ORIGINAL PAPER

FACTORS INFLUENCING THE DEVELOPMENT OF NON-AGRICULTURAL BUSINESS ACTIVITIES IN RURAL EASTERN POLAND

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ABSTRACT

The aim of the research was to assess the conditions and identify factors influencing the development of non-agricultural business activities in rural local government areas of Eastern Poland, making use of taxonomic methods and analyses of variance. The empirical content of the article was sourced from the Local Data Bank of Statistics Poland (Bank Danych Lokalnych GUS), including the 2010 Census of Agriculture (Powszechny Spis Rolny 2010), and also data from the Institute of Soil Science and Plant Cultivation (IUNG-PIB) in Puławy. The study findings indicate that rural local government areas of Eastern Poland are strongly differentiated in respect of prevailing conditions for the development of non-agricultural business activities. The most numerous of them was the group consisting of local government areas with moderate conditions while the group of local government areas with better or weaker conditions was less numerous. Moreover, the results of the statistical analysis have shown that significant factors favouring developments of such business activities in rural local government areas of Eastern Poland are essentially the influx of people, municipal investments, as well as European Union financial resources for programs and projects' implementation.

Key words: Eastern Poland, rural areas, non-agricultural business activities, conditions and factors of development, taxonomic methods and analysis of variance

JEL codes: O12, O13, O15, O18, R12, R51

INTRODUCTION

The development of non-agricultural business activities in European Union's rural areas is not only objective, but also a desirable process, which is both a concept of multifunctional and sustainable agricultural and rural development. This is particularly true for peripheral regions, which often lag behind in socio-economic development. Eastern Poland[1] is an example of such a region in Poland.

Non-agricultural business activities play significant roles in rural economies. It transforms the mono-

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[1] Eastern Poland is the region which was covered by so-called support program. It is the area of five provinces, i.e.: Warmińsko-Mazurskie, Podlaskie, Lubelskie, Podkarpackie and Świętokrzyskie [Ministerstwo Rozwoju Regionalnego 2011]. The strategic purpose with reference to rural areas of Eastern Poland should be building a social capital and economic diversification. It means differentiation of rural economy through pressure on development of non-agricultural business activities [Wilkin 2007].

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functional nature of villages into multifunctional ones, thus contributing to the economic activation of rural areas and the dynamics of their socio-economic development. It also constitutes a source of enrichment for rural residents, leading to the differentiation and increased economic prosperity of rural economies. Such businesses can be conducted by agricultural-oriented and non-agricultural persons. They can as well be agro-allied or non-agricultural businesses as well as registered or unregistered businesses. It needs to be emphasized, though that the development of non-agricultural businesses in rural areas could emerge from the search for new forms of production, using farm and household production resources. The result is the creation of new products, the offer of new services, and capturing of new markets [Sawicka 2000, Długokęcka et al. 2003, Honjo and Harada 2006, Zając 2014].

It should be additionally noted, that the development of non-agricultural business activities in the country-side in coexistence with agriculture and respect for the natural environment (landscape) effects beneficial transformation of rural areas by not only improving its quality and residents' living standards, but also preserves their economic, social, environmental as well as cultural viability. As a result, such rural areas become more diversified, while serving varied functions, which include very important societal and economic functions [Zając 2014].

Hence, support for the development of non-agricultural business activities in rural areas has drawn the special attention and interest of most countries, including highly developed states, who actively execute economic policies regarding this sector. Undertaking non-agricultural business activities is one the priorities of the Common Agricultural Policy of the EU, with the support for alternative sources of incomes in rural areas being reflected in several of its development programs. As study findings have shown, however, higher levels of budgetary support from the EU leads to greater increase in the number of enterprises, the number of employed persons as well as result in diminishing unemployment rates. The positive impact of EU's budgetary financial support on local economies is also observable in the incomes of local government authorities [Wasilewski 2014, Mickiewicz and Mickiewicz 2016].

Although the development of non-agricultural businesses in rural areas is conditioned by both exogenous and endogenous factors, it has continued to remain under the strong influence of regional and local circumstances. In view of the above, development in non-agricultural business is largely dependent on endogenous local (e.g. a specific local government area) environmental factors, which may either facilitate or hinder such processes [Wilkin 1997, Makarski 2003, Kłodziński 2012, Duczkowska-Małysz and Duczkowska-Piasecka 2014, Wasilewski 2014, Zając 2014, Zarębski 2015].

Consequently, non-agricultural businesses develop well in rural areas located near larger urban centres and along major transport routes, where there is immense concentration of people, extensive labour market, adequate infrastructure, high level of affluent people, high internal incomes of local authorities, and suitable location in relation to outlet markets. Non-agricultural business also develop well in places, where there is prevalence of business culture, with well-educated people – entrepreneurs and leaders – as well as in local government areas with very active local authorities and other institutions. This is also true in local government areas, where there is prevalence of special natural and cultural values and predisposed to tourism development. Therefore, the most important factors stimulating developments of non-agricultural businesses in rural areas include location, human, social and financial capital as well as the actions of local governments, while the most important barriers to its development include demand constraints and unfavourable demographic patterns, especially in peripheral rural areas [Duczkowska-Piasecka 1997, Czarnecki 2006, Pięta and Pomianek 2008, Kamińska 2011, Duczkowska-Małysz and Duczkowska-Piasecka 2014, Kopacz-Wyrwał 2015, Zarębski 2015, Brodziński and Brodzińska 2016].

OBJECTIVE, EMPIRICAL MATERIAL AND RESEARCH METHODS

The objective of the research is to assess the conditions and identify the factors influencing the development of non-agricultural business activities in rural local government areas of eastern Poland using taxonomic methods and analysis of variance.

The empirical data was obtained from the Local Data Bank of the Statistics Poland (Bank Danych Lokalnych GUS), including the 2010 Census of Agriculture (Powszechny Spis Rolny 2010), as well as the Institute of Soil Science and Plant Cultivation – the National Research Institute in Puławy (IUNG-PIB). The collected and sorted empirical data was compiled in a tabular form using the comparative analysis method.

The synthetic measure of Hellwig's development was applied to assess the diversity of rural local government areas [1981] of Eastern Poland. The point of start to determine the synthetic measures of development was the matrix of information regarding each object (the local government in this context), assuming the equation:

$$X = \begin{bmatrix} X_1 \\ X_2 \\ \ldots \\ X_k \end{bmatrix} = \begin{bmatrix} x_{11} & x_{12} & \ldots & x_{1k} \\ x_{21} & x_{22} & \ldots & x_{2k} \\ \ldots & \ldots & \ldots & \ldots \\ x_{m1} & x_{m2} & \ldots & x_{mk} \end{bmatrix}$$

In order to unify the diagnostic variables, expressed in varied units of measurement and characterized by varying time spans a process of unification was carried out using the formulas given below:

$$z_{ik} = \frac{x_{ik} - \min_i \{x_{ik}\}}{\max_i \{x_{ik}\} - \min_i \{x_{ik}\}}, \text{ in which } X_k \text{ represents}$$

a stimulant, while

$$z_{ik} = \frac{\max_i \{x_{ik}\} - x_{ik}}{\max_i \{x_{ik}\} - \min_i \{x_{ik}\}}, \text{ in which } X_k \text{ represents}$$

a destimulant;

where
z_{ik} ($i = 1, 2, \ldots, n, k = 1, 2, \ldots, K$) denotes an uniformed value for X_k factor in O_i set.

The coordinates of the development pattern z_{o1}, $z_{o2}, \ldots, z_{ok}$; was a set based on the z_{ik} variable; where:

$$z_{ok} = \max_i \{z_{ik}\}.$$

The distances of each object (local government areas) from the designated pattern were calculated based on the formula:

$$d_i = \left[\sum_{i=1}^{k} (z_{ik} - z_{ok})^2 \right]^{1/2} (i = 1, 2, \ldots, n).$$

Relying on the values of the synthetic variable d_i, a normalized relative measure of levels of development was constructed: $z_i = 1 - \frac{d_i}{d_o}$ ($i = 1, 2, \ldots, n$), where: $d_0 = \bar{d} + 2S_d$;

with: $\bar{d} = \frac{1}{n} \sum_{i=1}^{n} d_i$, $S_d = \left[\frac{1}{n} \sum_{i=1}^{n} (d_i - \bar{d})^2 \right]^{1/2}$.

The resulting measure usually accepts a value range of [0; 1]. The smaller the difference in value of z_i from unity, the lower the difference in levels of development between object O_i and the model object. A negative value of the measure z_i is observable in situations, where the development of a given object is significantly slower than the development of other objects [Nowak 1990].

A starting point for such analyses is by establishing a list of diagnostic variables which should be of significant use in the description of the analysed phenomenon, complete and accessible, weakly inter-correlated (thus avoiding data redundancy) and should have a high degree of variability [Heffner and Gibas 2007].

Given the fact that a diversified number of factors contribute to the development of non-agricultural businesses and relying on the availability of data, a list of potential diagnostic variables was identified, which includes the following:
1. Population density (number of inhabitants per 1 km^2) (S – stimulant).
2. Percentage of working-age population (S).
3. Demographic load index (non-productive age population per 100 people in working-age group) (D – destimulant).
4. Migration balance per 1,000 people (S).
5. Unemployment rate (percentage of the unemployed registered in the working-age population) (D).
6. Employment rate (number of employed in 1,000 inhabitants) (S).
7. Percentage of inhabitants making use of pipe-borne water supply (S).

8. Percentage of people benefitting from sewage systems (S).
9. Percentage of people benefitting from gas installation networks (S).
10. Number of homes per 1,000 inhabitants (S).
11. Average living space per person in m^2 (S).
12. Overall budgetary revenues of local governments in PLN per capita (S).
13. Share of internally generated revenues in total revenues of local governments (S).
14. Share of EU funds in financing EU programs and projects in total revenues of local governments (S).
15. Total budgetary expenditures of local governments in PLN per capita (S).
16. Share of investment expenditures in overall expenditures of local governments (S).
17. Number of business entities per 1,000 inhabitants in their working age (S).
18. Number of newly registered businesses per 10,000 inhabitants in their working age (S).
19. Percentage of businesses delisted in overall number of business listed in the REGON register (D).
20. Forest cover (share of forests in overall land area) (S).
21. Share of legally protected areas in overall land area (D).
22. Valorisation index (quality) of agricultural land area in points (D).
23. Share of cultivable land area in total land area (D).
24. Share of arable land area in total cultivable land area (D).
25. Share of individual farms, 1–5 ha in size in total cultivable land area (S).
26. Average size of individual farms in ha (D).
27. Average size of cultivable land area in individual farms in ha (D).
28. Average size of cultivable land area in good culture in individual farms in ha (D).
29. Share of agricultural family households earning incomes from agriculture (D).
30. Share of agricultural family households earning incomes from non-agricultural business activities (S).
31. Share of agricultural family households with earnings from paid employment (S).
32. Share of agricultural family households with incomes from non-employed sources (pensions etc.) (D).

The predetermined list of 32 potential diagnostic variables was reduced by rejecting the quasi-fixed variables namely, those with relatively low variability and thus have low discriminatory impacts on the objects. Having adopted the critical value for the coefficient of variation at 10%, a percentage of the working-age population ($V = 3.9\%$) eliminated from the list of potential diagnostic variables.

An appropriately selected diagnostic feature should exemplify low correlation with other diagnostic features, but strongly correlated with other potential features that were not considered as diagnostic.

The paper makes use of a parametric procedure for selecting the diagnostic features proposed by Hellwig [1981], which enables the identification of so-called clusters and isolated features. Clusters, usually consisting of similar features due to their high degree of correlation, contain one central feature and a number of satellite features. Features that lie outside the clusters are referred to as isolated features. Both central and isolated features are, in effect, adopted as diagnostic features. Having assumed the critical correlation coefficient to be 0.7, two clusters were identified. In the first case, the role of the central feature was performed by the x_{25} variable, while its satellite features were x_{26}, x_{27} and x_{28}. In the second case, however, the central feature turned out to the x_{23} variable, while its satellite feature was x_{20}. The other features were, thus, assumed as isolated. Finally, 27 diagnostic features were applied to assess the differences between local governments of Eastern Poland in respect of their potentials to develop non-agricultural businesses. Of these, 18 (x_1, x_4, x_6, x_7, x_8, x_9, x_{10}, x_{11}, x_{12}, x_{13}, x_{14}, x_{15}, x_{16}, x_{17}, x_{18}, x_{25}, x_{30}, x_{31}) were considered stimulants, while the other 9 (x_3, x_5, x_{19}, x_{21}, x_{22}, x_{23}, x_{24}, x_{29}, x_{32}) were considered as destimulants.

In addition, an analysis of variance was applied to determine the significance of the differences existing between the average values of the features [Luszniewicz and Słaby 2008] that exist in the identified group of local governments.

RESEARCH FINDINGS

The values of synthetic measures thus obtained, has enabled the ordering of local governments in Eastern Poland, with respect to the level of their potentials to develop non-agricultural businesses. The figure and Table 1 illustrate the classification of local governments into typological groups on the basis their means and standard deviation from the value of the synthetic measure, according to the pattern below:

− Class I (high level of conditions favourable for developing non-agricultural businesses – good condition): $z_i \geq z + S_z$;
− Class II (average level of conditions for the development of non-agricultural businesses – moderate conditions): $z - S_z \leq z_i \leq z + S_z$.
− Class III (low level of conditions for the development of non-agricultural businesses – poor conditions): $z_i < z - S_z$.

The calculations undertaken indicate that rural local governments of Eastern Poland are strongly differentiated in respect of conditions for the development of non-agricultural businesses. The most numerous group of local governments are those characterized by moderate conditions in respect of the issue concerned and it is applicable to all the provinces that constitute the region of Eastern Poland. The group characterized by good conditions for the development of non-agricultural businesses was less numerous. The highest percentage of such entities occurs in Podkarpackie Province with the least being in Lubelskie Province. Similarly, the number of local governments characterized by poor conditions for the development of non-agricultural businesses was small, with the highest percentage of such entities being found in two provinces namely, Lubelskie Province and Podlaskie Province, while the lowest was in Podkarpackie Province (the figure, Table 1).
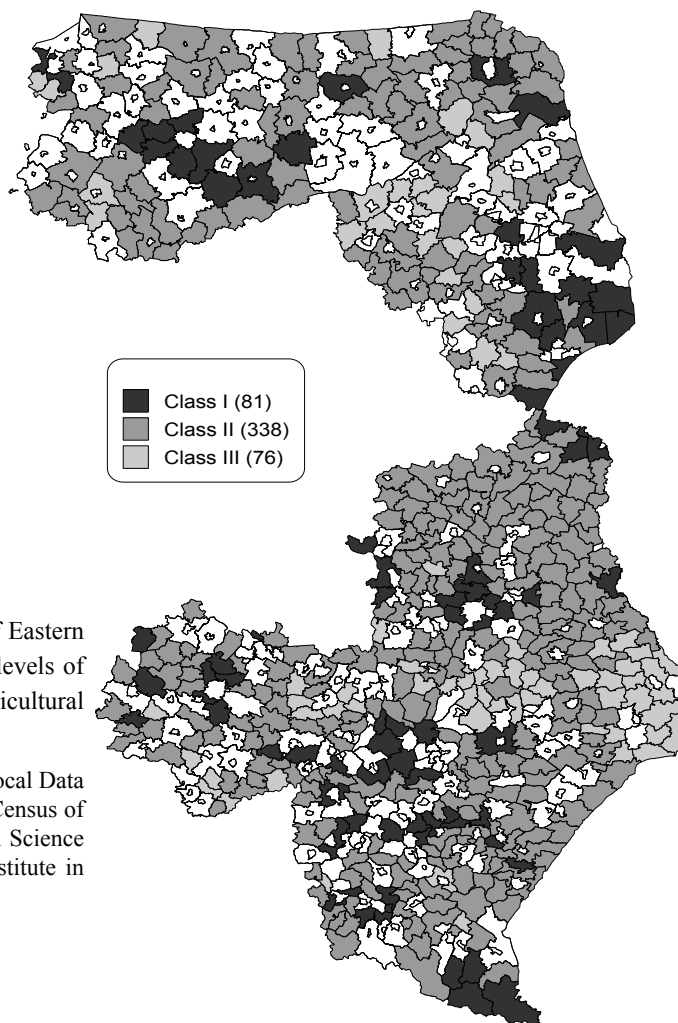
Fig. Classification of rural local governments of Eastern Poland into typological groups, based on their levels of conditions favourable to developing non-agricultural businesses

Source: Own elaboration based on data from the Local Data Bank of the Statistics Poland, including the 2010 Census of Agriculture, as well as data of the Institute of Soil Science and Plant Cultivation – the National Research Institute in Puławy (online access: January 2019).

Table 1. Classification of rural local governments of Eastern Poland into typological groups, based on their levels of conditions favourable to developing non-agricultural businesses

Class	Value range of synthetic measure	Specification	Number of local governments	Percentage of local governments
I	0.326–0.167	Warmińsko-Mazurskie Province	11	16.4
		Podlaskie Province	14	17.9
		Lubelskie Province	16	9.4
		Świętokrzyskie Province	11	15.5
		Podkarpackie Province	29	26.6
		rural governments in total	81	16.4
II	0.166–0.056	Warmińsko-Mazurskie Province	47	70.2
		Podlaskie Province	48	61.6
		Lubelskie Province	118	69.4
		Świętokrzyskie Province	48	67.6
		Podkarpackie Province	77	70.6
		rural governments in total	338	68.2
III	0.055–0.020	Warmińsko-Mazurskie Province	9	13.4
		Podlaskie Province	16	20.5
		Lubelskie Province	36	21.2
		Świętokrzyskie Province	12	16.9
		Podkarpackie Province	3	2.8
		rural governments in total	76	15.4

Source: Own elaboration based on data from the Local Data Bank of the Statistics Poland, including the 2010 Census of Agriculture, as well as data of the Institute of Soil Science and Plant Cultivation – the National Research Institute in Puławy (online access: January 2019).

Tables 2, 3 and 4 are illustrations of the mean values of diagnostic features determined for the rural local governments of Eastern Poland, categorized into typological classes. It can be observed from these data that the good conditions for the development of non--agricultural businesses in rural local governments of Eastern Poland (Class I local governments) are, first and foremost due to favourable demographic features, well-developed technical infrastructure as well as the good financial situation of these local government areas. Consequently, this group of rural local governments of Eastern Poland is characterized by the most developed non-agricultural business activities.

Additionally, Tables 2, 3 and 4 also present the results of the analysis of variance, which enabled the assessment of the significance of differences between the mean values of features in the typological classes of rural local governments of Eastern Poland. While analysing the values presented, attention need to be drawn to the extensive divergences with such features as the migration balance per 1,000 inhabitants. This value in Class I (local governments with good conditions for the development of non-agricultural businesses) averaged 4.8, while in Class III namely (with poor conditions in the range) it averaged –5.0. Significant differences are also observed in respect of such features as

Table 2. Mean values of diagnostic features concerning demographic and employment market conditions, including the technical infrastructure and housing resources as well as the results of analysis of variance in typological classes of rural local governments of Eastern Poland

Feature	Class I	Class II	Class III	F	p
Density of population	102.3	52.2	37.5	60.302	0.000
Demographic load index	58.4	60.8	62.2	6.320	0.002
Migration balance per 1 000 inhabitants	4.8	–2.4	–5.0	91.857	0.000
Unemployment rate	9.3	10.4	8.6	14.550	0.000
Employment rate	136.3	75.7	56.0	23.552	0.000
Percentage of people benefitting from pipe-borne water supply	85.0	79.4	78.7	2.093	0.124
Percentage of people benefitting from sewage systems	56.6	31.0	15.6	62.842	0.000
Percentage of people benefitting from gas installation networks	48.4	15.2	2.5	77.363	0.000
Number of homes per 1 000 inhabitants	313.7	319.6	300.8	3.074	0.047
Average living space per person in 1 m²	29.0	27.3	27.2	4.712	0.009

Source: Own elaboration based on data from the Local Data Bank of the Statistics Poland (online access: January 2019).

Table 3. Mean values of diagnostic features concerning demographic and employment market conditions, including the technical infrastructure and housing resources as well as the results of analysis of variance in typological classes of rural local governments of Eastern Poland

Feature	Class I	Class II	Class III	F	p
Overall budgetary revenues of local governments in PLN per 1 inhabitant	3 560.4	3 354.5	3 239.7	5.108	0.006
Share of internally generated revenues in overall budget of local governments	44.5	31.0	27.4	7.212	0.001
Share of EU funds in financing EU programs and projects in total revenues of local governments	10.0	4.4	1.4	6.141	0.002
Overall budgetary expenditures of local governments in PLN per 1 inhabitant	3 657.7	3 396.4	3 222.6	15.956	0.000
Share of investment expenditures in overall expenditures of local governments	23.4	18.1	13.2	21.280	0.000
Number of business entities per 1 000 inhabitants in their working age	113.4	86.8	75.0	56.224	0.000
Number of newly registered businesses per 10 000 inhabitants in their working age	113.7	87.1	75.1	32.347	0.000
Percentage of businesses delisted in overall number of business listed in the REGON register	7.0	7.3	7.0	0.538	0.584

Source: Own elaboration based on data from the Local Data Bank of the Statistics Poland (online access: January 2019).

Table 4. Average values of diagnostic features concerning demographic and employment market conditions, including the technical infrastructure and housing resources as well as the results of analysis of variance in typological classes of rural local governments of Eastern Poland

Feature	Class I	Class II	Class III	F	p
Share of legally protected areas in overall land area	28.2	37.0	38.7	2.007	0.136
Valorisation index (quality) of agricultural land area in points	71.4	68.2	65.9	2.343	0.097
Share of cultivable land area in total land area	62.5	65.8	73.5	8.301	0.000
Share of arable land area in total cultivable land area	64.7	69.4	71.5	5.481	0.004
Share of individual farms, 1–5 ha in size in total cultivable land area	73.4	52.9	30.9	74.151	0.000
Share of agricultural family households earning incomes from agriculture	81.8	89.2	93.7	23.585	0.000
Share of agricultural family households earning incomes from non-agricultural business activities	16.2	15.9	17.3	0.711	0.492
Share of agricultural family households with earnings from paid employment	44.7	40.5	29.7	39.999	0.000
Share of agricultural family households with incomes from non-employed sources (pensions etc.)	39.8	37.3	34.3	3.061	0.048

Source: Own elaboration based on data from the Local Data Bank of the Statistics Poland, including the 2010 Census of Agriculture, as well as data of the Institute of Soil Science and Plant Cultivation – the National Research Institute in Puławy (online access: January 2019).

population density, percentage of people benefitting from gas installation networks, share of EU funds for financing EU programs and projects in local governments' overall budgetary revenues, as well as the share of investment expenditures in local governments' overall budgetary expenditures. There is a lack of statistically significant difference between the averages in the various classes observed in respect of such features as percentage of people benefitting from pipe-borne water supply, the share of businesses delisted from the total number of business entered in the REGON register, share of legally protected areas in overall land area, valorisation index (quality) of agricultural land area as well as share of agricultural family households earning incomes from non-agricultural business activities.

CONCLUSIONS

1. The research has shown that rural local governments of Eastern Poland are strongly differentiated in respect of prevailing conditions for the development of non-agricultural business activities. The largest of these groups is that made up of local governments characterized by moderate conditions.

2. The group with good conditions for the development of non-agricultural businesses is less numerous, with the largest of their concentration occurring in Podkarpackie Province. A similar situation, with less abundancy, was associated with the group of rural local governments with poor conditions for the development of non-agricultural business. The highest percentage concentration of such businesses was in the Lubelskie Province and the Podlaskie Province.

3. Prevailing good conditions for the development of non-agricultural businesses in the group of rural local governments of Eastern Poland are due, first and foremost, to the promising demographic features, well-developed technical infrastructures and the favourable economic and financial situation of the local governments concerned. In consequence, this group of local governments have distinguished

themselves as having the most developed non-agricultural business activities.

4. The results of the statistical analysis have indicated that the most important facilitating factors for the development of non-agricultural businesses in rural local governments of Eastern Poland are, chiefly, human inflows, local government investments as well as the use of EU funds for the implementation of programs and projects.

5. The current research have confirmed the notion that local (governmental) environmental features constitute crucial prerequisites for the development of non-agricultural business activities in rural areas. Hence, they ought to be given priority and consideration, both in the local and regional policies being implemented by local government authorities, regarding the multifunctional and sustainable development of rural areas and agriculture in Eastern Poland. In so-doing they will become sooner and more efficiently transformed into effective factors of development, especially with the additional financial support from the EU.

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CZYNNIKI KSZTAŁTUJĄCE ROZWÓJ POZAROLNICZEJ DZIAŁALNOŚCI GOSPODARCZEJ NA OBSZARACH WIEJSKICH POLSKI WSCHODNIEJ

STRESZCZENIE

Celem badań jest ocena warunków oraz identyfikacja czynników kształtujących rozwój pozarolniczej działalności gospodarczej w gminach wiejskich Polski Wschodniej z wykorzystaniem metody taksonomicznej i analizy wariancji. Materiał empiryczny artykułu stanowią dane z Banku Danych Lokalnych GUS, w tym także z Powszechnego Spisu Rolnego 2010, oraz z IUNG-PIB w Puławach. Badania wykazały, że gminy wiejskie Polski Wschodniej są mocno zróżnicowane pod względem warunków do rozwoju pozarolniczej działalności gospodarczej, przy czym najbardziej liczebna jest grupa gmin o umiarkowanych warunkach w tym zakresie, a mniej liczebne są grupy gmin o dobrych i słabych warunkach. Ponadto wyniki analizy statystycznej pokazały, że istotnymi czynnikami sprzyjającymi rozwojowi tego rodzaju działalności w gminach wiejskich Polski Wschodniej są przede wszystkim: napływ ludności, inwestycje gminne oraz wykorzystanie środków finansowych z Unii Europejskiej na realizację programów i projektów.

Słowa kluczowe: Polska Wschodnia, obszary wiejskie, pozarolnicza działalność gospodarcza, warunki i czynniki rozwoju, metoda taksonomiczna i analiza wariancji