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Winners and Losers of the CAP's Rural Development Policy in Poland

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Abstract: The purpose of this study was to identify territorial clusters of Polish municipalities whose rural residents demonstrated higher or lower interest in the four programs of the CAP's rural development policy compared to the country's average interest. The clusters were identified on an aggregate basis and described with synthetic indexes of agriculture and rural development. The Moran's global spatial autocorrelation coefficient was used to check for spatial autocorrelation. The results demonstrated that the support offered under the rural development programs covered by this analysis was higher in the regions with well-developed agricultural structures, while the areas with structural defects and the areas in need of development had lower-than-average levels of applications for all programs (regardless of their objectives). These findings call for a clear strategy to change the unfavorable structures in Polish agriculture. Otherwise, the regional development gaps in Polish agriculture will only deepen under these programs.

Keywords: territorial clusters; the CAP; agricultural structures; farmers' interest

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1. Introduction

The Common Agricultural Policy remains one of the most important EU policies. Initially, the CAP was supposed to make Europeans self-sufficient in food, primarily through its market and price policy. Since the 1990s, greater importance has been attached to direct payments (as income aid for farmers), and rural development funds have been on the rise thanks to MacSharry [1]. As the second pillar of the Common Agricultural Policy, the rural development policy provides support for the European Union's rural areas by implementing measures designed to make agriculture more competitive, introduce sustainable management practices for environmental resources and follow a sustainable territorial development path for rural economies [2–4]. Aid may be defined through Rural Development Programs (RDP) at two levels (national or regional) and comprise a pool of funds co-financed by the European Union (from 50% to 85%) [5]. From a sustainable development perspective, it is important that aid be delivered to where it is needed [6]. Poland became a CAP member at its time of joining the EU in 2004. Since then, a total of EUR 35 billion has been disbursed under the second pillar in Poland. EU funds allocation provides an excellent opportunity to enhance the competitiveness of Polish agriculture and the living conditions of people in rural areas. In Poland, the second pillar funds are distributed on a national level by the Ministry of Agriculture and Rural Development in the form of a singular rural development plan; thus, no regional budgeting takes place.

The literature proves the existence of a link between the amount of support for different rural development programs and local development conditions. According to some studies, expenditure is less intense in the most agricultural EU regions [7–9]. Pavlis et al. [6] concluded that programs are more popular with residents of areas that are already prepared to implement similar measures [10] than with people living in peripheral areas with

poor agricultural potential. Bonfiglio et al. [8] pointed out differences between knowledge and innovation transfer programs, whereas Chaplin et al. [11] noted the problem of farm diversification. In turn, Camaioni [9] and Chiappini et al. [12] found the rural development program to be 'less rural' than it was supposed to be. Furthermore, a study by Dudu et al. [13] noted that improvements in productivity are witnessed in regions that receive greater payments allocated to investments in physical assets, agri-environmental measures or human capital development under the second pillar. In turn, rural development payments have no considerable impact on productivity.

Since most research projects focus on single programs, the question arises whether some areas exist that, compared to the national average level, demonstrate higher or lower rates of applications filed under most programs covered by the second pillar of the CAP. If so, what are their characteristics and geographic distribution? The existence of such areas could suggest that the EU's rural development policy favors certain territories with specific structural features, which may be contrary to its objectives of territorial and social cohesion of rural areas.

The purpose of this paper is to identify and describe territorial clusters of Polish municipalities whose rural residents demonstrate greater or smaller interests in all four programs of the second pillar than the country's average level. The analysis covers 'setting up of young farmers', 'modernization of farms,' 'diversification into non-agricultural activities' and 'establishment and development of micro-enterprises.' The programs were introduced under the 2007–2013 RDP and could be directly applied for by rural dwellers. The first two measures were implemented as part of the first objective laid down in Council Regulation (EC) No. 1698/2005, which was to improve the competitiveness of the agricultural sector. The other two programs are covered by the third objective, which was to enhance the quality of rural living and diversify the rural economy.

This is a follow-up to a study initiated in papers by Kiryluk-Dryjska and Więckowska [14] and Kiryluk-Dryjska et al. [15], which demonstrated that in Poland, areas where residents are highly active in applying for single selected measures under rural development programs tend to form territorial clusters. This paper investigates, on an aggregate basis, the frequency of applications for four programs with different objectives. If the values are found to be below the average level for all of these measures, it is concluded that the territory concerned is affected by a structural problem which needs to be diagnosed.

The outline of the paper is as follows. First, it presents a brief review of the literature on the use of different aid programs in the EU by territory. Second, it describes the study method. Third, it uses the Moran's spatial autocorrelation coefficients in selecting groups of municipalities with higher or lower application rates for selected programs. Finally, it describes the selected groups in terms of local conditions for rural development. The paper concludes with a discussion on territorial implications of the EU's rural development policy implemented in Poland.

2. Literature Review

The rural development policy was formally introduced as the second pillar of the CAP in 2000. Each of the RDPs were implemented in three programming periods and lasted seven years (2000–2006 (2004–2006 for Poland), 2007–2013 and 2014–2020 (in progress)) [16–18], while for the years 2023–2027, Poland proposed one Strategic Development Plan for two pillars of the CAP. All plans were set by the Ministry of Agriculture at the national level. Between 2007 and 2014, Poland implemented the Rural Development Program which consisted of 22 measures under four priorities: (1) improve the competitiveness of agricultural and forestry sectors; (2) improve the environment and rural areas; (3) improve the quality of rural living and diversify the rural economy; (4) improve leadership for young farmers. Funds allocated to the setting up of young farmers ('young farmer') are one of the ways to support Polish agriculture by making it more competitive. Under the 2007–2013 Rural Development Program, a total of PLN 3.1 billion was allocated to these measures, i.e., approximately 9.5% of funds were dedicated to the first axis of the

RDP and approximately 4.3% of the whole budget for the 2007–2013 RDP [19]. Aid could be applied for by people under 40 years old who either set up as farmers for the first time or already own a farm but started their farming activities less than 12 months prior to submitting the application. The young farmers were eligible for a bonus of PLN 50,000 (PLN 75,000 from 2010). A total of PLN 1.59 billion was disbursed to 23,000 beneficiaries of the program [20–23]. In turn, 'modernization of farms' was focused on aligning the farms with the single European market by upgrading animal and plant (except for fishery and forestry) production processes and by making farm products ready for sale [24]. Aid instruments were primarily targeted at beneficiaries who lacked capital needed to balance the productive inputs [25]. The modernization of farms was mainly focused on making Polish agriculture more competitive under the 2007–2013 RDP; 31% of funds available under the first axis, i.e., approximately 14% (PLN 10.3 billion) of the total budget, were allocated to that purpose. Modernization funds were delivered to 5.4% of farms under a total of 73,000 agreements signed [19]. The two other measures analyzed in the paper were non-agricultural in nature and were key from the perspective of multi-purpose rural development and improving the innovativeness of activities. Żmija [26] noted that the main reason why people start a new activity is their intent to increase their incomes, create new jobs for themselves and their family members and make better use of farm resources. The basic activities covered by 'diversification into non-agricultural activities' include services delivered with the use of owned assets, handicrafts and agri-tourism. Over 15,000 applications amounting to a total of PLN 1392 million were accepted as part of that measure. Of these, the smallest number (285) was recorded in the Lubuskie voivodeship and the largest (3296) in the Wielkopolskie voivodeship [19,26–28]. In turn, the establishment and development of micro-enterprises focused on increasing the activity and entrepreneurship in the rural labor market. Over 13,000 applications amounting to a total of PLN 2695 million were accepted as part of that measure. Legal and natural persons as well as organizational units (units not endowed with legal personalities. They operate as micro-enterprises by exercising economic activities on their own behalf) were eligible for aid [19,27]. The subsidy could reach PLN 300,000 depending on the number of jobs planned. The programmes implemented under RDP 2014–2020 were a continuation and development of the previous versions. Although similar measures were introduced, there were some differences in the access conditions as well as the amounts of financing. In 2014–2020, under the measure 'modernization of an agricultural holding', a minimum limit of 1 ha of the UAA of an agricultural holding was established, the amount of eligible costs was increased and financial instruments were additionally introduced to support farm restructuring. In the RDP 2007–2013, aid for 'young farmer' could not be granted after 18 months of the commencement of agricultural activity, while in RDP 2014–2020 this period was prolonged to 2 years. Moreover, farmers who benefited from payments under RDP 2007–2013 could not obtain further financing. In the measure 'diversification into non-agricultural activities', the form of granting aid changed. In 2007–2013, it was a refinancing of the costs incurred, while in RDP 2014–2020, it was a premium.

For the years 2023–2027, the planning of the structure of CAP measures at the national level was conducted for two pillars in one Strategic Development Program for Agriculture. Its budget amounts to over EUR 25 billion, of which EUR 17 billion is to be allocated to the first pillar. In the program in 2023–2027, measures such as 'young farmer' and 'modernization of farms' will be reintroduced. In turn, the measure 'development of entrepreneurship through creation and maintenance of jobs and income diversification' will be a kind of combination of 'diversification into non-agricultural activities' and 'creation and development of micro-enterprises' implemented under RDP 2007–2013 and continued under RDP 2014–2020.

The relevant literature addressing the way aid is allocated between EU territories is quite broad yet inconclusive. Camaioni et al. [9], Camaioni et al. [29], Crescenzi et al. [30] and Poczta et al. [31] demonstrated a negative relationship between the location of rural areas and the amount of aid granted under the RDP; furthermore, Camaioni et al. [29]

concluded that for 27 EU countries, the CAP appears to be less 'rural' and less 'agricultural' than stated in its political intentions. They wrote that 'In relative terms (per unit of land and, above all, of labour), urban and central regions tend to be more supported than strongly rural and peripheral ones. In other words, both rurality and the presence of agricultural activities matter in the allocation of CAP expenditure, even though they do not operate in the expected direction: the less rural (agricultural) the region, the larger the expenditure intensity that is observed.' [29]. Zasada et al. [32] also demonstrated that the regional model of RDP spending is strongly underpinned by spatial relationships. According to the authors, some kind of an adverse selection exists in rural development measures. Rudnicki et al. [27] observed that the RDP has a strong impact only on the urbanization factor, which is characteristic of territories at higher levels of development. Hence, the authors concluded that such an allocation of funds adds to the disproportion instead of bridging the gaps and that funds offered under the 'diversification into non-agricultural activities' and the 'establishment and development of micro-enterprises' are accessed on a free market basis. The less rural a region is, the greater the intensity of expenditure. In remote locations with smaller incomes (where there is the greatest need for RDPs), the programs' efficiency was relatively poor. Conversely, Crescenzi et al. [33] suggested that in the EU-15 the degree of rurality positively influenced the amounts of CAP support. Recent results of Bartkowiak-Bakun [34] concerning the Leader program in Poland (which is under the Polish Rural Development Program) demonstrate that the funds were better absorbed in municipalities of lower socio-economic status, which would suggest that they contribute to decreasing territorial imbalances. Additionally, Biczkowski [10] positively assessed the territorial impact of EU funds, as he states: 'there is intensification of agricultural production in areas well-placed for the development of that function'. This promotes the creation of economically sound agricultural holdings capable of competing with their counterparts from other EU countries.

According to a study by Kiryluk-Dryjska et al. [35], EU funds offered under the 'young farmer' measure were more frequently applied for by residents of areas which demonstrate a dominant role of intensive farming. Gołębiewska et al. [18] indicated that the largest number of beneficiaries of the measure 'young farmer' were based in the Wielkopolskie and Mazowieckie voivodeships; this could be related to a large number of farms owned by 'young farmers' who meet all eligibility criteria for aid. In turn, Wojewodzic [36] demonstrated that the following factors increased the intensity of applying for funds under the measures 'young farmer' and 'modernization of farms': a small share of farms with an area of up to 5 ha, high intensity of production organization and a relatively higher rate of application for other aid funds. The author concludes that funds that are supposed to provide support often add to the disproportion. As indicated by Wicki [37] and Poczta et al. [38], the characteristic that played the key role in determining the farmers' activity in accessing aid under the measure 'modernization of farms' was farm fragmentation; this is the consequence of their economic weakness which further restricts their capacities to develop.

To sum up, the existence of a link between the amount of support for different rural development programs and local development conditions has been already presented in the literature. However, the direction of this relation is not always obvious, and it strongly depends on the implemented program and geographical scale of the research. Thus, as stated by Camaioni et al. [29], constant efforts are needed to research reasons for spatial allocations of RDP measures.

3. Materials and Methods

To identify and describe territorial clusters of Polish municipalities whose rural residents demonstrate greater or smaller interest in all four RDP measures than the country's average level, we used the Queen adjacency matrix and Moran's global and local spatial autocorrelation coefficient [39,40], as previously presented in [14,15]. The local Moran's autocorrelation coefficient served to separate the statistically significant cluster of above-average frequencies of applying for separate analyzed programs (High-High) from the

cluster of below-average values (Low-Low) and outliers. 'The outliers are territories which statistically significantly differ from the adjacent municipalities in how they apply for EU funds. If a municipality with a high level of the coefficient of applying for a certain EU measure is adjacent to municipalities at low levels, it is designated as High-Low. In turn, if a municipality reporting a low level of the coefficient is surrounded by municipalities at high levels, it is labeled as Low-High.' [14,15]. However, two methodological differences between [14,15] and the current study must be highlighted. First, none of the former papers analyzed the municipalities with above- or below-average application rates in all four measures simultaneously. Thus, additional procedures had to be implemented. First, the outliers High-Low (with a high frequency of applying for separate measures surrounded by municipalities at low levels) were merged with High-High clusters, forming a group referred to as High for each of the measures. In turn, outliers with a low rate (Low-High) were merged with Low-Low clusters to form a group designated as Low. Second, the High clusters in all measures covered by this analysis (i.e., municipalities that formed part of the High cluster under the 'young farmer', 'micro-enterprises', 'modernization' and 'diversification' measures) were merged and labeled 'Super High'. Conversely, 'Super Low' cumulated those municipalities which belonged to Low clusters in all measures. To sum up, the 'Super High' group is composed of clusters of municipalities with above-average frequencies of applying for all analyzed programs merged with the outliers High-Low (with a high frequency of applying for measures surrounded by municipalities at low levels), while 'Super Low' consist of clusters of municipalities with below-average frequencies of applying for all analyzed programs merged with the outliers Low-High.

The second difference involves the way of describing merged groups of municipalities. The groups were characterized (and analyzed with the Kruskal–Wallis test together with the Dunn–Bonferroni post-hoc test) not only by synthetic factors of the Polish agriculture and rural areas calculated with the use-factor analysis, as presented by Kiryluk-Dryjska et al. [35], but additionally with real values of the core variables characterizing the state of agriculture and rural areas.

4. Results

Table 1 presents the results of the Moran's global statistic. A statistically significant result was obtained at $p < 0.001$ for each RDP measure covered by the study. This suggests that the frequencies of applying for aid under all measures covered by the analysis tend to form municipality clusters. This trend is the strongest for the measure 'young farmer' (with the global Moran statistic at 0.62) and the weakest, yet still statistically significant, for 'micro-enterprises' (with the global Moran statistic at 0.22).

Table 1. Global Moran results for clusters of municipalities.

	Global Moran Results	
	Moran Global Index	***p*-Value**
Young farmer	0.618	<0.001
Modernization of farms	0.501	<0.001
Diversification	0.488	<0.001
Micro-enterprises	0.218	<0.001

Source: own compilation.

The number of clustered and outlying municipalities is presented in Figure 1. Regarding the measure 'young farmer,' over 37% of the municipalities formed clusters, including 15.9% in the cluster with a high frequency of applying for 'young farmer' (High-High) and 21.2% in the cluster with a frequency below the national average (Low-Low). Outliers represented barely 1.5%, and most of them had below-average levels of the frequency of applying for 'young farmer' funds but were bordering municipalities at higher levels (Low-High outliers). Ten municipalities demonstrated much higher levels of the frequency coefficient than the bordering units (High-Low outliers). The remaining municipalities did not form any clusters.

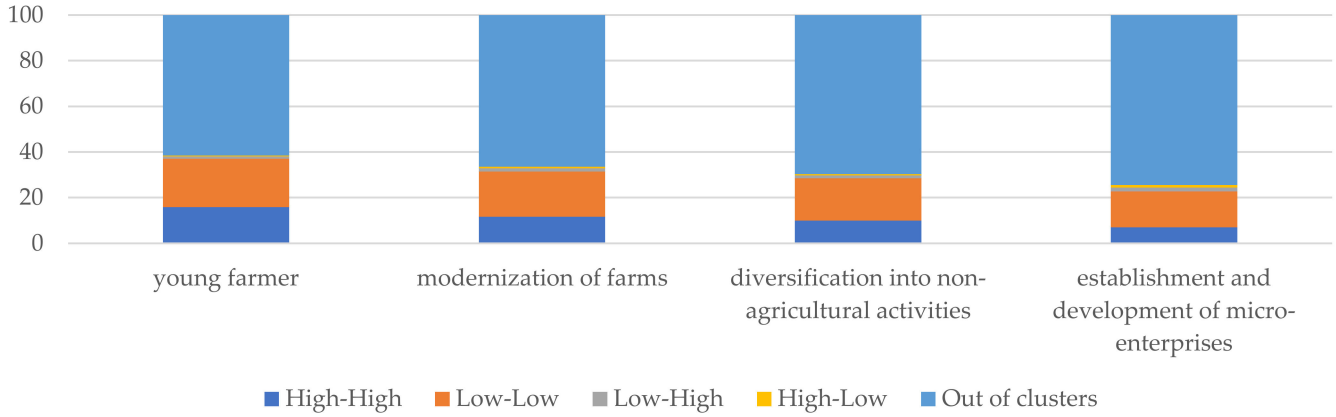

Figure 1. Clustered local Moran results for measures 'young farmer,' 'modernization of farms', 'diversification into non-agricultural activities' and 'establishment and development of micro-enterprises' (%). Source: own compilation.

Regarding the measure 'modernization of farms', barely 32% of the municipalities covered by this analysis were allocated to clusters, including 11.7% to the cluster exhibiting a high frequency of applying for the 'modernization' measure (High-High), and 19.7% to the Low-Low cluster. Over 2% of municipalities were outliers, the majority of them being Low-High units.

Regarding the measure 'diversification into non-agricultural activities,' barely 29% of the analyzed units were allocated to clusters, and most of them recorded below-average frequencies of applying. In turn, only 23% of municipalities were allocated to clusters under the 'micro-enterprises' measure, including twice as many Low-Low units as High-High units. Furthermore, the 'micro-enterprises' measure had the largest group of outliers (nearly 3%) and of out-of-cluster units (municipalities at an average level of indicators). This means that the frequencies of applying for measures related to the establishment and development of micro-enterprises are more evenly distributed across the territory. Moreover, there is a greater number of municipalities which—despite being surrounded by weak units—demonstrate an above-average number of applications, and vice versa (outliers).

In summary, it can be stated that the greatest number of HH and LL clusters was recorded for the 'young farmer' measure and the smallest for the 'micro-enterprises' measure. It is the opposite for outliers, i.e., the largest and the smallest numbers of outliers were found in the 'micro-enterprises' measure and in the 'young farmer' measure, respectively.

To describe the characteristics of areas at above- and below-average levels of the frequency of applying for all measures covered by this analysis, outliers with a high frequency of applying were combined with High-High clusters, forming a group dubbed High. Outliers with a low rate were joined with Low-Low clusters to form a group Low (Table 2). This means placing all municipalities at above-average levels of indicators, whether clustered or not, into a group referred to as High. Similarly, all municipalities which recorded indicators below the national average level were allocated to the group called Low.

In all measures, the Low group is larger than the High group, which means that municipalities at below-average levels of frequency of applying for aid measures are more numerous than those at above-average levels. The frequencies of applying for aid under the 'young farmer, 'modernization' and 'diversification' measures were below the national average level in approximately 20% of municipalities. The highest (16.4%) and the lowest (only 8.1%) percentages of municipalities in the High group were recorded for the 'young farmer' and the 'micro-enterprises' measures, respectively.

Table 2. High and Low clusters, and out-of-cluster units.

	High-High and High-Low	Low-Low and Low-High	
	High	**Low**	**Out-of-Cluster**
Young farmer	351 (16.4%)	474 (22.1%)	1317 (61.5%)
Modernization of farms	264 (12.3%)	454 (21.2%)	1424 (66.5%)
Diversification	225 (10.5%)	424 (19.8%)	1493 (69.7%)
Micro-enterprises	174 (8.1%)	374 (17.5%)	1594 (74.4%)

Source: own compilation.

Table 3 provides a number and percentages of the High cluster in all measures covered by this analysis (i.e., municipalities which formed part of the High cluster under the 'young farmer', 'micro-enterprises', 'modernization' and 'diversification' measures). They are referred to as 'Super High'. Conversely, 'Super Low' means those municipalities that belonged to Low clusters in all measures. Those that belonged neither to a Low nor to a High cluster in any of the measures are referred to as 'No Cluster'. The ones that formed part of a High and/or a Low cluster in specific measures are labeled as 'Others'.

Table 3. Count and percentage of municipalities by cluster category.

Variable: Total Clusters	Count	%
Super Low (Low under four measures)	98	4.6
No Cluster	826	38.6
Super High (High under four measures)	35	1.6
Others (High and/or Low cluster in specific measures)	1183	55.2

Source: own compilation.

The vast majority of municipalities did not belong to any cluster (38.6%) or only had an above-average frequency of applying for aid under a specific measure (55.2%). Approximately 5% of municipalities were attributed to the Super Low cluster which means that their residents' activity in applying for aid was below the national average level for each of the four 2007–2013 RDP measures covered by this analysis. It also means that their residents were passive in applying both for investment measures and for measures designed to diversify farm activities, which therefore provides opportunities to find non-agricultural jobs. In turn, only 1.6% of municipalities belonged to the Super High cluster that recorded above-average levels of activity in applying for every measure. The territorial differences between the municipalities are shown in Figure 2.

It follows from these results that residents of rural areas located in central-west Poland—the Wielkopolskie voivodeship (which formed the largest Super High cluster)—exhibited above-average levels of activity in applying for all measures covered by this analysis. Moreover, these areas are surrounded by territories where the activity in applying for specific measures was above the average national level (labeled as 'Others'). Additionally, there is one Super High municipality (Brańsk) located in central-east Poland—the Podlaskie voivodeship. According to Klepacka et al. [41] and Przygodzka [42], this municipality demonstrates a good demographic structure and has the region's highest index of agricultural production space (ca. 65%). A similar situation was found in the Podkarpackie voivodeship (southeast of Poland), which also had only one Super High municipality (Jarocin). However, as specified in the Agriculture and Rural Development Strategy for the Podkarpackie voivodeship by 2030 [43]: 'Jarocin is a rural municipality which requires support for its development processes'. Moreover, according to a study by Głębocki et al. [44], in the Jarocin municipality, over 40% of farms are engaged in agricultural production for the sole purpose of self-supply; permanent pasture represents over 25% of agricultural land; and 10% of the farms' arable land is fallow land.

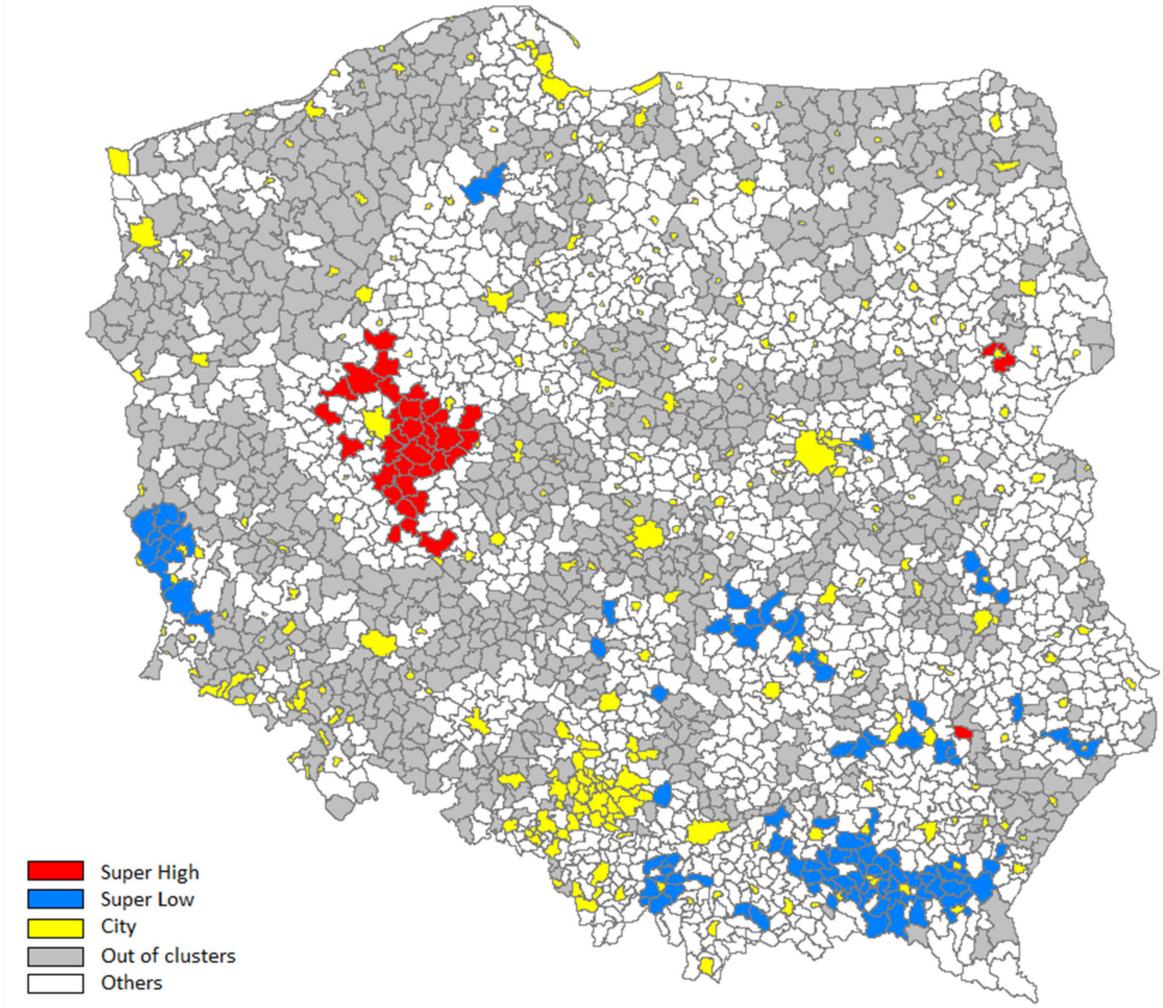

Figure 2. Spatial distribution of Super High and Super Low groups of municipalities in Poland. Source: own compilation.

Most Super Low municipalities are located in the southern regions of Poland (the Podkarpackie, Małopolskie and Świętokrzyskie voivodeships) and in the southwestern part of the Lubuskie voivodeship.

Table 4 presents the factor scores characteristic of municipality groups at above-average levels of frequency of applying for all measures covered by this analysis (Super High) and of municipalities at levels below the national average (Super Low). Additionally, the out-of-cluster group was described for comparison purposes. Additionally, this study demonstrated that factor scores significantly differed between the municipality groups covered by the analysis.

The results of the statistical analysis (Kruskall–Wallis and Dunn–Bonferroni post-hoc test) show that the Super High and Super Low groups significantly differ from each other in most factors: farm structures, role of organic farming, demography, organic and animal production and rural entrepreneurship.

The highest values of the farm structures factor were recorded in members of the Super High group (the median factor score was 0.73). Similar values of that factor were found in members of the Super Low group and in out-of-cluster municipalities (the median was ca. −0.21). The variables covered by that factor (these factors are listed in the method's description) relate to the quality of agrarian structure. Therefore, the findings suggest that all four measures covered by this analysis were statistically more frequently applied for by farmers based in municipalities with better structural conditions for farming, demonstrating

a larger average farm area, a larger average sown area and a greater share of industrial crops and fertilizers use.

Table 4. Results of comparing the factor scores. Significance of differences between the Super High and Super Low groups of municipalities and the out-of-cluster municipalities.

Synthetic Factors	Municipality Group	Median (Q1–Q2)	Dunn–Bonferroni Post-Hoc		
			Super High vs. Super Low	Super High vs. out of Cluster	Super Low vs. out of Cluster
Farm structure	Super High	0.73 (0.27; 1.15)	<0.0001	<0.0001	0.1953
	Super Low	−0.21 (−0.55; −0.02)			
	Out of cluster	−0.20 (−0.69; 0.77)			
Infrastructure	Super High	0.23 (−0.11; 0.65)	1.0000	<0.0001	<0.0001
	Super Low	0.68 (−0.40; 1.43)			
	Out of cluster	−0.38 (−0.66; −0.06)			
Organic agriculture	Super High	−0.70 (−0.94; −0.49)	0.0026	<0.0001	0.0003
	Super Low	−0.365 (−0.72; 0.04)			
	Out of cluster	−0.16 (−0.45; 0.34)			
Demography	Super High	0.55 (0.13; 1.00)	0.0034	0.0002	1.0000
	Super Low	0.04 (−0.38; 0.49)			
	Out of cluster	−0.02 (−0.58; 0.57)			
Animal production	Super High	1.49 (1.17; 2.21)	<0.0001	<0.0001	<0.0001
	Super Low	−0.99 (−1.13; −0.81)			
	Out of cluster	−0.25 (−0.70; 0.32)			
Entrepreneurship	Super High	0.45 (−0.04; 1.50)	<0.0001	0.0019	<0.0001
	Super Low	−0.55 (−1.14; 0.08)			
	Out of cluster	−0.01 (−0.51; 0.53)			
Agricultural land greening	Super High	0.35 (−0.06; 0.6)	<0.0001	1.0000	<0.0001
	Super Low	−1.07 (−1.39; −0.45)			
	Out of cluster	0.21 (−0.28; 0.77)			

Source: own compilation.

In the case of the animal production, the highest score was also found in the Super High group (a median of 1.49), while the lowest were reached in the Low group (a median of −0.99). The results suggest that regions with a high frequency of applying for the RDP measures were characterized by relatively good levels of animal production in comparison to the other parts of the country. This is similar when it comes to demography, entrepreneurship, and agricultural land greening: the indicators are more favorable in locations where the frequency of applying for all measures was above the national average level. In turn, an opposite relationship exists for the organic farming indicator, which is higher in the Super Low group and in the Super High group. Finally, no statistically significant differences existed between Super High and Super Low clusters in the case of the infrastructure indicator.

To further research the structural problems of Super Low municipalities, we presented selected features describing their socio-economic conditions in Table 5. The average farm area in Super Low municipalities does not exceed 4 ha. This is far below Poland's average and definitely less than in Super High areas (20.3 ha). The disproportions in farm size between analyzed areas are also visible when looking at the structure of land owned by farms with different sizes. In Super Low areas, 60% of utilized agricultural area belongs to farms with 5 or less hectares, while only 16.2% to 15 or more hectares. The Super High and 'out of cluster' municipalities are characterized by far better land structure. The farm area results in large differences in all presented agricultural indexes, such as average herd size, technical equipment, fertilizer usage and share of industrial crops. Additionally, demography indexes such as age dependency rate and live births are less favorable in Super Low areas compared to the other areas. Super Low municipalities show also lower economic activity and the density of entities of the national economy tend to be modest compared to other regions. Conversely, they are characterized by larger population density and consequently better developed social and technical and infrastructure. However, some parameters, such as population connected to wastewater treatment plants in % of population, are higher for Super High and 'out of cluster' municipalities. A higher

percentage of organic farms is located in Super Low areas compared to Super High. This might be a result of more favorable natural conditions and the smaller scale of production.

Table 5. Selected features describing the socio-economic conditions of Super Low, Super High and out of cluster municipalities.

Features	Municipality Group		
	Super Low	**Super High**	**Out of Cluster**
Features related to agricultural structures and production			
Share of utilized agricultural area belonging to farms with 5 or less hectares (%)	60.1	5.6	22.5
Share of utilized agricultural area belonging to farms with 15 or more hectares (%)	16.2	74.8	46.6
Average farm size (hectares)	3.7	20.3	11.0
Average herd size in a farm (in large heads)	1.2	18.4	6.0
Number of tractors per 1 farm	0.4	1.3	0.8
Area of agricultural land per 1 tractor (hectares)	8.0	14.1	12.5
Consumption of NPK fertilizers per 1 farm (in dt)	2.9	38.1	19.5
Average sown area per farm (hectares)	1.3	16.3	6.7
Share of industrial crops in total sown area (%)	2.3	14.6	7.9
Organic faming			
Share of organic farms among total farms (%)	0.7	0.5	1.1
Share of organic farms within total farm area (%)	2.5	1.1	2.3
Infrastructure			
Primary schools (per 100 km^2)	6.9	3.6	3.9
Length of the water supply network (km per 100 km^2)	73.0	113.1	100.0
Length of the sewage network (km per 100 km^2)	77.9	51.1	44.3
Population connected to wastewater treatment plants in % of population	47.4	63.6	52.7
Length of the gas supply network (km per 100 km^2)	106.0	62.6	45.5
Population connected to gas supply network in % of population	43.7	37.0	19.0
Population per 1 km^2	111.0	98.8	79.5
Demography			
Age dependency rate	97.9	81.3	100.0
Live births per 1000 women	39.8	46.9	41.4
Entrepreneurship			
Entities of the national economy per 1000 people	66.8	98.1	74.1
Entities of the national economy per 1000 people at working age	106.3	155.9	118.3
Agriculture land greening			
Relation of forested land to agricultural land	0.2	0.0	0.1
Agricultural production space valorization index	65.3	69.3	66.1

Source: own calculations based on the data from the Polish Central Statistical Office, the Institute of Soil Science and Plant Cultivation, the State Research Institute and the Agricultural and Food Quality Inspection.

5. Discussion

The EU funds accessed by the Polish agricultural sector enabled its transformation in terms of creating new jobs, improving production innovativeness and driving mechanization and business diversification. While the Rural Development Program is among the basic sources of rural support, the distribution of CAP funds is only partly focused on regional diversification of rural areas and agriculture [9,14,15,31,32].

This study found that municipality groups that demonstrated above-average frequencies of applying for the four measures under the 2007–2013 RDP (with different implementation objectives), as delimited in this paper, are mostly located in the Wielkopolskie voivodeship. This is a territory with well-developed agricultural structures and relatively high levels of productivity. In their study, Poczta et al. [38] found that the Wielkopolskie voivodeship, in addition to being the region with the highest potential per hectare of agricultural land, demonstrates an above-average farm size, a high GFCF (gross fixed capital formation) per employee ratio and a high assets-to-labor ratio. In turn, Nowak et al. [45]

demonstrated that Wielkopolskie is among the voivodeships with the highest synthetic indicator of agricultural potential, whereas Łukiewska et al. [46] described it as the voivodeship with the highest land productivity ratio. Our results show that municipalities at above-average levels of frequency are mostly located in the Wielkopolskie voivodeship and demonstrate high indicators of agricultural structures, agricultural production, demography and entrepreneurship.

Unfortunately, an opposite relationship can be observed in the Super Low group, mostly located in the country's southern regions that are affected by defective agrarian structures. According to Nowak et al. [45] and Łukiewska et al. [46], voivodeships of southeast Poland (Świętokrzyskie, Małopolskie, Podkarpackie) exhibit medium or poor agricultural potential. Łukiewska et al. [46] found that agriculture in these voivodeships contains the lowest levels of labor and capital productivity and has the smallest capital-to-labor and land-to-labor ratios. In turn, Rudnicki et al. [27] pointed out that southeast Poland struggles with a problem related to agrarian fragmentation and adverse environmental conditions.

Our results demonstrate that support offered under the four measures covered by this analysis (which seek different goals) is concentrated in regions with a well-developed agricultural sector and a relatively high level of economic development (the GDP of the Wielkopolskie voivodeship is above the national average amount). It can therefore be concluded that aid available under the 2007–2013 RDP did not always reach the locations where it was actually needed. This corroborates the findings by Pavlis et al. [6], who concluded that funds are more frequently applied for by people prepared for the implementation of similar measures, and by Biczkowski [10] who claimed that people living in peripheral areas with poor agricultural potentials are less active in applying for funds. The above is also consistent with the analysis of single RDP measures by Miś [7], Poczta et al. [38] and Wicki [37]. Moreover, similar patterns may be seen in the years 2014–2020. Table 6 presents a number of beneficiaries of the selected measures of the Polish Rural Development Program 2014–2020 (per 1000 of farms), which are the continuation of what was analyzed in the paper for the years 2007–2013. It is clearly visible that farmers from the southern and eastern regions of Poland (Świętokrzyskie, Małopolskie, Podkarpackie) are less likely to benefit from EU funds compared to areas of better developed agriculture (Wielkoplskie, Zachodnipomorskie). Although clustering has not been constructed for 2014–2020, as the process of funds application is still in progress, the first findings tend to confirm our results.

Table 6. Number of beneficiaries of selected measures of Polish Rural Development Program 2014–2020 per 1000 of farms.

Region	Modernization of Farms	Young Farmer	Starting Non-Agricultural Activities	Entrepreneurship	Producers Groups
Dolnoslaskie	20.06	7.49	1.79	0.67	1.61
Kujawsko-Pomorskie	29.08	21.43	2.47	1.53	1.15
Lubelskie	14.90	13.02	5.33	0.33	0.14
Lubuskie	25.99	7.37	3.30	2.30	1.39
Łodzkie	16.51	11.65	2.68	0.73	0.74
Malopolskie	6.84	5.53	2.85	0.20	0.06
Mazowieckie	11.00	13.65	2.75	0.68	0.33
Opolskie	24.83	15.29	1.33	1.29	3.65
Podkarpackie	5.84	2.33	2.95	0.28	0.28
Podlaskie	29.53	21.47	3.16	1.06	0.29
Pomorskie	24.03	15.93	3.59	1.84	1.15
Slaskie	9.43	4.78	2.30	0.81	0.26
Swietokrzyskie	14.11	11.43	4.04	0.31	0.07
Warminsko-Mazurskie	33.09	18.09	5.09	2.38	1.25
Wielkopolskie	17.48	17.58	3.96	2.03	3.26
Zachodniopomorskie	33.81	10.71	3.04	1.84	0.70

Source: calculation based on the data of the Agency for Restructuring and Modernization of Agriculture.

This analysis adds value by indicating and characterizing the areas which recorded above- or below-average levels of activity in applying for four measures that pursue dif-

ferent goals (increasing agricultural competitiveness and improving the quality of rural living). In summary, areas showing below-average levels of activity in applying for RDP measures (Super Low municipalities) are characterized by unfavorable land structures, resulting in low levels of agricultural development. Extreme fragmentation of farmland in these municipalities results in defective agrarian structures and low production indexes of agriculture. Moreover, the indexes of entrepreneurship are low in these areas, which limits their economic development. Our results suggest that in Poland, conversely to EU 27 [29], the second pillar of the CAP is indeed 'agricultural', and it is better absorbed in regions of well-developed agrarian structures. In this view, our analysis of four different measures showing the opposite direction provides an important observation in the ongoing discussion of the current policy. It is worth mentioning that all changes in the implementation conditions of the analyzed measures in the successive RDP renditions (such differences in the access conditions, the amounts of eligible costs, etc.) have so far not reduced the allocation asymmetry.

However, several limitations of the study should also be acknowledged. First, we are aware that we analyzed only RDP measures, which were designed directly for farmers. Thus, our study cannot conclude on the overall effects of the EU rural development policy. Additional research is needed to analyze the impact of rural development funds that were not directly accessible for farmers. Secondly, a study of application barriers faced by habitants of municipalities located in areas of well-developed agricultural structures but with lower-than-average application rates could provide interesting advice for more efficient allocation of rural development funds. Next, in this paper we used the Queen adjacency matrix, but we are aware that other procedures such as the Kernel-based matrix could be alternatively used for this purpose. However, when using a Kernel-based matrix, the decisions regarding the size of the bandwidth parameter need to be taken (as in other matrixes based on various types of distance or similarity). The Queen matrix guarantees the use of nearest neighbor, which gives clear neighborhood boundaries. Finally, we are aware that the application for EU funds might be motivated by conditions other than those researched in this paper. This presents an opportunity for further detailed analysis of the groups of municipalities identified in this study. The clustering might be also replicated for the current and future programming period to monitor the progress in EU funds application in Poland.

6. Conclusions

The existence of areas with a below-average frequency of applying for all measures covered by this analysis is a worrying discovery that could threaten harmonious rural development. When it comes to programs focused on farm investments (modernization and 'young farmer'), the low application rate is partly justified by eligibility criteria. However, the fact that the same territories demonstrate a below-average frequency of applying for measures such as business diversification and establishment and development of micro-enterprises testifies their structural incapacity.

Steps taken to overcome this situation in coming EU financial perspective should be stimulated by national and regional authorities. Most importantly, there is a need for a clear strategy to change unfavorable agricultural structures in Polish agriculture. This needs to be supported by a vast majority of measures under the Polish Strategic Plan for the Common Agricultural Policy for the years 2023–2027 (including first pillar measures). As pointed out in this paper, only well-developed agricultural structures can stimulate farmers to apply for the EU funds and furthermore increase competitiveness of Polish agriculture. Moreover, as mentioned by Kiryluk-Dryjska et al. [15], 'to ensure the economic development of rural areas in regions where agriculture is currently unable to compete, it would be of critical importance to create conditions for alternative types of economic activities.' This process could be supported by regionalization of the policy to better adjust EU funds to local conditions of development. Otherwise, measures implemented under the

second pillar will continue to deepen the development gaps in Polish agriculture instead of bridging them.

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