of variance was applied and calculated for each variable. Then, variables with the value of the variance coefficient not exceeding the critical value adopted at a level of 10% were eliminated from the set of acceptable variables. Based on this, three variables were excluded from further taxonomic analysis for 2005 as well as 2015 (i.e., X_6, X_7, X_{13}). The remaining variables were subject to further reduction, and their information capacity was verified. It is high if the diagnostic variables are weakly correlated with other variables considered diagnostic, and strongly correlated with variables not considered diagnostic. The verification of information capacity employed one of the methods frequently applied in practice, namely the Hellwig's parametric method. The starting point in this method is constructing a symmetric matrix. The strength of the connection between variables was determined by means of the Pearson correlation coefficient. Then, threshold value of the correlation coefficient was adopted at a level of 0,5.[4] Above this value variables are significantly correlated. In the correlation matrix, sum of an absolute value was calculated for each column. In the column with the highest sum, the row with higher value than threshold value of the correlation coefficient was chosen. The variable which corresponds to the highlighted column is called the central variable and variables which correspond to the highlighted rows are called satellite variables. Together they form a cluster. Variables belonging to a given cluster show significant correlations. In practice this means the reproduction of provided information by the variables. The correlation matrix was reduced. The described steps were repeated until all variables were used.

Finally, the group of diagnostic variables adopted for the study included central variables and isolated variables, i.e. those that did not belong to any cluster (tab. 2) (Panek 2009). In order to maintain comparability of results, the same set of indices was applied for 2005 and 2015. Therefore, the final set of diagnostic variables includes 13 indices describing socio-economic development, with different types of variables (X_1, X_2, X_9, X_{12}, X_{14}, X_{15}, X_{16}, X_{17}, X_{18}, X_{19}, X_{21}, X_{22}, X_{23}). For the purpose of avoiding the controversial problem related to weights of variables, further analysis assumed that each variable had identical importance and constant weight.

Tab. 2. The results of the selection of diagnostic variables by means of parametric method

2005			2015		
Central variables		Satellite variables	Central variables		Satellite variables
X_4	–	X_5	X_{11}	–	X_3, X_4, X_{10}, X_{20}
X_9	–	X_8	X_9	–	X_8
X_{10}	–	X_{11}			
Isolated variables			Isolated variables		
X_1, X_2, X_3, X_{12}, X_{14}, X_{15}, X_{16}, X_{17}, X_{18}, X_{19}, X_{20}, X_{21}, X_{22}, X_{23}			X_1, X_2, X_5, X_{12}, X_{14}, X_{15}, X_{16}, X_{17}, X_{18}, X_{19}, X_{21}, X_{22}, X_{23}		

1.2 Transformation of diagnostic variables

The next stage involved the unification of the character of variables, consisting in the transformation of destimulants into stimulants. The process is also called stimulation. For this purpose, difference transformation was applied according to the formula:

$$x_{ij}^S = a - bx_{ij}^D \qquad i = 1, 2, \ldots, n; \quad j = 1, 2, \ldots, m; \quad b > 0, \tag{1}$$

where a, b are constants adopted arbitrarily ($a = 0$, $b = 1$).

4. [In the journal European practice of number notation is followed—for example, 36 333,33 (European style) = 36 333.33 (Canadian style) = 36,333.33 (US and British style).—Ed.]

In order to enable further research concerning the level of socio-economic development of the analyzed area, it was necessary to obtain mutual comparativeness of dissimilar diagnostic variables. For this purpose, normalizing transformation was performed by means of the zero unitarization process according to the formula (2) — in this paper, the zero unitarization process was applied while in the original Hellwig's method it is the procedure of standarization, that is:

$$z_{ij} = \frac{x_{ij} - \min_i x_{ij}}{\max_i x_{ij} - \min_i x_{ij}} \qquad i = 1, 2, \ldots, n; \quad j = 1, 2, \ldots, m, \tag{2}$$

where:
z_{ij} — normalised diagnostic variable,
x_{ij} — value of j-th variable in i-th object,
$\min_i x_{ij}$ — lowest value of j-th variable among objects,
$\max_i x_{ij}$ — highest value of j-th variable among objects.

It permitted the unification of measurement units and replacing different ranges of their variability with a constant range from 0 to 1, whereas value 0 was ascribed to the object with the least beneficial value of the analyzed variable, and value 1 to the object with the most beneficial value (Panek 2009).

1.3 Hellwig's development pattern method

The next extensive stage of the research involved the construction of a synthetic development index. It employed one of the most frequently applied pattern methods (i.e., Hellwig's measure of development). The obtained index permitted ordering of objects in terms of their level of socio-economic development. They were divided in this context into four separate groups. In order to compare changes in the socio-economic development of the analyzed communes of the Lubelskie Voivodship, an index for two years was constructed (i.e., for 2005 and 2015).

Normalized values of variables provided the basis for the construction of a so-called development pattern, i.e. an abstract object adopting "the most beneficial" values for each variable with coordinates, whereas the coordinates of the pattern are designated based on the following formula:

$$z_{oj} = \begin{cases} \max_i z_{ij} & \text{for } z_j^S \\ \min_i z_{ij} & \text{for } z_j^D \end{cases} \qquad i = 1, 2, \ldots, n; \quad j = 1, 2, \ldots, m, \tag{3}$$

where:
z_j^S — j-th variable which is stimulant,
z_j^D — j-th variable which is destimulant.

At the earlier stage, all variables constituting destimulants were changed into stimulants. Therefore, the vector of the development pattern for the analyzed variables was as follows:

$$z_{oj} = [1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1]. \tag{4}$$

Then, for each analyzed object, its distance from the pattern object was calculated with the application of the Euclidean matrix (the lower value of d_{i0} the higher the level of development of a given object), expressed as the following formula:

$$d_{i0} = \sqrt{\sum_{j=1}^{m} (z_{ij} - z_{0j})^2} \qquad i = 1, 2, \ldots, m. \tag{5}$$

Finally, the synthetic measure s_i was calculated as

$$s_i = 1 - \frac{d_{i0}}{d_0} \qquad i = 1, 2, \ldots, m, \tag{6}$$

where:

$d_0 = \bar{d}_0 + 2s_{d_0}$,

$$\bar{d}_0 = \frac{1}{n} \sum_{i=1}^{n} d_{i0} \quad \text{and} \quad s_{d_0} = \sqrt{\frac{1}{n} \sum_{i=1}^{n} (d_{i0} - \bar{d}_0)^2}.$$

Synthetic measure s_i is usually within the range from 0 to 1. Values closer to 1 indicate a smaller distance and higher similarity to the pattern, and therefore a higher level of socio-economic development. A situation can also happen where the measure adopts negative values. It happens when values of variables of an object differ from values for the pattern object considerably more strongly than for other objects, and when a high number or subordinate objects occur (Panek 2009).

2 Research results

Based on substantive, formal, and statistical criteria, a set of diagnostic variables was selected (tab. 1). They were then subject to stimulation (1) and normalization (2). This provided the basis for the designation of coordinates of the pattern object in accordance with formula (3) and distance of each object from the pattern by means of the Euclidean matrix (5). Finally, the synthetic measure was determined for each analyzed commune (6). It permitted ordering rural and urban-rural communes of the Lubelskie Voivodship by obtained level of socio-economic development in 2005 and 2015 (tab. 3).

In 2005, communes that obtained the highest level of socio-economic development (highest value of the synthetic measure) and reached leading positions in the ranking included: Nałęczów (0,3065), Kazimierz Dolny (0,2650), and Janów Lubelski (0,2639). The last positions (lowest value of the synthetic measure) were occupied by the following communes: Ruda-Huta (0,0053), Miączyn (0,0051), and Rybczewice (0,0041). In 2015, leaders were: Janów Lubelski (0,3145), Puchaczów (0,2807), and Kazimierz Dolny (0,2545). Communes weakest in terms of level of socio-economic development included: Uchanie (0,0027), Tuczna (−0,0085), and Miączyn (−0,0437). Negative values of the synthetic measure resulted from considerable differences (i.e., very low values of variables) occurring between the analyzed objects and the development pattern and probably from a high number of analyzed objects. The analysis of values of the synthetic measure of the analyzed objects in 2015 in comparison to 2005 shows that in the majority of communes, namely 132 (68,4%), an increase in the level of socio-economic development occurred (fig. 1). The highest level was recorded in communes: Milanów (0,1285), Podedwórze (0,1162), and Wólka (0,0940). In the remaining 61 communes (31,6%), decreases in the level of development were observed, the highest in communes: Trzydnik Duży (−0,0824), Ludwin (−0,0747), and Nałęczów (−0,0744).

Tab. 3. Fragment of a table with values of synthetic measure and positions of the analyzed communes in the years 2005 and 2015

Commune	Synthetic measure s_i		Change of measure[a]	Position		Change of position[b]
	2005	2015		2005	2015	
Nałęczów	0,3065	0,2321	−0,0744	1	12	−11
Kazimierz Dolny	0,2650	0,2545	−0,0105	2	3	−1
Janów Lubelski	0,2639	0,3145	0,0506	3	1	2
Uścimów	0,2308	0,1605	−0,0703	4	53	−49
Józefów	0,2252	0,1559	−0,0693	5	57	−52
Puchaczów	0,2222	0,2807	0,0585	6	2	4
⋮	⋮	⋮	⋮	⋮	⋮	⋮
Hrubieszów	0,0124	0,0127	0,0003	188	189	−1
Grabowiec	0,0103	0,0206	0,0103	189	185	4
Mircze	0,0070	0,0308	0,0238	190	179	11
Ruda-Huta	0,0053	0,0222	0,0169	191	184	7
Miączyn	0,0051	−0,0437	−0,0488	192	193	−1
Rybczewice	0,0041	0,0434	0,0393	193	173	20

[a] Increase or decrease in the measure in 2015 to 2005
[b] Change of position in 2015 to 2005

Considering positions occupied by particular communes in 2015 in comparison to 2005, 95 communes (49,2%) improved their positions, 4 (2,1%) maintained their positions on an unchanged level, and 94 communes (48,7%) dropped in the ranking (fig. 2). The highest increase was observed in the case of communes: Milanów (130 positions), Podedwórze (116), and Chrzanów (96). The highest decrease was recorded for communes: Ludwin (107 positions), Trzydnik Duży (102), and Terespol (90).

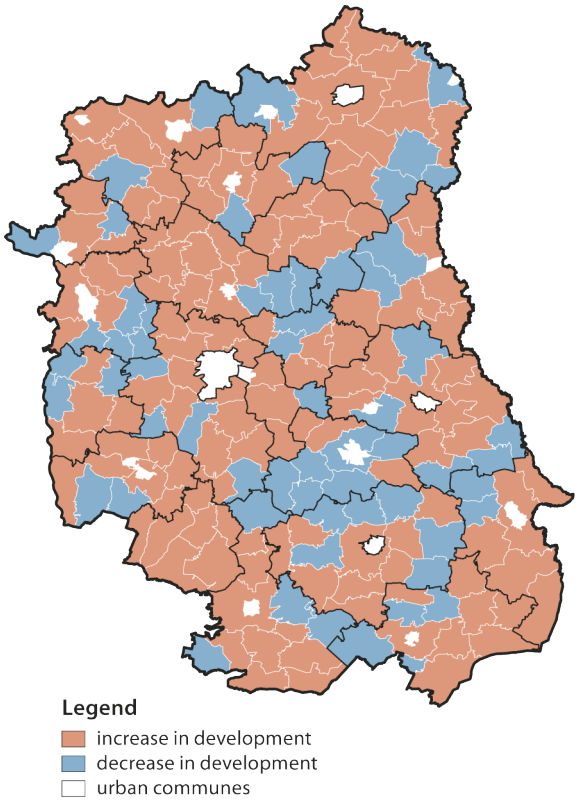

Fig. 1. Spatial distribution of communes with recorded decrease or increase in the level of socio-economic development in the years 2005–2015

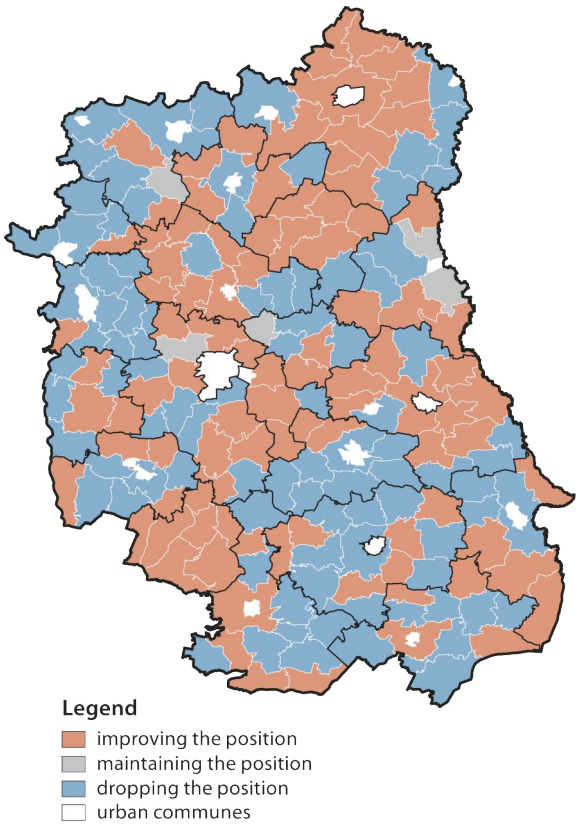

Fig. 2. Changes in positions occupied by communes in the ranking table in the years 2005–2015

An evident dependency is observed between the occurring changes in the level of the synthetic measure and change of particular positions in the ranking. The higher the decrease or increase in the synthetic measure, the higher the migration of particular units in the ranking table. A drop of a commune in the ranking does not always have to entail its negative change in the level of socio-economic development (i.e., a decrease in the synthetic measure in 2015 in comparison to 2005). Sometimes the situation was the opposite. The level of development improved, but in reality it was not sufficient for a given unit to maintain its position or obtain a position better than other units. Therefore, the objects had to recognize the "superiority" of those that obtained better results and fell in the ranking table.

The calculated Hellwig's measure of development for 2005 and 2015 permitted the designation of four separate groups of objects with different levels of socio-economic development. The division was performed by means of a diagram employing the arithmetic mean and standard deviation of the synthetic measure the values of which for 2005 and 2015 are included in table 4. This provided the basis for the designation of the following groups:

Type I —high level of development $s_i > \bar{s}_l + s$

Type II —moderately high level of development (higher than average) $\bar{s}_l + s > s_i > \bar{s}_l$

Type III—moderately low level of development (below average) $\bar{s}_l > s_i > \bar{s}_l - s$

Type IV—low level of development $\bar{s}_l - s > s_i$

where: s_i is value of the synthetic measure calculated by mean of the Hellwig's method of development pattern, $\bar{s}_l$ is arithmetic mean of s_i, and s is standard deviation of s_i (Ziemiańczyk 2010).

Tab. 4. Values of the arithmetic mean and standard deviation of the synthetic measure for 2005 and 2015

Arithmetic mean of s_i		Standard deviation of s_i	
2005	**2015**	**2005**	**2015**
0,1078	0,1241	0,0539	0,0621

Tab. 5. Classification of the analyzed communes by values of the synthetic measure in 2005

Type	n	s_i	Communes
I	32	$> 0{,}1617$	Nałęczów, Kazimierz Dolny, Janów Lubelski, Uścimów, Józefów, Puchaczów, Ostrów Lubelski, Włodawa, Sosnowica, Krasnobród, Łukowa, Zwierzyniec, Parczew, Łęczna, Poniatowa, Aleksandrów, Strzyżewice, Ludwin, Wąwolnica, Ryki, Szczebrzeszyn, Opole Lubelskie, Terespol, Siennica Różana, Krzywda, Głusk, Janowiec, Susiec, Lubartów, Tarnogród, Ułęż, Łuków
II	58	0,1078–0,1617	Puławy, Wólka, Garbów, Piaski, Lubycza Królewska, Modliborzyce, Tereszpol, Adamów, Baranów, Konopnica, Końskowola, Biłgoraj, Jastków, Stężyca, Kodeń, Kock, Niemce, Biała Podlaska, Wisznice, Czemierniki, Chełm, Potok Górny, Łaszczów, Tarnawatka, Markuszów, Borzechów, Konstantynów, Radzyń Podlaski, Dzierzkowice, Międzyrzec Podlaski, Janów Podlaski, Zalesie, Urzędów, Biszcza, Żyrzyn, Kamionka, Stary Brus, Księżpol, Mełgiew, Trzebieszów, Niedrzwica Duża, Bełżyce, Trzydnik Duży, Dębowa Kłoda, Kurów, Cyców, Serniki, Frampol, Stoczek Łukowski, Chodel, Spiczyn, Hańsk, Białopole, Ostrówek, Siemień, Komarówka Podlaska, Zamość, Krasnystaw
III	74	0,0539–0,1078	Piszczac, Firlej, Nowodwór, Sawin, Potok Wielki, Kraśnik, Kąkolewnica, Bychawa, Zakrzówek, Jabłonna, Bełżec, Rejowiec, Rachanie, Skierbieszów, Łaziska, Wola Mysłowska, Trawniki, Batorz, Milejów, Urszulin, Obsza, Rossosz, Józefów nad Wisłą, Abramów, Gościeradów, Tyszowce, Michów, Sławatycze, Wojsławice, Jabłoń, Turobin, Serokomla, Annopol, Niedźwiada, Wilków, Borki, Fajsławice, Krynice, Godziszów, Szastarka, Telatyn, Leśniowice, Leśna Podlaska, Kłoczew, Łabunie, Komarów-Osada, Goraj, Hanna, Stary Zamość, Adamów (II), Trzeszczany, Krzczonów, Wysokie, Wola Uhruska, Wyryki, Kamień, Żmudź, Wojciechów, Sitno, Izbica, Sułów, Jarczów, Jeziorzany, Wohyń, Sosnówka, Łomazy, Wojcieszków, Ulhówek, Stanin, Wierzbica, Żółkiewka, Rokitno, Horodło, Łopiennik Górny
IV	29	$< 0{,}0539$	Ulan-Majorat, Milanów, Rejowiec Fabryczny, Radecznica, Dubienka, Drelów, Nielisz, Werbkowice, Tuczna, Podedwórze, Tomaszów Lubelski, Gorzków, Siedliszcze, Chrzanów, Dzwola, Dorohusk, Uchanie, Karczmiska, Wilkołaz, Dołhobyczów, Zakrzew, Kraśniczyn, Rudnik, Hrubieszów, Grabowiec, Mircze, Ruda-Huta, Miączyn, Rybczewice

Results of the classification of the analyzed units based on the synthetic measure are presented in tables 5 and table 6, and figure 3, respectively for 2005 and 2015.

In 2005, the most abundant groups were groups II and III, i.e. those oscillating around the average level of socio-economic development. They cover 68,4% of all communes subject to the study. Group I, where a high level of development was determined, particularly included urban-rural communes and communes that are adjacent or located in the vicinity of urban communes. They constituted 16,6% of all analyzed units. The remaining 15,0% are communes included within the group of objects with the lowest level of socio-economic development. They were particularly located at the eastern border of the country. Their highest concentration occurred in counties: Hrubieszowski, Chełmski, and Zamojski.

Just as in 2005, in 2015 the most abundant groups in terms of level of socio-economic development were groups II and III. They covered 69,9% of the total number of the analyzed communes. This suggests that socio-economic development was still maintained on an approximately average level. The group with the highest level of development included 14,5% of all the analyzed communes (particularly urban-rural communes and those located near urban communes), and the group with a low level of development 15,6% of their total number (particularly near boundaries of counties: Hrubieszowski, Chełmski, Zamojski, and Krasnostawski).

Tab. 6. Classification of the analyzed communes by values of the synthetic measure in 2015

Type	n	s_i	Communes
I	28	> 0,1862	Janów Lubelski, Puchaczów, Kazimierz Dolny, Parczew, Opole Lubelskie, Wólka, Lubartów, Włodawa, Janowiec, Niemce, Konstantynów, Nałęczów, Biłgoraj, Chełm, Kock, Krasnobród, Tarnogród, Garbów, Konopnica, Janów Podlaski, Zwierzyniec, Łukowa, Piaski, Potok Wielki, Poniatowa, Modliborzyce, Kamionka, Biszcza
II	66	0,1241–0,1862	Ułęż, Ryki, Urszulin, Aleksandrów, Siemień, Łuków, Wisznice, Milanów, Łęczna, Głusk, Bełżyce, Zalesie, Biała Podlaska, Hańsk, Lubycza Królewska, Mełgiew, Jastków, Końskowola, Annopol, Obsza, Sosnowica, Puławy, Dębowa Kłoda, Rossosz, Uścimów, Urzędów, Kodeń, Piszczac, Józefów, Podedwórze, Batorz, Susiec, Ostrów Lubelski, Radzyń Podlaski, Adamów, Kąkolewnica, Baranów, Jeziorzany, Łaszczów, Hanna, Żyrzyn, Ostrówek, Strzyżewice, Księżpol, Goraj, Bychawa, Jabłonna, Chodel, Tereszpol, Tarnawatka, Cyców, Godziszów, Abramów, Chrzanów, Spiczyn, Stanin, Markuszów, Niedrzwica Duża, Dzierzkowice, Frampol, Szastarka, Jabłoń, Krzywda, Kamień, Międzyrzec Podlaski, Stężyca
III	69	0,0621–0,1241	Niedźwiada, Sitno, Stary Brus, Siennica Różana, Firlej, Borki, Wąwolnica, Michów, Krzczonów, Stoczek Łukowski, Milejów, Adamów (II), Szczebrzeszyn, Serokomla, Zamość, Rokitno, Czemierniki, Kraśnik, Terespol, Leśna Podlaska, Tyszowce, Zakrzówek, Fajsławice, Łabunie, Potok Górny, Borzechów, Krynice, Leśniowice, Wola Mysłowska, Ulan-Majorat, Ludwin, Wohyń, Sułów, Serniki, Józefów nad Wisłą, Dołhobyczów, Wola Uhruska, Krasnystaw, Żmudź, Telatyn, Trzebieszów, Łopiennik Górny, Ulhówek, Dzwola, Karczmiska, Tomaszów Lubelski, Bełżec, Gościeradów, Kłoczew, Sławatycze, Komarówka Podlaska, Sawin, Turobin, Drelów, Skierbieszów, Wilkołaz, Trawniki, Nowodwór, Wierzbica, Kurów, Łomazy, Radecznica, Wojcieszków, Rachanie, Jarczów, Wilków, Horodło, Białopole, Rejowiec Fabryczny
IV	30	> 0,0621	Izbica, Łaziska, Wojciechów, Stary Zamość, Rejowiec, Werbkowice, Dorohusk, Sosnówka, Siedliszcze, Rybczewice, Dubienka, Wojsławice, Komarów-Osada, Trzydnik Duży, Nielisz, Mircze, Gorzków, Zakrzew, Wysokie, Wyryki, Ruda-Huta, Grabowiec, Żółkiewka, Trzeszczany, Kraśniczyn, Hrubieszów, Rudnik, Uchanie, Tuczna, Miączyn

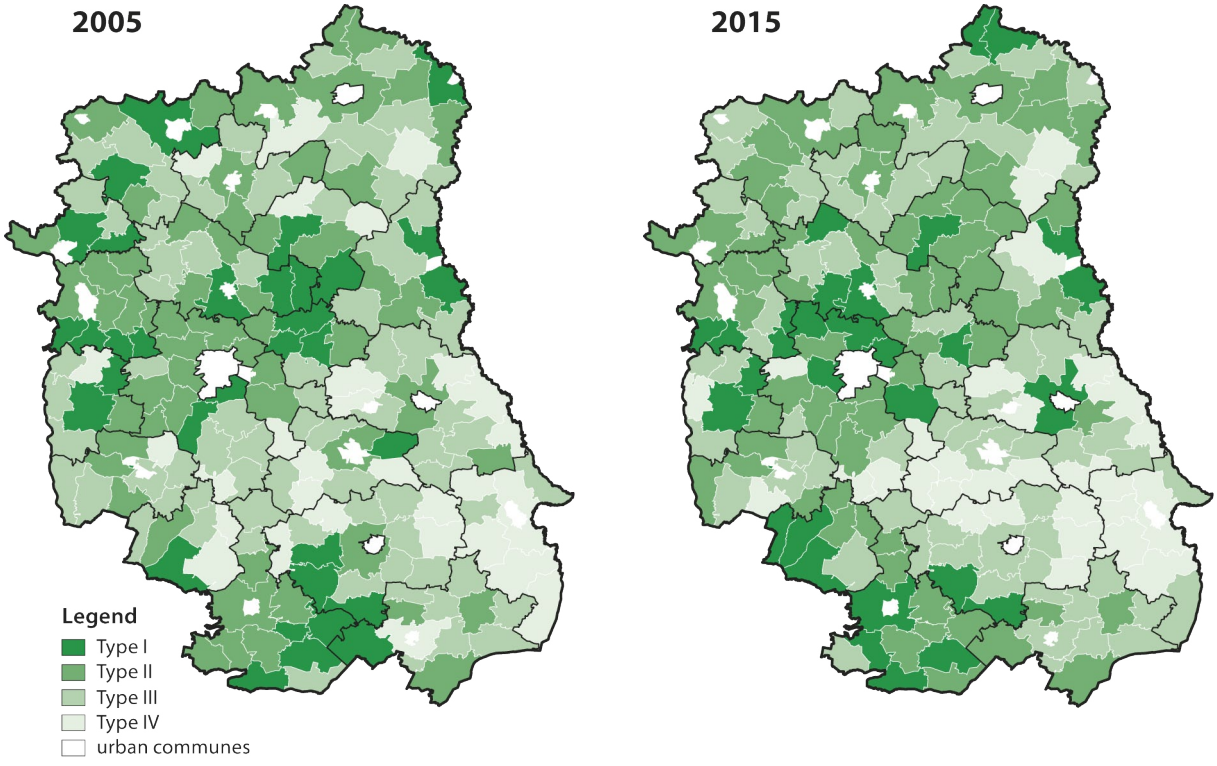

Fig. 3. Spatial distribution of the analyzed communes with consideration of the synthetic measure of development in the years 2005 and 2015

Conclusions

The analysis employing the synthetic measure permitted the designation of the variability of the socio-economic level in 2005 and 2015, and determination of changes in development occurring between the analyzed years. This in turn contributed to the formulation of certain conclusions.

- The study results suggest quite considerable disproportions in the socio-economic development of the analyzed units. Communes in the northern part of the Lubelskie Voivodship are characterized by a higher level of socio-economic development than communes located in the southern part of the voivodship.
- In 2015 in comparison to 2005, in the majority of communes — 68,4% — the level of socio-economic development increased. In the case of the remaining 31,6%, a decrease in the level of socio-economic development was observed.
- In the analyzed period, positions occupied by particular units changed. 95 communes improved their positions, 4 maintained current positions, and 94 fell to lower positions.
- A dependency exists between changes in the level of development and change of occupied positions. The higher the decrease (or increase) in the synthetic measure, the greater migration in the table. A drop in the table did not always entail a negative change of the level of socio-economic development of a given commune. In many cases the situation was the opposite. The level of development increased, however not sufficiently to go above other communes or maintain the current position in the ranking.
- The level of socio-economic development of urban-rural communes and communes neighboring on urban communes was usually higher than in the case of the remaining units. Relatively high results were obtained for communes located in the direct vicinity of the voivodship capital (Lublin). A lower level of socio-economic development characterized units located in peripheral areas (e.g., at the national border or on the boundary of counties).
- Both in 2005 and 2015, groups II and III proved the most abundant (i.e., groups with moderately high and moderately low level of socio-economic development). The lowest number of communes qualified for two extreme classes, i.e. classes with the highest and lowest level of development.
- The "best" communes from the point of view of the level of development can be considered as successful areas, and the "weakest" as stagnation areas requiring intervention of government and self-government authorities.

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