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THE EVALUATION OF THE AGRARIAN STRUCTURE IN THE POMERANIA AND KUJAWY REGIONS IN THE YEARS 1921 AND 2002

OCENA STRUKTURY AGRARNEJ NA POMORZU I KUJAWACH W LATACH 1921 I 2002

Key words: agrarian structure, Gini coefficient, Pomerania and Kujawy regions
Słowa kluczowe: struktura agrarna, współczynnik Giniego, Pomorze i Kujawy

Abstract. The article attempts to present the agrarian structure in the Pomerania and Kujawy regions in the years 1920 and 2002. The differentiations occurring within the agrarian structure were measured with the application of the Gini coefficient. As shown in the paper, despite the flow of time and the shaping transformations the structure has not been changed significantly. In the majority of the districts the structure has worsened which results from the process of the defragmentation of agricultural holdings. In spite of the implementation of the common agrarian and economic policies the shape of the agrarian structure present in 1918 has, in fact, persevered up to now.

Introduction

One of the underlying concepts applied in the description of the transformations occurring in agriculture as such and rural areas of specific regions and states is the concept of agrarian structure. For the purposes of the present paper the agrarian structure is going to be understood as the participation of specific area groups in the overall number (area) of agricultural holdings [Happe 2004, Happe et al. 2005]. The data used in the paper come form the First Common Census of the Republic of Poland of 30 September, 1921 and from the State Agricultural Census conducted in 2002[1].

The paper seeks to present and compare the agrarian structure in the Pomerania and Kujawy regions in the years 1920 and 2002. Due to certain definition related problems and for the sake of maintaining the data comparability appropriate assumptions have been made. The compared regions of Pomerania and Kujawy currently form the kujawsko-pomorskie province. However, in the year 1921 they constituted separate districts belonging to the then three provinces (warszawskie, poznańskie and pomorskie), and their overall area equalled the area of the present kujawsko-pomorskie province. In the year 1921 the overall area of the districts discussed was 18,769 km², and in the year 2002 their overall area equalled 17, 972 km². Within the period of almost one hundred years some districts ceased to exist, as, for instance, the nieszawski district out of which the aleksandrowski and radziejowski districts were established. The brodnicki, rypiński and wąbrzeski districts still exist, however their area was partially decreased in order to establish yet another district – the golubsko-dobrzyński district. Moreover, the present kujawsko-pomorskie province covers approximately a half of the former wyrzyski district.

The data from 2002 concerning agricultural land in private agricultural holdings were compared with the data from 1921 on the overall area of agricultural holdings, excluding forests and wasteland (presently agricultural land).

In order to determine the disproportionality of the deployment of agricultural land the Gini coefficient was applied. The coefficient is a measure of the distribution of the variable (in this case – of the agricultural land variable) among agricultural holdings. The value of the Gini coefficient ranges from 0 to 1. It equals 0 if the distribution of the variable is equal (e.g., 50% of arable land is possessed by 50% of agricultural holdings), and it moves towards 1 together with an increase in the concentration of agricultural land.

[1] At the moment of writing the present paper the data concerning the number of agricultural holdings and the area of arable land as per poviat obtained within the State Agricultural Census of 2012 were not available yet. All the calculations were made with the use of the R-Cran programme.

The Gini coefficient was calculated with the Brown Formula shown below [Özdemir et al. 2011][2]:

$$G = 1 - \sum_{k=0}^{n-1} (X_{k+1} - X_k)(Y_{k+1} + Y_k) \quad (1)$$

where:
X – cumulated share of the number of agricultural holdings,
Y – cumulated share of the area of arable land.

The agrarian structure in the Pomerania and Kujawy regions in 1921 and 2002

In the period researched the area of agricultural land in the Pomerania and Kujawy regions decreased from 1.4 million hectares to about 1.08 million hectares. That is due to their transformation in industrial or construction areas. The share of agricultural land in the overall area fell from 74.9% to 60.3% [Jaskulski, Jaskulska 2011]. At the same time the number of agricultural holdings fell by only 3,266. Also, we can see a considerable fall of over 50% in agricultural land possessed by the larges agricultural holdings. The above changes lead to a decrease in the Gini coefficient from 0.59 in the year 1921 to 0.50 in 2002.

Table 1.The number and area of agricultural holdings in the kujawsko-pomorskie province in the years 1921 and 2002
Tabela 1. Liczba i powierzchnia gospodarstw rolnych na terenie województwa kujawsko-pomorskiego w latach 1921 w 2002

Specification/ ***Wyszczególnienie***	**Farms total/** ***Gospodarstwa ogółem***	**Private farms/** ***Gospodarstwa indywidualne***
Years/*Lata*	**1921**	**2002**
Overall area of the districts/*Powierzchnia całkowita [km²]*	18,769	17,972
Number of farms total, of which/*Liczba gospodarstw ogółem, w tym:*	82,793	79,527
– 1-5 ha	29,181	28,295
– 5-10 ha	19,984	19,113
– 10-20 ha	20,780	20,543
– 20-50 ha	9,408	10,105
– over 50/*powyżej 50 ha*	3,440	1,471
Area of farms total, of which/*Powierzchnia gospodarstw ogółem [ha]*, w tym:	1,405,606	1,083,286
– 1-5 ha	77,562	67,646
– 5-10 ha	136,543	142,407
– 10-20 ha	280,569	289,412
– 20-50 ha	253,948	293,174
– over 50/*powyżej 50 ha*	656,984	290,647
Arable coefficient/ *Wskaźnik urolnienia** [%]	74.9	60.3
Gini coefficient/ *Współczynnik Giniego*	0.59	0.50

* Arable coefficient = share of agricultural land in the total area/ *Wskaźnik urolnienia = udział użytków rolnych w powierzchni*
Source: own study based on the results of the Pierwszy Powszechny…1921, Bank Danych Lokalnych 2012
Źródło: opracowanie własne na podstawie wyników Pierwszy Powszechny …1921, Bank Danych Lokalnych 2012

In the 1921-2002 time period the agrarian structure was impacted by various political, economic, historical and cultural factors. The interwar period was characterized by the breaking up of huge land estates as well as of the land belonging to the Roman Catholic Church. The post-war period was the time of the collectivization of agriculture and pressure was put on establishing state agricultural holdings and individual farmers were either encouraged or compelled to give their land into the disposal of the State Treasury. After Poland had gained again its political independence in the year 1989, State Agricultural Holdings were put on sale. At that time the State Treasury also offered preferential agricultural loans and that resulted in a dynamic growth in individual agricultural holdings [Spaulding 2009, Grancelli 2011].

Historical background constitutes one of the factors shaping the agrarian structure [Happe 2004]. As show in table 2 and figures 1 and 2, the lowest values of the Gini coefficient occurred, and are still occurring, in the southern and eastern districts of the kujawsko-pomorskie province. That land used to be under Russian rule and the annexed territory had its border along the borders of the rypiński, lipnowski and nieszawski (as seen from today's administrational division – firstly, the border went along the border of the present rypiński district, then it went across the golubsko-dobrzyński and toruński districts and, further, along the borders of the aleksandrowski and radziejowski districts).

[2] More about the Gini coefficient and his other calculation methods also in [Ceriani, Verme 2011].

Table 2. The Gini coefficient, the number and area of agricultural holdings in the districts of the kujawsko-pomorskie province in the years 1921 and 2002
Tabela 2. Współczynnik Giniego, liczba i powierzchnia gospodarstw rolnych (wiejskich) w powiatach województwa kujawsko-pomorskiego w latach 1921 oraz 2002

NO./ *Nr*	Districts/ *Powiaty*		The Gini coefficient/ *Współczynnik Giniego*		Area of agricultural holdings [thous. ha]/*Powierzchnia gospodarstw [tys. ha]*		Number farms [thous.]/*Liczba gospodarstw [tys.]*	
	1921	2002	1921	2002	1921	2002	1921	2002
1	brodnicki	brodnicki	0.63	0.53	80,395	64,610	5,008	5,205
	rypiński	rypiński	0.58	0.41	100,999	38,390	7,475	3,777
	wąbrzeski	wąbrzeski	0.61	0.55	58,990	40,566	3,950	2,475
	-	golubsko-dobrzyński	-	0.51	-	44,579	-	3,732
2	bydgoski	bydgoski	0.64	0.65	79,478	59,044	4,542	4,456
3	chełmiński	chełmiński	0.70	0.57	60,284	40,160	3,018	2,808
4	grudziądzki	grudziądzki	0.69	0.63	66,986	53,182	3,037	3,409
5	inowrocławski	inowrocławski	0.69	0.59	80,269	86,597	3,073	5,054
6	lipnowski	lipnowski	0.59	0.44	110,249	63,382	8,906	5,989
7	mogileński	mogileński	0.60	0.54	67,647	44,680	2,775	2,736
8	nieszawski	-	0.58	-	110,335	-	8,255	-
	-	aleksandrowski	-	0.47	-	35,806	-	3,528
	-	radziejowski	-	0.46	-	50,252	-	4,086
9	sępoleński	sępoleński	0.60	0.59	50,076	46,553	2,526	2,165
10	szubiński	-	0.64	X	69,424	-	3,519	-
	wyrzyski	-	0.67	X	100,552	-	3,869	-
	żniński	żniński	0.58	0.63	64,492	71,387	2,534	3,310
	-	nakielski	-	0.64	-	68,242	-	3,258
11	świecki	świecki	0.62	0.61	99,173	70,798	7,246	5,487
12	toruński	toruński	0.68	0.57	60,948	63,378	3,154	5,419
13	tucholski	tucholski	0.61	0.61	46,016	42,735	2,887	3,204
14	włocławski (including the town of Włocławek)	włocławski	0.64	0.46	95,962	94,356	6,309	8,532
	-	Włocławek	-	0.44	-	884	-	191
15	-	-						
16	Bydgoszcz	Bydgoszcz	0.46	0.64	2,597	1,664	567	280
17	Grudziądz	Grudziądz	0.53	0.50	281	1,283	33	285
18	Toruń	Toruń	0.34	0.56	453	758	110	141
Total/*Łącznie*		-	-	-	1,405,606	1,083,286	82,793	79,527

Source: see tab. 1
Źródło: jak w tab. 1

In the majority of districts the Gini coefficient decreased. Obviously, the decrease was smaller in the western and northern districts (such as, for instance, żniński and tucholski) than in the eastern districts (e.g., lipnowski and włocławski). In the year 1921 the Gini coefficient reached the value below 0.6 in only four districts; however, in 2002 the coefficient exceeded that value merely in six districts (excluding urban areas)[3].

[3] Due to a decrease of the value of the Gini coefficient, as seen in figures 1 and 2, the division of the poviats into four groups as well as their borderlines were established by the authors arbitrarily and distinctively for respective years. For the purpose of increasing the clarity of the data presented in Figures 1 and 2 the following towns are omitted: Bydgoszcz, Grudziądz, Toruń and Włocławek. The reason for doing so is a small share of agricultural holdings in the total area.

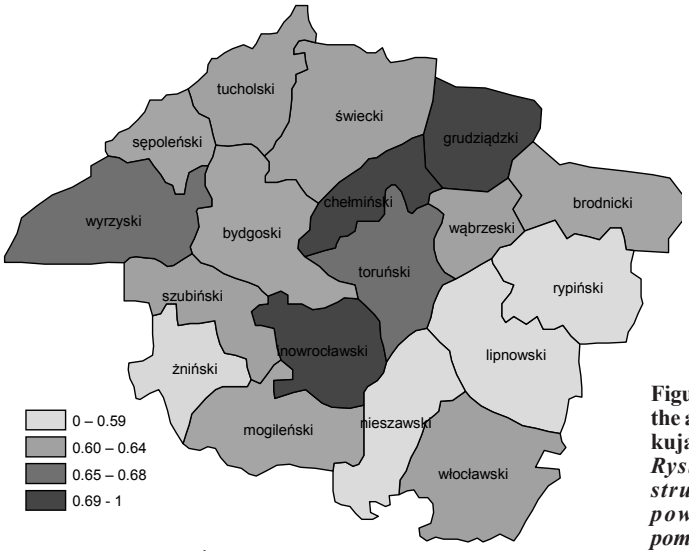

Figure 1. The Gini coefficient calculated for the agrarian structure in the districts of the kujawsko-pomorskie province as of 1921
Rysunek 1. Współczynnik Giniego dla struktury agrarnej w poszczególnych powiatach województwa kujawsko-pomorskiego w 1921 r.
Source: own study
Źródło: opracowanie własne

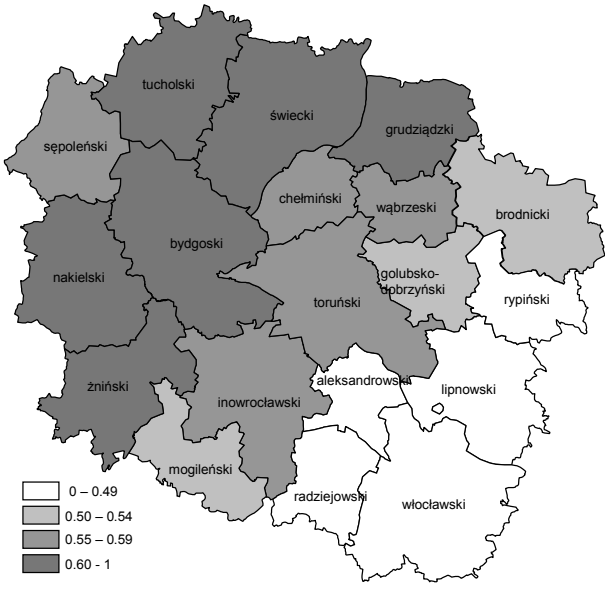

Figure 2. The Gini coefficient calculated for the agrarian structure in the districts of the kujawsko-pomorskie province as of 2002
Rysunek 2. Współczynnik Giniego dla struktury agrarnej w poszczególnych powiatach województwa kujawsko-pomorskiego w 2002 r.
Source: own study
Źródło: opracowanie własne

Conclusions

Based on the research conducted on the agrarian structure of the kujawsko-pomorskie province it can be concluded that any changes in it may be difficult to be implemented. Despite the fact that for the last hundred years farmers in the districts of the kujawsko-pomorskie province have been affected by the same set of activities, some differences resulting from historical reasons remain unchanged. The lowest values of the Gini coefficient can be seen in the districts established on the area that used to be under Russian rule.

In the period between 1921 and 2002 the concentration of agricultural land decreased. On the one hand, it may bring positive results since the number of people running their own agricultural holdings rises; on the other hand, the defragmentation of agriculture may lead to stagnation in technological progress and growth in unit production costs.

Therefore, while preparing any plans to be realized within the agrarian structure policy one should bear in mind the difficulties related to intended changes in it and the lasting character of those changes which, in most cases, are impossible to be reversed for a considerably long period of time.

Bibliography

Bank Danych Lokalnych, [www.stat.gov.pl], 20.03.2012.
Ceriani L., Verme P. 1912: The origins of the Gini index: extracts from Variabilità e Mutabilità (1912) by Corrado Gini. *Journal of Economic Inequality*, (for coming).
Grancelli B. 2011: Local development in the rural regions of Eastern Europe: Post-socialist paradoxes of economic and social Entrepreneurship. *Journal for East European Management,* vol. 16 Issue 1, 31-53.
Happe K. 2004: Agricultural policies and farm structures. Agent-based modelling and application to EU-policy reform. *Studies on the Agricultural and Food Sector in Central and Eastern Europe*, vol. 30, Halle (Saale): IAMO, 1-13.
Happe K., Balmann A., Kellermann K. et al. 2005: Does structure matter? The impact of switching the agricultural policy regime on farm structures. *Journal of Economic Behavior& Organization*, vol. 67, Issue 2, 432-436.
Jaskulski D, Jaskulska I. 2011: Share of Agricultural Land in Spatial Variation in Plant Cover of Kujawy and Pomorze Province. *Polish Journal of Environmental Studies*, vol. 20, Issue 3, 571-579.
Özdemir P., Karabulut E., Menteş T. 2011: Examination of Inequality of Life Span by Using the Gini Coefficient in the Turkish Population for the Period 1990-2008. *Balkan Medical Journal*, vol. 28, Issue 4, 421.
Pierwszy Powszechny Spis Rzeczypospolitej Polskiej z dnia 30 września 1921 r. GUS, Warszawa, [www.stat.gov.pl], 20.03.2012.
Spaulding R.M. 2009: "Agricultural Statecraft" in the Cold War. A Case Study of Poland and the Westfrom 1945 to 1957. *Agricultural History*, vol. 83, Issue 1, 5-28.

Streszczenie

Celem artykułu było zaprezentowanie struktury agrarnej na Pomorzu i Kujawach w latach 1921 i 2002. W większości powiatów struktura ta pogorszyła się, co jest wynikiem rozdrobnienia gospodarstw rolnych. Z jednej strony może to mieć pozytywne skutki – większa liczba osób we własnym gospodarstwie rolnym. Z drugiej jednak rozdrobnienie rolnictwa może oznaczać brak możliwości postępu i zwiększenie jednostkowych kosztów produkcji.

Pomimo Wspólnej Polityki Rolnej, gospodarcze i ekonomiczne różnice w strukturze agrarnej z 1918 r. pozostają zauważalne i obecnie. W związku z tym formułując jakiekolwiek plany w zakresie polityki dotyczącej struktury agrarnej należy uwzględnić trudności związane z jej zmianą oraz trwałość wprowadzonych zmian, które mogą być nieodwracalne.

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