

EFFECTS OF LAND CONSOLIDATION IN SOUTHERN POLAND

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ABSTRACT

Motives: The fragmentation of land and the distribution of plots in rural areas negatively affects the profitability and efficiency of agricultural production. Land consolidation is an activity that facilitates the improvement of the spatial structure and at the same time contributes to the sustainable development of rural areas. European Union (EU) funding helps to improve, among others the area structure of agricultural land in the EU countries.

Aim: From these premises, the purpose of the work results, which is the assessment of the effects of the performed consolidation of land with EU funding. The detailed analysis covered 16 precincts from the Podkarpackie voivodeship and 3 precincts from the Świętokrzyskie voivodeship. The assessment of the consolidation of land was made in 19 consolidated objects in the years 2007-2020. In practice, there is a problem of how to demonstrate the effects of land consolidation? This article proposes to present the four most important effects of land consolidation in the form of the following coefficients: W_1 (coefficient of reducing the number of plots as a result of consolidation), W_2 (coefficient of increasing the average plot area in the consolidation facility), W_3 (coefficient of reducing the number of plots in an individual farm as a result of consolidation), W_4 (index of road network density in merged area) are a reliable image of the results of the land consolidation performed in the studied area.

Results: The results were obtained. Index W_1 in the examined objects indicated the result of 34.0% for the Podkarpackie voivodeship, and 28.8% for the Świętokrzyskie. Index W_2 in the Podkarpackie voivodeship is 27.0%, and in the Świętokrzyskie it is higher and amounts to 29.7%. Index W_3 which amounts to 39.4% of the average number of plots in a farm in the Podkarpackie voivodeship and much higher, amounting to 46.6% in the Świętokrzyskie. Index W_4 for the Podkarpackie voivodeship is + 14.7%. However, for the Świętokrzyskie it is only + 3.7%. Summing up, the study analyzed four indicators showing the effects of land consolidation in southern Poland. The results obtained for these two voivodeships were similar. However, unsatisfactory in terms of the effects of land consolidation.

Keywords: effects of land consolidation, land fragmentation, agricultural area, cadastral plots, Poland

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INTRODUCTION

The consolidation of land is a surveying work, as a result of which there is a change in the object (objects) of property rights. The merger is a complicated procedure, because unlike the division of real estate or the delimitation of real estate, in most cases it concerns several dozen entities, and sometimes even several hundred or several thousand. For this reason, the legal regulation of this process must on the one hand be very precise, as well as anticipate almost all possible situations that may arise, and on the other hand, flexible enough to prevent attempts to paralyze it [Kwartnik-Pruc & Trembecka, 2019].

LITERATURE REVIEW

Almost 100 years of development of land consolidation that took place in Poland shows the multi-criteria nature of this procedure. EU funding helps to improve, among others the area structure of agricultural land in the European Union (EU) countries [Pawlikowska et al., 2017; Bieda, et al., 2014]. Agricultural area in the EU countries covers most of the land of the whole country [Klimach et al., 2020].

Figure 1 shows the agricultural area in individual EU countries. The agricultural area is the area that may be included in land consolidation works. Poland

takes 9th place out of 27 EU member states, where 1st place is the largest percentage of agricultural area in relation to the country's area. Additionally, the very large fragmentation of the agricultural area in Poland makes us one of the leading countries that urgently need land consolidation [Stręk & Noga, 2019; Janus & Taszakowski, 2018; Noga et al., 2017; Balawejder & Leń, 2016]. The problem of excessive fragmentation of land concerns, among others: Bulgaria [Di Falco et al., 2010; Moteva, 2020], Cyprus [Demetriou, 2018], Czech Republic [Sklenicka, 2016], Estonia [Jürgenson, 2016], Finland [Vitikainen, 2014], Hungary [Cegielska et al., 2018], Latvia [Jankava et al., 2014], Lithuania [Pašakarnis & Maliene, 2010], Slovakia [Muchová & Petrovic, 2019], Spain [Crecente et al., 2002], The Netherlands [Louwsma et al., 2020; Stańczuk-Gałwiazek et al., 2018].

According to the research conducted by the FAO, the results of which are presented in Figure 2, we can see the level of fragmentation of land and agricultural land. Poland is in the medium height group. We managed to leave the high group thanks to the mergers and exchanges of land with EU funding under the programs: Sectoral Operational Program (SOP) and Rural Development Program (RDP).

Figure 3 shows the status of the introduction of land consolidation instruments. Poland has the status of an ongoing land consolidation program. This

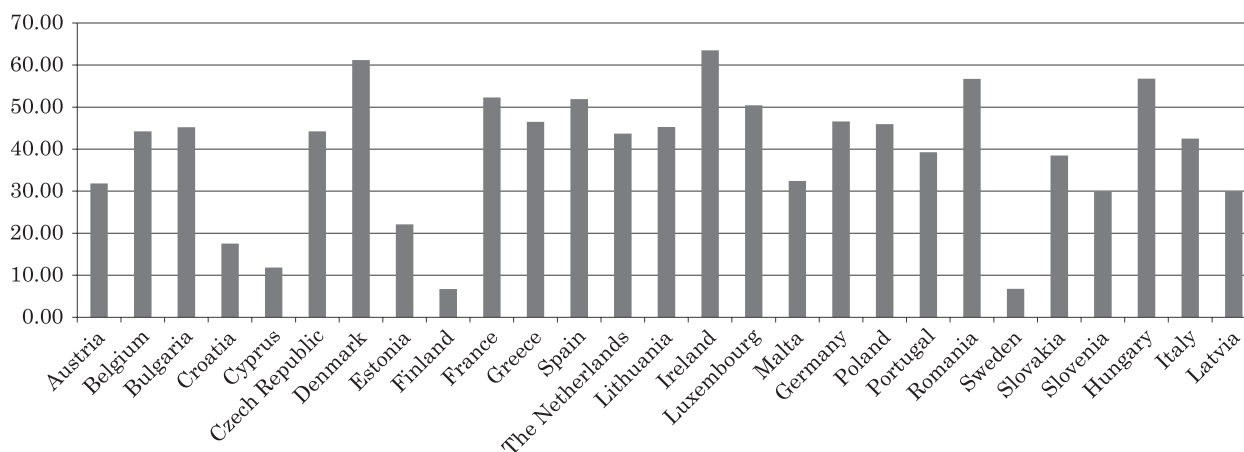


Fig. 1. Agricultural areas in individual EU countries

Source: own research based on data from FAO Estimate, 2016 [<http://www.fao.org/countryprofiles/index/en/?lang=en&iso3=POL>, date: 20.02.2021].

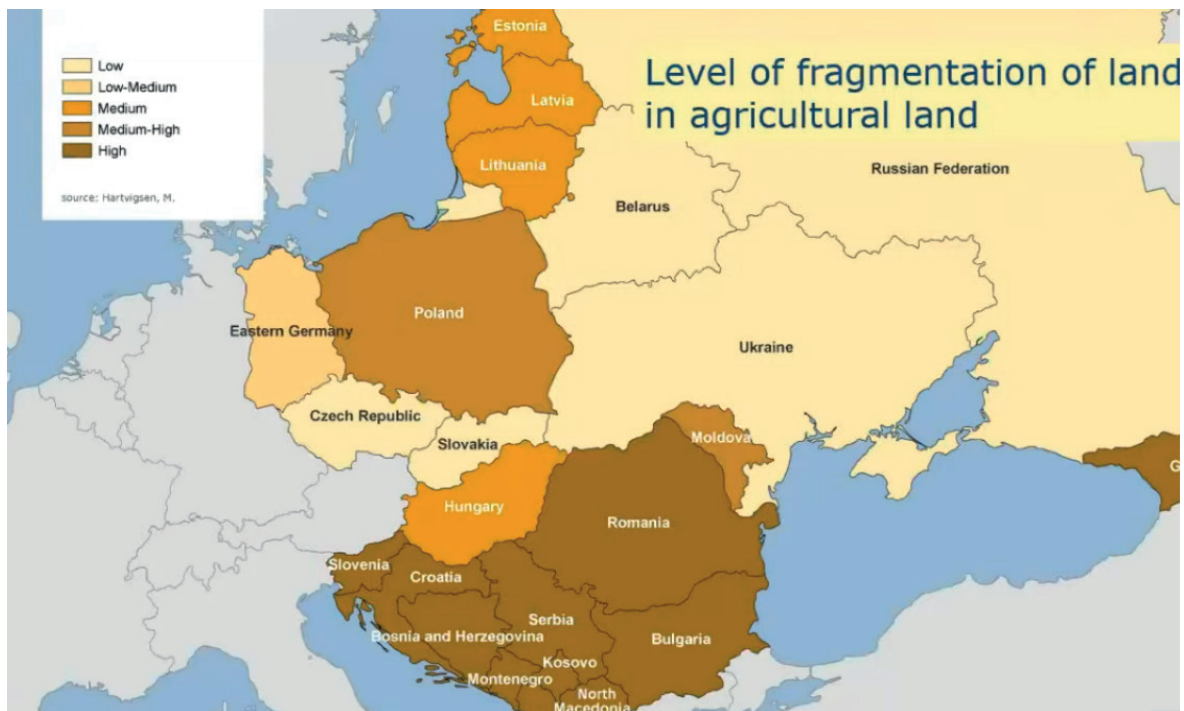


Fig. 2. Level of fragmentation of land and agricultural land
Source: Veršinskas et. al., 2020.

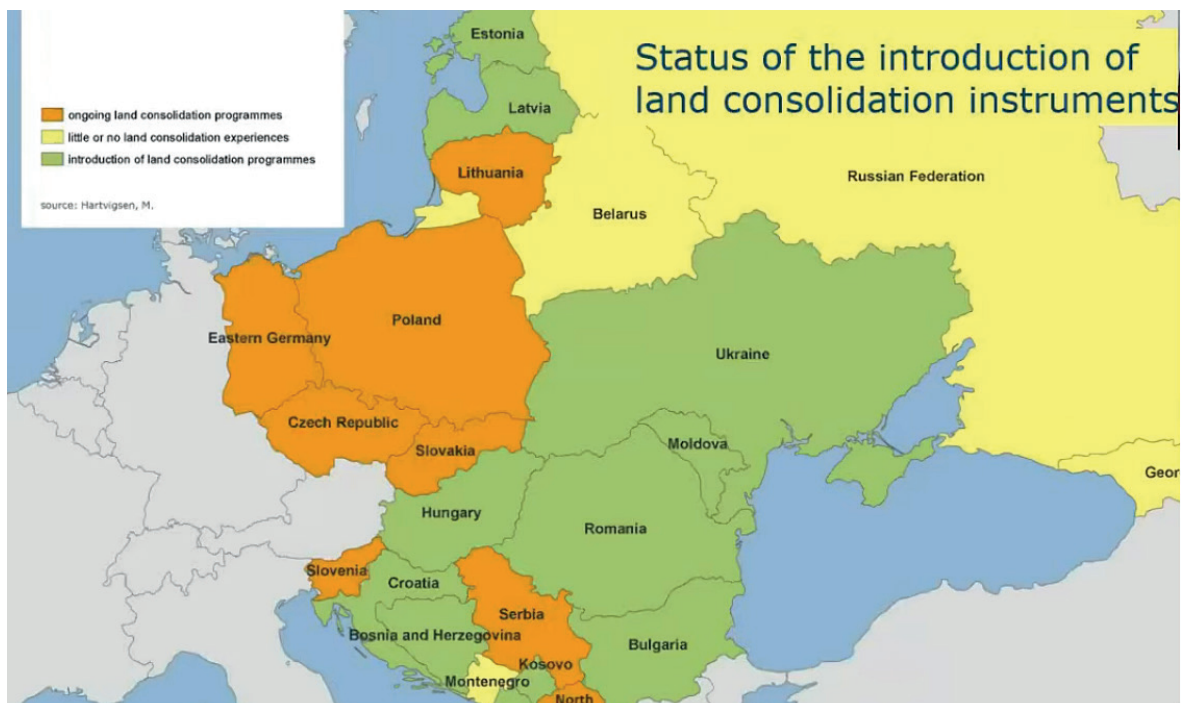


Fig. 3. Status of the introduction of land consolidation instruments
Source: Hartvigsen, 2015.

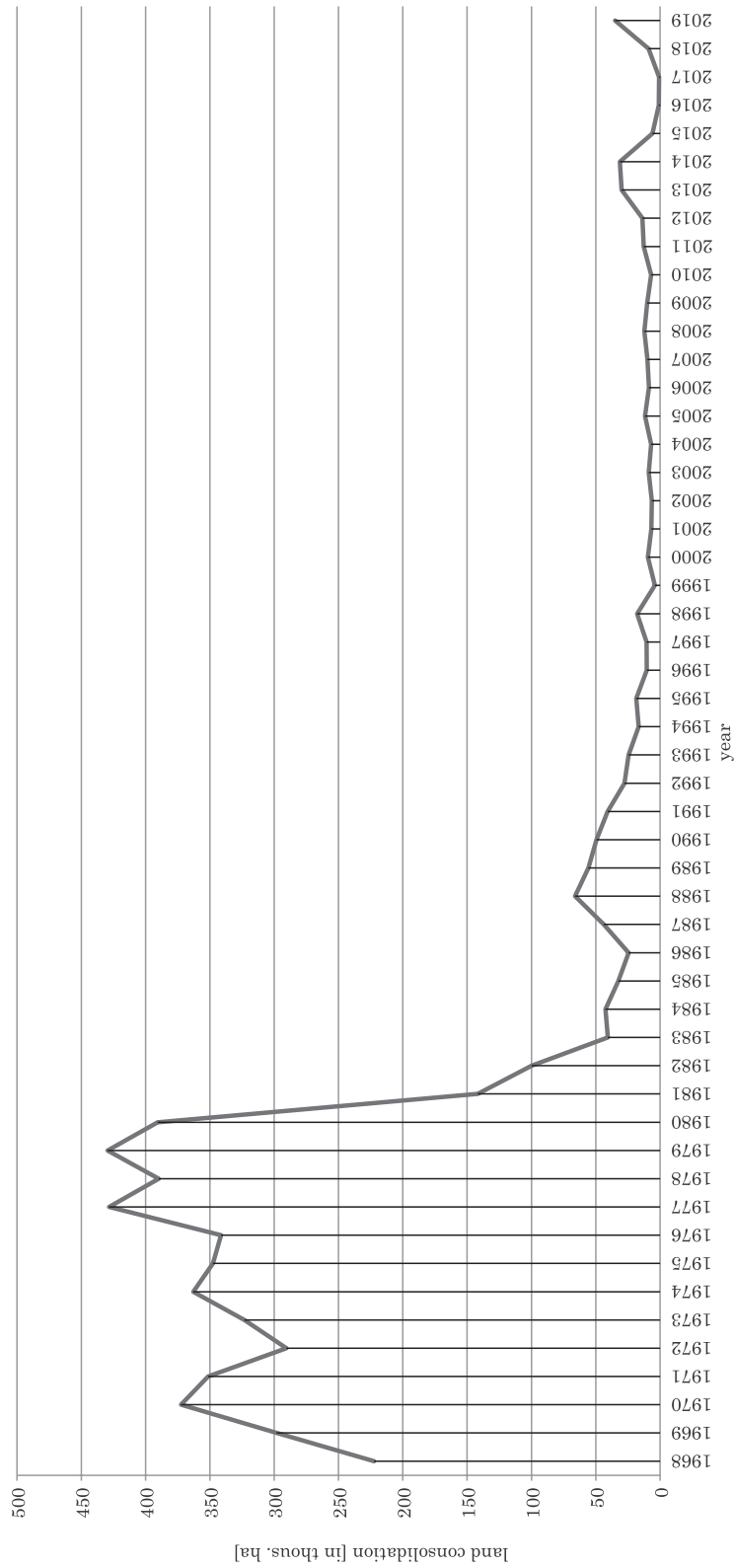


Fig. 4. Scope of land consolidation in Poland in 1968–2019
Source: own research based on data from MRiRW.

is related to the EU programs SOP and RDP, which have been implemented in Poland since 2004 until now, based on the Act on the consolidation of land [Act, 1982]. In Poland, land consolidation has been carried out for almost 100 years, introduced by the Act on land consolidation in 1923 [Act, 1923].

As shown in Figure 4, most land consolidation was carried out in the 1970s. Later, the area of land merged decreased and increased slightly in the years 2013–2014 at the end of the RDP 2007–2013 program and in 2019, the RDP 2014–2020 program. Until now, only 19% of the administrative area of Poland has been consolidated in Poland. According to Woch, Janus, Syp and Miklewski [2018], the demand for consolidation works is very high. The greatest demand for over 50% of the area of communes occurs in south-eastern Poland [Basista & Balawejder, 2020; Basista, 2020], including in the Podkarpackie voivodeship [Balawejder & Noga, 2016].

These premises result in the purpose of the work, which is the assessment of the effects of the consolidation of land with EU funding under the RDP program. The scope of the research covered two adjoining voivodeships: Podkarpackie and Świętokrzyskie. According to the distribution of EU funds, the Podkarpackie voivodeship receives much more of them than the Świętokrzyskie voivodeship. Therefore, a detailed analysis covered 16 precincts from the Podkarpackie voivodeship and 3 precincts from the Świętokrzyskie voivodeship. The assessment of the performed land consolidation was made in 19

consolidated objects in the years 2007–2020. In practice, there is a problem of how to demonstrate the effects of land consolidation? This article proposes to present the four most important effects of land consolidation in the form of the following coefficients: W_1 , W_2 , W_3 , W_4 are a reliable image of the results of the land consolidation performed in the studied area. The study analyzed four indicators showing the effects of land consolidation, which is extremely important for the improvement of the area structure of farms and the rational formation of land configuration.

RESEARCH OBJECT

The subject of the research are towns situated in Poland, belonging to the Podkarpackie and Świętokrzyskie voivodeships. The Podkarpackie voivodeship covers an area of 1,784,576 ha and covers 5.71% of the country's territory. On the other hand, the Świętokrzyskie voivodeship covers an area of 1,171,050 ha, occupying 3.74% of the territory of Poland. In terms of the number of inhabitants, the Podkarpackie voivodeship (119 inhabitants/km²) ranks 9th in Poland. It is the southernmost voivodeship of Poland, which is graphically presented in Figure 5. The Podkarpackie voivodeship is divided into 21 districts and 4 cities with district rights.

On the other hand, the Świętokrzyskie voivodeship is inhabited by about 1.23 million people, which gives a population density of 106 inhabitants/km².

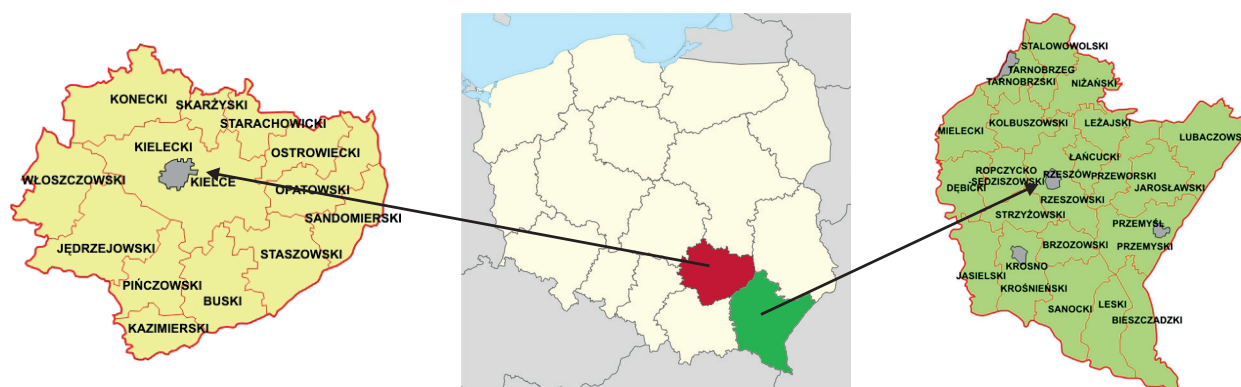


Fig. 5. Research object – Świętokrzyskie voivodeship (left) Podkarpackie voivodeship (right)

Source: own research based on data from <https://osp.org.pl>, date: 20.02.2021.

Table 1. Summary for Poland with the division into the voivodeships discussed

Research area	Surface		Agricultural land		Private land		Population inhabitants/km ²
	ha	%	ha	%	ha	%	
Podkarpackie voivodeship	1784576	5.7	971434	54.4	984509	55.2	119
Świętokrzyskie voivodeship	1171050	3.7	764669	65.3	813459	69.5	106
Poland	31270627	100.0	19177780	100.0	18181348	100.0	123

Source: own research based on data from the EGiB, as of January 1, 2021.

The voivodeship consists of 13 districts and one city with the district status of Kielce.

As shown in Table 1, in the Podkarpackie voivodeship, agricultural land that may be subject to consolidation covers 54.4% of the area of the Podkarpackie voivodeship. On the other hand, agricultural land in the Świętokrzyskie voivodeship covers 65.3% of the voivodeship's area. If we analyze the potential participants of consolidation, the land of natural persons in the Podkarpackie voivodeship covers 55.2% of the land area of the entire voivodeship. On the other hand, the land of natural persons in the Świętokrzyskie voivodeship is as much as 69.5% of the voivodeship's area.

Land consolidation under SOP in 2004–2006

EUR 17,000,000 was allocated to land consolidation under the SOP in 2004–2006, while EUR 4,191,946 was allocated to land consolidation in the Podkarpackie voivodeship [SOP, 2004]. Comparing the number of submitted applications and the number of concluded contracts – the Podkarpackie voivodeship was second in the country. On the other hand, no land consolidation was performed in the Świętokrzyskie voivodeship. The first EU program that was used is the implementation of consolidation projects under the SOP “Restructuring and Modernization of the Food Sector and Rural Development in 2004–2006” [Regulation, 2004]. This project has been implemented. In 2007, with the completion date of the EU project, the first three mergers from three districts (Przeworski, Jarosławski, Mielecki) of the Podkarpackie voivodeship were completed, including the precincts: Krzeczowice (783 ha), Hawłowice

(812 ha), Padew Narodowa (1,853 ha) with a total area of 3,452 ha.

Land consolidation under RDP in 2007–2013

As part of the Rural Development Program (RDP) for 2007–2013, the allocation of EU funds for the consolidation of land with post-merger management was adopted [RDP, 2007]. The RDP 2007–2013 regulation specified the maximum rates that may be allocated to 1 ha of the development of a land consolidation project together with post-merger management [Regulation, 2008]. For the Podkarpackie and Świętokrzyskie voivodeships, it was the amount of 1,400 EUR/ha. The cost of developing a land consolidation project for the above-mentioned voivodeships has been increased because they are characterized by a large patchwork of land as well as particularly difficult topographic conditions.

In total, the area of land consolidation in Poland was 92,704 ha, which is presented in detail in the analyzed voivodeships in Table 2. The entire country, which includes 16 voivodeships, was allocated an amount of EUR 160,000,000 for land consolidation under RDP 2007–2013. The merged areas in the Podkarpackie voivodeship covered the area of 13,422 ha, while the

Table 2. Area of land consolidation implemented in 2007–2013

Research area	Area of land consolidation implemented in 2007–2013	
	[ha]	[%]
Podkarpackie voivodeship	13,422	14.5
Świętokrzyskie voivodeship	1,321	1.4
Poland	92,704	100.0

Source: own research.

areas of the Świętokrzyskie voivodeship only 1,321 ha. Therefore, the Podkarpackie voivodeship ranks third in terms of its share in the total area of consolidation in Poland in 2007–2013, occupying 14.5%. On the other hand, the Świętokrzyskie voivodeship together with the Opolskie voivodeship took the penultimate place, receiving a 1.4% share in the total area of land consolidation in Poland in 2007–2013. It is worth emphasizing that four voivodeships did not receive any EU funds for land consolidation.

Land consolidation selected for research under RDP in the Podkarpackie and Świętokrzyskie voivodeships

Therefore, as it results from the distribution of EU funds on a national scale, Table 3 presents the completed land consolidation selected for research under RDP in the Podkarpackie and Świętokrzyskie voivodeships. The Podkarpackie voivodeship receives much more funds from the EU than the Świętokrzyskie voivodeship. Therefore, a detailed analysis covered 16 precincts from the Podkarpackie and 3 precincts from the Świętokrzyskie. The assessment of the performed land consolidation was made in 19 consolidated objects in the years 2007–2020. The analysis covered 12,232.18 ha from the Podkarpackie and 2,680.00 ha from the Świętokrzyskie. The research covered a total of 36,565 registration plots. Mergers and exchanges of land in 19 localities were carried out with the participation of 11,014 participants of the consolidation (9,818 participants from the Podkarpackie voivodeship and 1,196 from the Świętokrzyskie voivodeship).

MATERIALS AND METHODS

In order to show the results of the performed land consolidation the effects are presented in the form of coefficients presented in the formulas below. The following coefficients were developed by Authors: Noga, Balawejder and Matkowska [Noga et al., 2018]. Based on the total number of plots on the site before

and after land consolidation, the percentage reduction factor in the number of plots as a result of land consolidation W_1 (1) was calculated:

$$W_1 = \frac{L_A - L_B}{L_A} \cdot 100\% \quad (1)$$

where:

L_A – total number of plots in the research facility before consolidation;

L_B – total number of plots in the research facility after consolidation.

Based on the average plot area on the site before and after land consolidation, the percentage coefficient of increasing the average plot area in the site covered by land consolidation W_2 (2) was calculated:

$$W_2 = \frac{D_B - D_A}{D_B} \cdot 100\% \quad (2)$$

where:

D_A – average plot area in the research facility before consolidation;

D_B – average plot area in the research facility after consolidation.

Based on the average number of plots in an individual farm before and after the consolidation, the percentage coefficient of reducing the number of plots in an individual farm was calculated as a result of consolidation W_3 (3):

$$W_3 = \frac{S_A - S_B}{S_A} \cdot 100\% \quad (3)$$

where:

S_A – average number of plots on an individual farm in a research facility before consolidation;

S_B – average number of plots on an individual farm in a research facility after consolidation.

Based on the length of roads and the area of agricultural land in the facility before consolidation, the density of the road network in the G_1 facility was calculated (4):

$$G_1 = \frac{dł. A \text{ [km]}}{100 \cdot GR \text{ [ha]}} \quad (4)$$

where:

- dł. A – length of roads measured in kilometers at the test facility before consolidation;
- GR – area of agricultural land in [ha].

Based on the length of roads and the area of agricultural land in the facility after consolidation, the density of the road network in the G_2 facility was calculated (5):

$$G_2 = \frac{\text{dł. B}_{[\text{km}]}}{100 \cdot \text{GR}_{[\text{ha}]}} \quad (5)$$

where:

- dł. B – length of roads measured in kilometers at the test facility after consolidation;
- GR – area of agricultural land in [ha].

Based on the density of the road network in the G_1 facility and the road network density in the G_2 facility, the percentage index of the road network density in the W_4 consolidation area was calculated (6):

$$W_4 = \frac{G_2 - G_1}{G_2} \cdot 100\% \quad (6)$$

where:

- G_1 – road network density in the research facility before consolidation;
- G_2 – road network density in the research facility after consolidation.

The effects presented in the form of coefficients W_1 , W_2 , W_3 , W_4 are a reliable picture of the results of the performed land consolidation [Noga et al., 2018].

RESULTS

The effects of land consolidation is presented in Table 3. The table shows the results of calculating the W_1 , W_2 , W_3 , W_4 coefficients for selected precincts merged under the RDP in 2007–2020 in the Podkarpackie and Świętokrzyskie voivodeships. The detailed analysis covered 16 precincts from the Podkarpackie voivodeship and 3 precincts from the Świętokrzyskie voivodeship. The evaluation of the performed consolidation of land was made in 19 merged objects.

In Table 3, we observe that for land consolidation, 87.3% of the land area of the studied precincts in

the Podkarpackie voivodeship and 90.7% of the land area of the studied districts in the Świętokrzyskie voivodeship were assumed. This is due to the fact that the land of the State Forests (PGL) was excluded from consolidation. The coefficient of reducing the number of registration plots (W_1) as a result of consolidation is 34.0% for the Podkarpackie voivodeship, and 28.8% for the Świętokrzyskie. In both cases, it is lower than the rate for Poland, which is 39.3% [Satańczuk-Gałowiczek, 2017]. The W_1 coefficient is very diverse. It ranges from 10.6% in the village of Tarnogóra, up to 46.3% in the village of Roźwienica, which is graphically presented in Figure 6. On the other hand, the coefficient of increasing the average area of the land plot W_2 in the Podkarpackie voivodeship is 27.0%, and in the Świętokrzyskie it is higher and amounts to 29.7%. The W_2 coefficient is also diversified and ranges from 10.3% in the village of Tarnogóra, to 44.9% in the village of Rudołowice. Detailed values are presented in Table 3 and Figure 6.

Subsequently, calculations were made of another coefficient of reducing the number of plots in an individual farm as a result of consolidation W_3 , which is 39.4% of the average number of plots in a farm in the Podkarpackie voivodeship and much higher, amounting to 46.6% in the Świętokrzyskie voivodeship. The calculated W_3 index is very diverse in the examined localities. In Pantalowice, the decrease in the number of plots of land is 20.1%, while in the village of Słupia it is 63.3%, as shown graphically in Figure 6. As shown in Table 3 and Figure 6, the density of the road network before consolidation was 5.13 km/100 ha of GR in the Podkarpackie voivodeship, while in Świętokrzyskie it was only 2.18 km/100 ha of GR. However, the density of the road network before the consolidation is very diverse and ranges from 2.25 km/100 ha of GR in the village of Rozbórz Okrągły, to 9.39 km/100 ha of GR in the village of Hucisko. Subsequently, after consolidation, the road network density was calculated, which is 6.01 km/100 ha of GR in the Podkarpackie voivodeship, while in Świętokrzyskie it was only 2.33 km/100 ha of GR. Detailed road network densities in individual towns after consolidation are presented in Table 3 and Figure 6. In the Podkarpackie voivodeship, the

Table 3. Effects of consolidation of land in selected localities of the Podkarpackie and Świętokrzyskie voivodeships

Research area	Land consolidation in the village		Number of plots in the village			Average plot area in the village			Average number of plots in an individual farm			Road network density		
			before land consolidation	after land consolidation	W ₁	before land consolidation	after land consolidation	W ₂	before land consolidation	after land consolidation	W ₃	G ₁ before	G ₂ after	W ₄
	ha	%	number	number	%	number	number	%	number	number	%	km/100 haGR	km/100 haGR	%
	Podkarpackie voivodeship													
Hłudno	1,224.7	96.8	5,284	3,368	36.3	0.24	0.38	36.3	21	11	47.6	6.82	9.3	26.7
Bystrowice	455.56	100	1,147	724	36.9	0.4	0.63	36.4	4.2	2.1	51	4.78	4.78	0
Tyniowice	321.22	100	771	487	36.8	0.42	0.66	36.3	4.2	2.1	51	5.84	5.84	0
Więckowice	297.51	100	594	381	35.9	0.5	0.78	36	4.2	2.1	51	6.36	6.36	0
Rożwienica	621.43	71.6	1,307	702	46.3	0.66	0.89	25.4	2.7	1.7	35.3	6.37	8.26	22.8
Rudołowice	871.1	100	2,727	1,500	45	0.32	0.58	44.9	2.7	1.7	35.3	5.92	7.1	16.7
Rozbórz Okrągły	377.44	100	1,005	740	26.4	0.38	0.51	26.4	2.7	2.4	11.1	2.25	2.69	16.1
Hucisko	438.37	96.2	2,355	1,563	33.6	0.19	0.28	32.1	11.5	8.3	27.8	9.39	9.11	-3.1
Tarnogóra	660.76	46.8	1,881	1,682	10.6	0.35	0.39	10.3	6.9	3.8	44.9	4.1	7.23	43.2
Domacyny	276.48	100	637	489	23.2	0.43	0.57	26.4	3.3	2.6	21.2	2.9	3.45	15.9
Pantalowice	1,142.85	100	3,433	2,283	33.5	0.33	0.5	34	3.5	2.8	20.1	4.08	4.08	0
Łopuszka Mała	330.74	100	1,028	729	29.1	0.33	0.46	28.3	4.7	3.1	34	4.01	3.81	-5.1
Żuklin	454.22	100	1,322	820	38	0.34	0.55	38.2	5	3	40	3.94	4.41	10.5
Roźniatów	510.12	89.1	1,369	879	35.8	0.41	0.65	36.9	5.8	2.3	60.3	4.67	3.9	-19.9
Pełnatycze	533.89	94.7	1,254	851	32.1	0.45	0.67	32.9	6	3.7	38.3	6.18	4.76	-29.9
Harta	2,157	84	7,715	5,144	33.3	0.33	0.42	21.3	9	6	33.3	4.52	6.69	32.4
Overall	10,673.39	87.3	33,829	22,342	34	0.35	0.48	27	8.3	5	39.4	5.13	6.01	14.7
Świętokrzyskie voivodeship														
Słupia	1,260	87.44	1,523	1,021	33	0.83	1.25	33.9	6	2.2	63.3	3.74	3.85	3
Wielkopole	130	100	211	167	20.9	0.62	0.78	21.3	5	2.8	44	0.52	0.49	-4.9
Raszków	940	84.76	1,002	675	32.6	0.94	1.42	33.9	4	2.7	32.5	2.3	2.65	13.1
Overall	2,330	90.73	2,736	1,863	28.8	0.79	1.15	29.7	5	2.6	46.6	2.18	2.33	3.7

Source: own research.

lowest road network density in Rozbórz Okrągły is 2.69 km/100 ha GR. On the other hand, the largest one is in Hłudno, amounts to 9.30 km/100 ha of GR. In the Świętokrzyskie voivodeship, the road network density after consolidation is the lowest in Wielopole, it is 0.49 km/100 ha of GR. On the other hand, the largest one is in Słupie, it is 3.85 km/100 ha of GR, but it is 5.45 km /100 ha of GR lower than the highest in the Podkarpackie. To illustrate the road network

density in detail, the percentage of the road network was calculated, as shown in Table 3 and Figure 6.

Overall, the road network indicator for the Podkarpackie voivodeship is +14.7%. However, for the Świętokrzyskie voivodeship it is only +3.7%. However, the road network index varies considerably in individual villages. It ranges from +32.4% in the village of Harta, to -29.9% in the village of Pełnatycze, where the density of the road network has decreased.

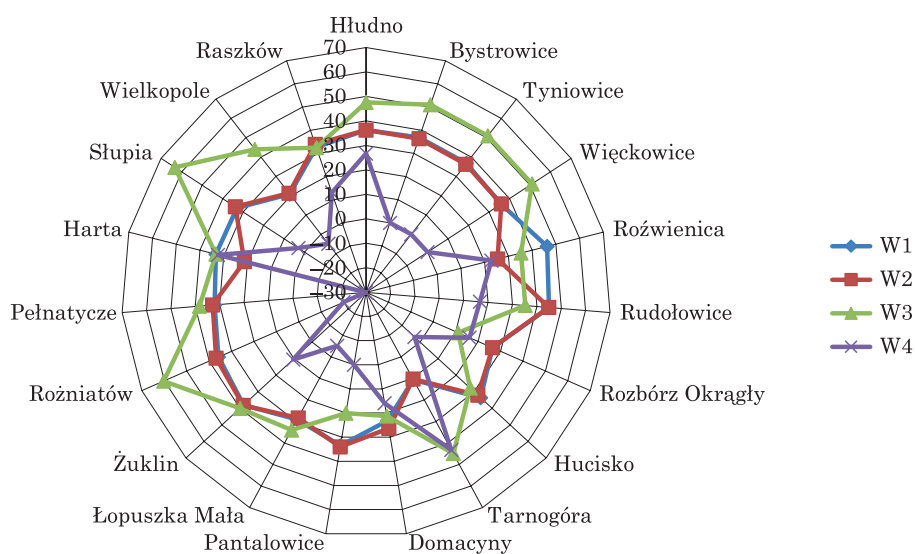


Fig. 6. Effects presented in the form of coefficients W_1 , W_2 , W_3 , W_4 for consolidation of land in selected localities of the Podkarpackie and Świętokrzyskie voivodeships
Source: own research.

In villages where the road network index is negative, we observe the phenomenon of liquidation of unnecessary roads, which made it difficult for farmers to manage rationally. These are villages where the average area of an individual farm is about 3 ha. In the villages of Bystrowice, Tyniowice, Więckowice and Pantalowice, the indicator is 0%, which means that the density of the road network has not changed as a result of consolidation.

CONCLUSIONS

In this study, two adjacent voivodeships in Poland were compared: Podkarpackie and Świętokrzyskie. The analyzes were carried out for 19 villages covered by land consolidation with EU funding. The evaluation of the consolidation of land was made in the merged precincts in the years 2007–2020. For each of these objects in the state before and after consolidation, four indicators were calculated showing the effects of land consolidation. As part of this study, the following conclusions were obtained:

1. Index W_1 – the coefficient of reducing the number of plots as a result of consolidation in the examined objects indicated the result of 34.0% for

the Podkarpackie voivodeship, and 28.8% for the Świętokrzyskie. In both cases, it is lower than the rate for Poland. This proves that in the analyzed voivodeships there is a very high fragmentation and many participants of land consolidation. It is very difficult to carry out consolidation and exchange of land with a large number of participants of consolidation and high fragmentation. In addition, a very unfavorable ribbon system does not facilitate this work [Balawejder, 2010a; Balawejder, 2010b].

2. Index W_2 – the coefficient of increasing the average plot area in the consolidation facility in the Podkarpackie voivodeship is 27.0%, and in the Świętokrzyskie voivodeship it is higher and amounts to 29.7%. Unfortunately, this is only a quarter of the possibilities. Such a low coefficient is not favorable for farming in the Podkarpackie and Świętokrzyskie voivodeships. Nowadays, in rural areas, min. therefore, the share of agricultural production is decreasing. The structure of registration plots limits the possibilities of developing various functions in rural areas [Delnicki et al., 2019].

3. Index W_3 – the coefficient of reducing the number of plots in an individual farm as a result of consolidation, which amounts to 39.4% of the aver-

age number of plots in a farm in the Podkarpackie voivodeship and much higher, amounting to 46.6% in the Świętokrzyskie. This is half the full potential. In order to achieve better effects of land consolidation, i.e. to reduce the number of plots with a simultaneous increase in their area, additional criteria should be introduced. It would depend on them to grant EU financial aid, such as the factor of increasing the area of plots or reducing the number of registration plots.

4. Index W_4 – road network density indicator in the total area of the consolidated area for the Podkarpackie voivodeship, the road network indicator is +14.7%. However, for the Świętokrzyskie it is only +3.7%. This is a very low rate. In villages where the road network index is negative, we observe the phenomenon of liquidation of unnecessary roads, which made it difficult for farmers to manage rationally. These are villages where the average area of an individual farm is about 3 ha. It is disturbing that in some villages the indicator is 0%, so the density of the road network has not changed as a result of land consolidation. On the other hand, this indicator is often mentioned by communes as the most important consolidation effect. A very important of land consolidation effect is post-merger management, including the arrangement and modernization of “agricultural transport roads”, which provide access to each registration plot and access roads to individual farm habitats. Perhaps on the legal basis, it is worth defining the basic technical parameters and standards for the construction and modernization of “agricultural transport roads” and include the existing municipal roads for post-merger development and simplify the provisions on construction works (culverts, road exits, etc.) in the land consolidation project.

Summing up, when comparing the effects of land consolidation in two voivodeships, attention should be paid to the preparation and selection of data for analysis. The study analyzed four indicators showing the effects of land consolidation. The results obtained for these two voivodeships were similar. However, unsatisfactory. Therefore, the question arises whether the hierarchy of performing land consolidation should not be carried out before submitting applications

for co-financing of land consolidation by the EU. According to Balawejder and Leń [2016] or Stręk and Noga [2019] or Mika, Leń, Oleniacz and Kurowska [2019], prior to the land consolidation project, prioritization of the needs of land consolidation should be performed, divided into counties and municipalities, which can be used for objectively distributing financial assistance resources. This should be done because the money for co-financing land consolidation projects co-financed from the EU is not enough for all villages requiring land consolidation. According to Hartvigsen [2015], Poland has the status of an ongoing land consolidation program. This is related to the EU programs that have been implemented in Poland since 2004 until now, but there is still not enough land covered by land consolidation. It should be remembered that the greater the awareness of the inhabitants of villages selected for consolidation, the better the effect of land consolidation. It is noticeable that the level of knowledge of merge participants is related to the level of satisfaction with the mergers and post-merger management. Perhaps it is worth developing and implementing a training methodology in order to increase the knowledge of merger participants in the field of merging and replacement of land and post-merger management.

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