Bulgarian Journal of Agricultural Science, 20 (No 5) 2014, 1018-1039
Agricultural Academy

THE ANALYSIS OF THE AGRARIAN STRUCTURE IN POLAND WITH THE SPECIAL CONSIDERATION OF THE YEARS 1921 AND 2002

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Abstract

PIETRZAK, M. B. and D. WALCZAK, 2014. The analysis of the agrarian structure in Poland with the special consideration of the years 1921 and 2002. *Bulg. J. Agric. Sci.,* 20: 1018-1039

The subject of the paper concerns the spatial differentiation of Poland's agrarian structure and its volatility over time. The agrarian structure is very important if considered from the perspective of the agricultural policy, since it determines the economic situation in the agricultural sector. The size of agricultural farms conditions, for instance, farmers' income levels, or farms' productivity. On a country's scale, the adequate agrarian structure ensures the maintenance of agricultural production at an appropriate level, which translates into the country's food safety.

A characteristic feature of Poland's agriculture, in the aspect of the agrarian structure, is its dispersion and significant spatial differentiation. Over years, the agrarian structure in Poland has been affected by a lot of various factors. However, the spatial differentiation of the agrarian structure has remained unchanged despite the implementation of various policies in the past. This lasting nature of the agrarian structure results, among other things, from economic, social, and historical factors. The analysis of the spatial differentiation of the agrarian structure constitutes one of the arguments in favour of the verification of a research hypothesis formulated by the authors. According to the research thesis, the agrarian structure is a long-term and lasting structure. Also, the authors indicate the importance of the consideration of a selected country's agrarian structure due to the planned agricultural policy concerning the implementation of vital changes in the agricultural sector.

Key words: Poland, agrarian structure, long-term structure, spatial dependency

Introduction

The subject of the paper concerns the spatial differentiation of Poland's agrarian structure and its volatility over time. The agrarian structure is one of the basic terms applied in the description of changes taking place in agriculture in specific regions or countries. For the purposes of the present paper we define the agrarian structure as the participation of specific area groups in the aggregate number (size) of agricultural households (farms) (Happe, 2004; Happe et al., 2005).

As research findings indicate, any changes in the scope of the agrarian structure do impact the level of income in farms in the same way as any other indicators of well-being impact this social and vocational group referred to as 'farmers'(Reyes, 2002; Mutunhu, 2008). The agrarian structure also translates into the situation in non-agricultural sectors. Examples include the impact of income earned by farmers on incomes earned by people working in non-agricultural sectors. In the case of low incomes derived from agricultural production, we can observe a process of 'pushing out' farmers to non-agricultural works, which by increasing the job supply may contribute to lowering pays (Gürel, 2011; Ingham et al., 2011).

Changes in the agrarian structure occur in a lot of countries. These changes affect both the participation of agrarian land in the total of land and the number of farms and their sizes. As regards changes in the participation of agrarian land in the total of land, these values have increased over time. In many countries forest areas or meadows are transformed into arable land, e.g., in 1920 in the Philippines arable land constituted merely 12 per cent and in 1980 it increased to 32 per

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cent. A similar increase was noted in other Asian countries (Goldewijk and Ramankutty, 2005). As concerns the area researched by the authors, i.e., the area of Poland[1], the participation fell from 62.3 per cent, in 1921 to 56.4 per cent in 2002. However, the number of farms in Poland grew from 1.60 million in 1921 to 1.65 million[2] in 2002. At the same time, in the United States in the time period 1935 – 1988 the number of farms decreased by 66 per cent (Colwell and Yavaş, 1994).

The research objective of the present paper is to analyse the changes that occurred in Poland's agrarian structure with the emphasis laid on the years 1921 and 2002 and the strengthening of the agrarian structure due to the partitions of Poland made by Russia, Prussia, and Austria in the years 1772-1795. As a result of the partitions, Poland was divided into three occupational zones controlled by the three above-mentioned aggressors. Russia received the areas of central and eastern Poland, including such geographical regions as Podlasie, Mazowszee, Kujawy. Prussia controlled the areas of today's central and northern Poland with such regions as Wielkopolska, Pomerania, and part of Silesia. Austria, in turn, got southern Poland, the then Galicia and today's Małopolska region. As a result, it led to the creation of a homogenous agrarian structure with a high concentration of arable land in the zone belonging to Prussia, an unfavourable homogenous agrarian structure with a low concentration of arable land in the Austrian occupational zone and to the creation of a differentiated agrarian structure with a medium concentration of arable land in the Russian zone.

In the paper the authors set a research hypothesis according to which the agrarian structure is a long-term structure within the meaning of the concept defined by Fernand Braudel. According to Braudel 'The second key, which is more useful, is a word "structure." Whether for good or bad, it controls the issue of long-term continuation. (…) Some structures have long lives and become permanent. In other words, some structures stop the tide of history, agitate it, and then control it.' For him it is the opposite of event '… event: for myself I would limit it, and imprison it within the short time span: an event is explosive, a 'nouvelle sonnante' ('a matter of moment') as they said in the sixteenth century.' (Braudel, 1958; Braudel, 1980). In order to verify the hypothesis set a comparison of spatial differentiation of the agrarian structures in 1921 and 2002 was made as well as of the existing spatial dependence. The analysis allowed the formulation of the following statement: despite the implementation of the intense agricultural policies, the agrarian structure in 2002 had much in common with the agrarian structure from 1921. The existing spatial dependence also indicated a spatial similarity in the selected years. The research outcome obtained provides evidence in favour of the formulated research hypothesis.

Historical Conditions of Polish Agriculture

While analysing the agrarian structure in Poland in the years 1921-2010, attention should be paid to the factors that impacted it throughout the time period analysed and prior to that period. The major factors are historical factors. It must be emphasised that the country was established as early as in the tenth century of our era and the key date is the year 966 when Poland was baptised. In the medieval times Poland was one of the largest countries in Europe. In the sixteenth and the seventeenth centuries its area, including fiefdoms, covered the territory of today's Poland, Lithuania, Latvia, Estonia, Belarus, and part of Russia and Ukraine. In the context of the agrarian structure, it must be stressed that in the Wielkopolska region as early as in the sixteenth century the dominating form of ownership was the ownership of gentry which was connected with the functioning of the largest manors. In the Małopolska and Mazowsze regions minor gentry was dominating. The differences between the regions sustained also in the seventeenth century. According to Władysław Grabski, twice elected Poland's Prime Minister and a historian dealing with the history of the Polish agriculture, larger farms existed only in the Mazowsze and Podlasie regions, and Małopolska was characterised by small-sized farms (Bukraba-Rylska, 2008).

Poland started to be referred to as 'The Republic of Poland' in the early seventeenth century and the name was used until the end of the eighteenth century. The years 1772, 1792 and 1795 are the dates when Poland was invaded and started to be occupied by three neighbouring countries – Prussia, Russia and Austria. The situation of agriculture at the period of partitions of Poland can be characterized as follows (Bukraba-Rylska, 2008; Groniowski, 1976):

(1) the Prussian model: farms are large and, therefore, they employ a substantial number of landless peasants;

(2) the southern model (Galicia): characterised by an increasing number of small farms;

(3) the remaining part of the country (mainly the area of the Russian partition) had a big number of farmers and, therefore, the number of hired workers and peasants running small farms was relatively low.

The differentiated economic systems in effect, economic, political and social factors in various occupational zones led to the deepening of regional differences in the levels of the development of agriculture. The only element shared by all of the occupational zones was granting freehold to peasants which led to decreasing the size of farms. The process of granting freehold to peasants at the cost of landed gentry was started first in the Prussian zone (1807), next in the Austrian zone (1848) and finally in the Russian zone (1864). As Groniowski claims, about one million peasants were granted freehold, primarily in the Russian and Austrian zones. The

[1] The area analysed was the area which continuously belonged to Poland from 1921 to 2002. This area will be shown in a further part of the paper in Table 6-8.

[2] The territory of Poland was changed in the indicated period.

process was the slowest in the Prussian occupational zone and in fact it did not affect property changes (Gorzelak, 2010; Groniowski, 1976).

The agrarian structure was also influenced by the economic situation in the occupational zones. In Galicia the agrarian structure was subject of fragmentation due to sharing farms into separate units. Farms were usually shared between siblings who could not find any employment in non-agricultural sectors (literature frequently makes reference to a well-known term of 'the Galician poverty'). Prussia saw an intense industrial development which meant possibilities for children from landed gentry of finding employment in other sectors of the economy. As a result the enforced fragmentation of farms did not occur in that zone. A similar intense industrial development could be seen in the Russian zone. However, opposite to the Prussian zone, the development was more polarized in larger cities (Łódź, Warsaw, Dąbrowa Górnicza), for instance, the population of Łódz in the time period 1815-1915 increased six hundredfold. The limitation of the impact of the growing population on the agrarian structure resulted also from an exceptional development of agricultural crafts (Gorzelak, 2010; Chomać, 1970).

Summing up, it must be noted that in the period of the partitions of Poland, the proportion of land possessed by gentry changed to the benefit of peasants (Jezierski and Leszczyńska, 1997):

(1) in the Prussian zone the share of land owned by peasants rose from 30 per cent in 1870 to 43 per cent in 1910;

(2) in the Russian zone the share rose from 38 per cent to 49 per cent[3];

(3) the largest proportion of land belonged to peasants in the Austrian zone, the change amounted to 8 percentage points (the increase from 58 per cent to 66 per cent).

In 1918, after 123 years of the partitions, the country appeared on the map of Europe again. The new Poland was created out of the three separate zones and inherited different legal, taxation, customs and currency systems. Each of the former invaders had a different organization of the economic and banking administration, different rates of economic development, and, most importantly, different agrarian structures (Ozbay and Aras, 2008). In the inter-war period (1918-1939) Poland's agrarian policy was impacted by numerous economic and political factors. The rural population started to demand similar transformations to those happening in the neighbouring communist Russia[4].

In the face of a potential revolution there was a favourable climate for making changes in the agrarian structure for the benefit of small farms. Therefore, the problem of agricultural reforms, mainly dividing big land properties and church land into smaller parts for the benefit of small farms holders and of peasants who did not possess any land, became the major issue in that time. Parcelling out land was sanctioned legally in 1920 and 1925, and the owners of the parcelled out land were to be compensated with the amount equal to half the value of the parcelled out land (Ciepielewski, 1968). In the inter-war period 2,654.8 thousand hectares of agricultural land of big land properties (above 1,000 hectares) or from the Catholic Church properties were parcelled out. Within the land allotment process 153.6 thousand individual farms were created with the total land surface of 1431.8 hectares (the average size of a newly set up farm was 9.3 hectares and it clearly indicates their production character) and 3.9 thousand of so-called special land of the total surface of 89.7 hectares. As follows from the figures, 57.3 per cent of the parcelled out land became the property of the newly established farms (GUS 1939).

The process of the implementation of agricultural reforms was ceased by the breakout of the Second World War. After the war the People's Republic of Poland became dependent on the Soviet Union. In the early post-war period, due to the change of the political system, an agricultural reform was conducted and it covered the whole country. In accordance with the provisions of the reform, German land properties and any land property bigger than 100 hectares located in western and northern Poland and any property bigger than 50 hectares and located in eastern, central or southern parts were to be nationalised. Within the nationalisation process, big land properties were divided between new land owners or were transformed into state agricultural farms. In the years 1945-1949 as many as 2384.4 thousand hectares were divided among 601.5 thousand farms and out of that number 347.1 thousand were newly established farms and 254.4 thousand were added to the already existing farms.

Similar to the solution applied in the Soviet Union, it was intended to collectivize individual farmers and their land was to be included to State Agricultural Farms or to Agricultural Cooperatives (so-called nationalised farming). Unlike in the Soviet Union, the collectivisation process failed in Poland, however, individual farmers were made legally incapacitated through being fully dependent on the state in production, supplies, sale, and in social aspects as well (Zelenin, 2011; Van Zyl et al., 1996). Despite that in Poland, unlike in other communist states, agricultural production was controlled by private family agricultural farms. Although private farms were small, they provided approximately 76 per cent of the agricultural production (when possessing 75 per cent of agricultural land) in 1990 and their efficiency, though state farms were favoured, was comparable to the nationalized economy (BneSaad, 2002). Poland was the only country of the eastern bloc in which private agricultural farms, usually family ones, existed and played such a big role. (Brada and King, 1993;

[3] The share of the land property in that period fell from 40.6 per cent to 34.8 per cent (Chomać, 1970, 81).

[4] Another purpose of the process of parcelling out of land properties was enriching the poorest social groups and in that way diluting the social support for communist parties backed by Russia (from 1922 on by the Soviet Union) fighting for the rights of the poor.

Pouliquen, 1989). However, for the post-war period more important is the analysis of the size of state farms, which despite indoctrinating farmers to make them include their land to the so-called nationalized economy, oscillated around 4.2-4.3 million hectares of agricultural land. In 1990 the total land controlled by state farms was 4.2 million and was regularly decreased. At the end of 2012 a state agency[5] responsible for selling and leasing agricultural land of 4740.4 thousand hectares (agricultural land and other property), which it disposed on the date of its creation in 1992, managed to sell, or give away free of charge, about 2641.1 thousand hectares.

Therefore, after twenty years of activity the agency is still in the possession of 2100 thousand hectares of land (GUS 2011a).

After the collapse of socialism in Poland in 1989, private family farms did not stop to exist but modified their relations with the changing environment into more market ones. Under a market economy, those farms adapted to a new economic situation. Moreover, due to the sale of cheap land from State Agricultural Farms and subsidising preferential loans from the state budget, private farms developed mainly through increasing their size (Spaulding, 2009; Grancelli, 2011).

After Poland's joining the European Union in 2004, and despite the implementation of programmes supporting changes in the agrarian structure, for instance early retirement, attempts to make positive changes failed. Early retirement in Poland, like in France, was more successful in the social and redistributions aspects than in the realisation of the structural goals (Fellmann and Möllers, 2009). Obviously, after joining the European Union the Polish agricultural sector obtained a possibility to use direct funds and many other forms of support such as, for instance, support given to young farmers or to investments in agricultural farms. On the one hand, such funds support the development of the Polish agriculture; however, on the other hand, through subsidizing unprofitable farms with direct funds they impede changes in the agrarian structure in Poland (Gazinski, 2010).

While providing an overview of the situation in Polish agricultural sector after 1989, it is necessary to mention the legal aspects governing it that is the major legal act – the Constitution of the Republic of Poland. Article 23 of the Constitution of the Republic of Poland from 1997 provides that the basis of the agricultural system in Poland is a family farm[6]. Therefore, this provision impedes making changes in the agrarian structure in Poland (it may be stated that farms are usually run by families and the ownership of properties is handed down from generation to generation). In particular, emphasis should be laid on the fact that small family farms base on the work of family members and the emotional, aesthetic and social values of land have survived and have been handed down from generation to generation (Buzalka, 2008). However, this is the possibility of the engagement of the work of family members that gives an edge over large industrial farms. Also, private farms frequently specialise in labour-intense production such as, for instance, fruit framing (Ciaian et al., 2009).

The Current Situation of Polish Agriculture

In Poland the analysis of the agrarian structure is becoming crucial due to a poor condition in the agricultural sector. In accordance with FADN (Farm Accountancy Data Network)[7], out of over 2.26 million of Polish farms in 2010 merely 738 thousand gained an annual profit of over 4000 Euros and produced about 90 per cent of the so-called standard production in all farms. The implication is that approximately 1.5 million of farms generate a profit below 4000 Euros, and in most cases they produce only to satisfy their own needs, or do not produce at all (FADN 2011). Therefore, it is necessary to present the factors which have led to the situation in which about 70 per cent farms produce below 10 per cent of the agricultural output in Poland and do not guarantee the income even at the level of social minimum, which in a two-person employee farm in Poland in 2010 amounted to 4700 Euro (18 564.84 PLN) (Institute 2011; Michna, 2007).

The average size of a farm in the European Union is 21.6 hectares of arable land, while in Poland it is only 9.6 hectares. Comparing the average size of farms in the European Union, the largest ones can be found in the Czech Republic (152.4) and Great Britain (78.6), however, ones that have below 10 hectares are popular in such countries as Greece (5.8) or Italy (7.9), the smallest are in Malta (0.9). In the case of Polish farmers, the problem is that they are not able to compete with big and well-developed farms (Eurostat, 2011)[8].

The agricultural, forestry and fishery sectors generate merely 3.1 per cent of the Gross Domestic Product calculated in current prices and employ 14.8 per cent of those economically active (data for 2010) (GUS 2011b). Of course the participation of agriculture in GDP for the services sector, and decreasing the number of the employed in agriculture, is demanded. However, a mention must be made that

[5] In 1992 the arable land belonging to the State Treasury was handed over to a state institution – Agricultural Property Agency of State Treasury, and since 2003 it has functioned as Agricultural Property Agency whose aim is to restructure and privatize the property of State Treasury for agricultural purposes (Marks-Bielska and Żukovskis, 2011).

[6] A family farm in Poland is economically and socially a farm that is run by an individual (individuals) and his/her other family members are also involved in running it. Quite frequently agricultural property is handed down from generation to generation.

[7] The FADN system (Farm Accountancy Data Network) was established in 1965 to create a common agricultural policy and it functions in all EU member states. It is focused on farms that produce about 90 per cent of the Standard Output.

[8] It must be emphasised that the data presented include only those farms whose economic size (the value of animal and plant output) exceeds 1 ESU (European Size Unit) =1.2 EUR.

self-sufficiency in food is a crucial factor in the context of the country's security. One of the basic elements making up this security is crops production which is used for consumption purposes and for animal feed. Unfortunately, the average wheat yield from a hectare in Poland, with a decreasing acreage of arable land (Table 4), has grown but very slightly, from 35.0 dt/ha in 1999 to 41.3 dt/ha in 2011. It is important particularly in the context of using crops for other purposes than food production, for instance energy production (Foley, DeFries, Asner et al., 2005).

The crop is dependent on multiple factors such as, for instance, weather conditions, investment outlays, or the size of farms. However, the decisive factor is the size of a given farm. The average wheat yield from one hectare is the lowest in small farms (37.7 dt/ha in farms below 5 ha) and it is much higher in big, however in numerous in Poland, production farms (57.5 dt/ha in high farms over 50 ha). Other production factors describing farms (e.g. milk yield per cow) are also dependent on the size factor (FADN 2010). The size of a farm also impacts its profitability. Persons (according to the terms of the European Union: fully-employed family member) who work for big farms (over 50 ha) earn more than the average salary in the economy – 62 239 PLN yearly per capita (the average salary in Poland in 2009 amounted to 39 784.56 PLN), but in very small farms (below 5 ha) they earn only 22 573 PLN yearly (FADN 2010).

Basic characteristics of the level and culture of Polish agriculture is its significant spatial differentiation. While outlining some basic rates, attention should be paid to the use of mineral fertilizers, yield per hectare, average size and to the number of hectares per one tractor. Each of the rates reaches the highest values in central and western Poland, and the lowest in the area of the former Austrian occupational zone[9]. In the Małopolskie province their average size reaches merely 3.0 hectares. The largest ones, in turn, function in the former Prussian occupational zone and in the areas that Poland obtained after the Second World War with the average in each of the provinces exceeding 10 hectares (Figure 1, Table 1).

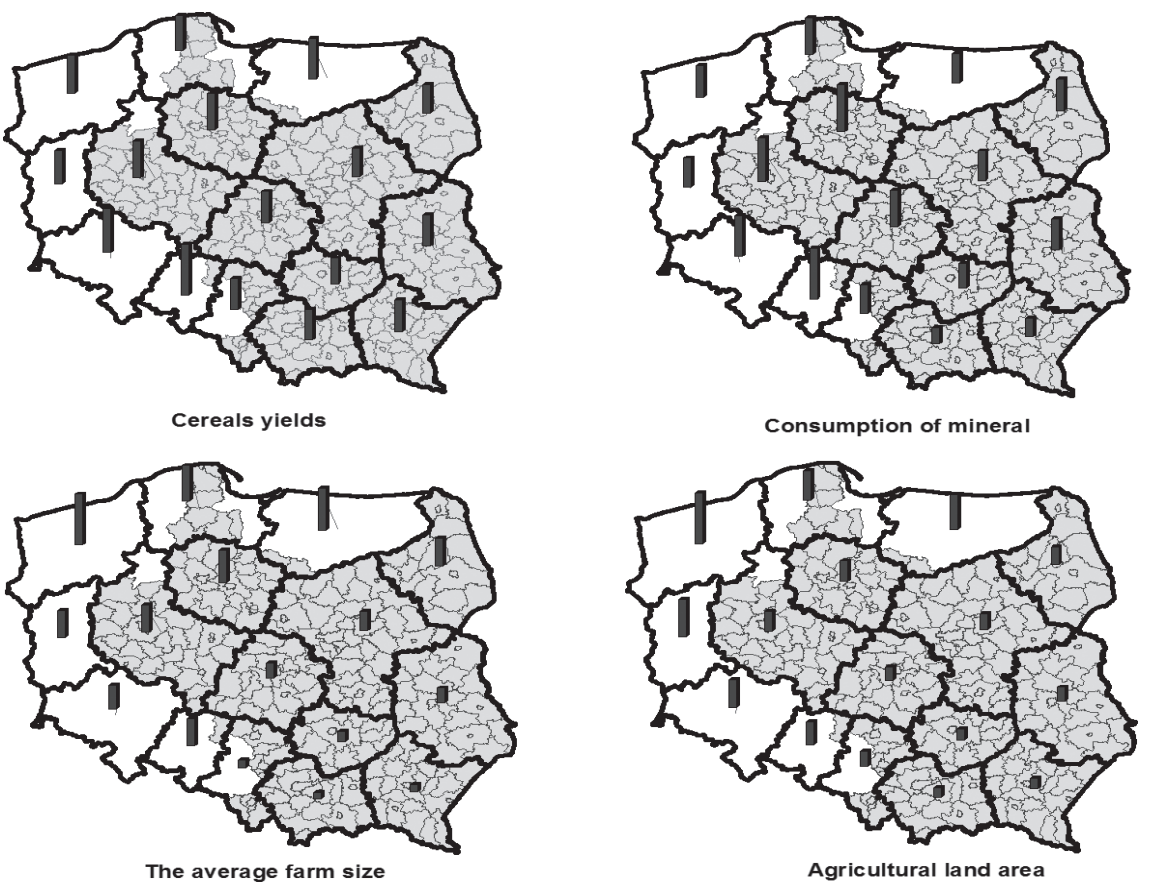

Fig. 1. Rates describing agriculture in Polish provinces, 2010
(*Source*: GUS 2011a; GUS 2011b)

[9] In the kujawsko-pomorskie province the use of mineral fertilizers per one hectare is three times as big as in małopolska.

Table 1
Rates describing agriculture in Polish provinces, 2010[1]

Provinces	Cereals yields, per ha in dt	Consumption of mineral, in terms of pure ingredient and per 1 ha	The average farm size, in hectares of arable land	Agricultural land area, per 1 tractor in ha
dolnośląskie	43.6	133.4	10.5	16.6
kujawsko-pomorskie	36.0	154.0	14.3	12.2
lubelskie	31.5	102.9	6.4	8.2
lubuskie	32.9	94.1	11.9	22.3
łódzkie	31.1	119.8	6.9	7.9
małopolskie	30.6	53.3	3.0	5.7
mazowieckie	28.1	97.1	8.5	9.5
opolskie	50.7	166.3	12.2	13.4
podkarpackie	31.7	60.8	3.2	6.3
podlaskie	29.0	104.7	12.3	10.5
pomorskie	35.2	119.6	15.8	17.2
śląskie	30.9	93.5	3.4	8.8
świętokrzyskie	25.8	80.7	4.6	6.6
warmińsko-mazurskie	40.8	97.3	18.7	20.5
wielkopolskie	36.5	143.1	12.2	11.7
zachodniopomorskie	37.7	103.4	22.6	30.1
Poland	34.1	109.5	7.9	10.6

Source: [GUS 2011a; GUS 2011b].
[1] The maps also show districts of the area that was the subject of analysis.

Having analysed the above information, the agrarian structure needs to be indicated as an important factor determining the productivity of agricultural farms and their profitability.

Materials and Methods

The analysis of the agrarian structure for Poland was based on the data taken form the first the First General Census in Poland from 30 September 1921 and from the Agricultural Census from 2010[10]. The data obtained allowed the comparison of the total area decreased by the area of forests and non-agricultural land (currently agricultural land) of agricultural farms from 1921 with the area of agricultural land in individual farms from 2010. Due to some definition related problems and the obtainment of data comparability, only farms which were located within the Polish territory in both 1921 and 2010 were analysed (Figure 2). These territories are referred to as the maintained pre-war land property. The analysis does not cover the land lost by Poland to the Soviet Union and the land taken from the German Reich and annexed to Poland after the Second World War was not considered, either (the aftermath of the Yalta conference).

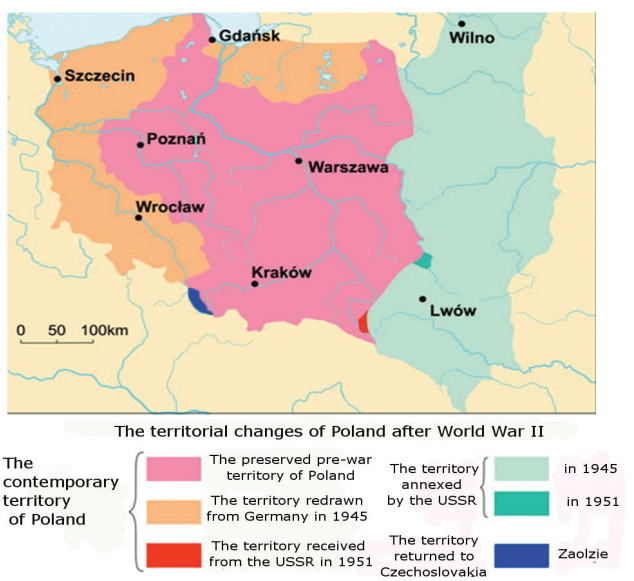

Fig. 2. Poland's territorial changes after the Second World War
(*Source:* based on Wydawnictwo Edukacyjne Wiking, http://www.wiking.edu.pl)

[10] All of the SPSS Statistics 20.0 programmes.

While analysing the concentration of the size of agricultural land, the Gini coefficient was applied in order to determine the inequality of the distribution of agricultural land. It is a measure of the distribution of a variable, in that particular case the variable is the agricultural land in farms. Its value oscillates between zero and one. It equals one when the distribution of the variable is the same and when it grows to one together with the increase of the concentration of agricultural land. The Gini coefficient was calculated with the Brown Formula shown below (Ceriani and Verme, 2012):

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

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

A measure of the spatial dependence in agricultural land is the Global Moran's I statistics which indicates the existence of a significant spatial autocorrelation.

Moran's I statistics (Cliff and Ord, 1981), is described with the following formula:

$$I = \frac{N}{\sum_i \sum_j w_{ij}} \cdot \frac{\sum_i \sum_j w_j (x_i - \bar{x})(x_j - \bar{x})}{\sum_i (x_i - \bar{x})^2}, \quad (2)$$

where N shows the number of regions, x_i denotes the values of the researched variable in an *i*-region, $\bar{x}$ is the average obtained from all the regions, and w_{ij} denotes the neighbourhood or its lack between regions.

The zero value of the statistics denotes lack of spatial dependence and values above zero indicate the existence of a positive autocorrelation.

Apart from global measures, there are also applied local measures which make it possible to consider the dependence of specific regions relative to their neighbouring regions. Statistically significant and positive local spatial autocorrelation prove the similarity of a specific region to its adjacent regions. In order to measure local dependence the local I_i Moran's statistics was applied in the present paper (Anselin, 1995). The local I_i Moran's statistics can be described by means of the following formula[11]

$$I_i = \frac{N(x_i - \bar{x})\sum_{j=1}^{n} w_j (x_j - \bar{x})}{\sum_{j=1}^{n} (x_j - \bar{x})^2}, \quad (3)$$

Attention should be paid also to the participation of agricultural land in the total area of land, so in paper was calculated the arable coefficient *Wu*

$$Wu = \frac{Af}{At}, \quad (4)$$

where *Af* represents the agricultural land and *At* the total area of land.

Results and Discussion

Starting with the analysis of the agrarian structure should be noted that the decreasing value of the Gini coefficient in the years 1921-1950 results from the changes in the agrarian structure in the inter-war period (the division of big land properties) and from the changes resulting from the second world war (the change of the territory of Poland and the post-war agricultural reform). The gradual increase of the Gini coefficient from 0.36 in 1950 to 0.402 in 1990 illustrates a slow increase of the concentration of the size of individual farms (in the 1980s the coefficient changed by only 0.02) and the lack of efficient policy of the collectivization of peasants' farms in Poland under socialism. The communist authorities did not manage to liquidate private farms, most frequently family ones. A decisively quicker concentration of farms occurred in the period following 1990. At the beginning of the system transition there was a considerable number of large State Agricultural Farms whose land property was being leased or purchased by owners of individual farms. The sale (lease) of that land property and the possibility of trading it contributed to the enhancement of the size of farms, in particular the largest ones. The number of farms with the area exceeding 10 hectares increased in the period 1990-2010 by 27.6 per cent and the area of the agricultural land possessed by them rose by as much as 52.7 per cent (Table 2).

Table 2 contains the analysis of the agrarian structure made for the whole country just as was done by Barraclough and Domike (1996), and Guichaoua and Majeres (1981). However, as Wegenast (2010) and Roberts (1982) point out, more important is conducting an analysis of spatial differentiation of the agrarian structure for the country's total territory. Spatial (regional) differentiation of agriculture is also reflected in, for instance, presenting accountancy data originating from EU farms (the FADN system). For that purpose the European Union was divided into 138 statistical regions in 27 countries[12]. Such a big number of regions illustrate the differentiated nature of agriculture and its operating conditions, including the agrarian structure, within the European Union. In the later part of the article an analysis of the agrarian structure on the level of districts was conducted[13] for the years 1921 and 2002[14].

In accordance with the authors' assumptions only the areas contained in Poland's territory, both in 1921 and 2010, were compared[15] (the preserved pre-war territory of Poland: Figure 2). The values presented below concerning the agrarian structure were presented with the division into three oc-

[11] Designations are identical as in the case of formula.

[12] These regions correspond to the NUTS regions.

[13] The division into districts corresponds to a statistical classification referred to as the Nomenclature of Territorial Units for Statistics applied by the European Union on the level 4 (NUTS – 4) (in 2012 there were 8,323 such units in the European Union and 379 in Poland).

Table 2
Description of the agrarian structure in Poland, selected years, 1921-2010

Specification	1921	1950	1960	1980	1990	1996	2002	2010
Gini index	0.569	0.366	0.374	0.381	0.402	0.489	0.538	0.547
The share of households below 5 ha, in %	56.6	50.9	55.0	55.7	52.8	55.3	58.7	55.3
The share of agricultural land owned by the holdings below 5 ha, in %	19.3	24.0	26.7	26.7	23.1	20.0	19.1	16.3
The share of households from 5 to 10 ha, in %	27.6	35.4	31.9	30.0	29.8	25.5	21.9	22.6
The share of agricultural land owned by the holdings from 5 to 10 ha, in %	22.5	42.5	40.2	37.5	34.3	26.0	20.9	18.7
The share of households over 10 ha, in %	15.7	13.7	13.1	14.3	17.4	19.1	19.4	22.2
The share of agricultural land owned by the holdings over 10 ha, in %	58.2	33.5	33.1	35.8	42.6	54.0	59.9	65.0

Note: In order to provide the comparability of data the Gini coefficient was calculated for farms possessing more than one hectare of agricultural land. For the years 1950-2010 the calculations were made for the following intervals: 1-2,2-5,5-7,7-10,10-15 and above 15, for 1921, in turn, the maximum was 1-2, 2-3, 3-4, 4-5, 5-10, 10-20, 20-50, above 50 (for the classes: 1-2,2-5,5-10,10-20 and above 20 the Gini coefficient is 0.554).
Source: like in Tables 4 and 5.

cupational zones (Table 3) out of which the Polish state was formed in 1918. Districts with the area exceeding 204.5 thousand km² in 1921 and 204.2 thousand km² in 2002 were eventually taken into consideration, so the majority out of the 210 thousand km² of the preserved pre-war territory of Poland. Some of the districts in the considered time period did not only change their area but the Gini coefficient calculated form them remained almost unchanged, as, for instance, the Rawicz district (located in the Prussian occupational zone). There are some districts, however, that ceased to exist and their area was annexed to another district, for instance the Grybów district (Galicia) or those districts that were formed out of two districts which had been previously situated in two different occupational zones (Golub-Dobrzyń and Bielsko-Biała[16]) (Tables 4 and 5). The area of agricultural land and the number of individual farms or land properties and the Gini coefficient calculated for them are contained in table included in the annex. The area of individual districts was presented in order to compare the share of agricultural land in the total area (see the annex – Tables 6, 7 and 8).

Despite various economic and social systems that Poland has had for the last 80 years, the spatial equation of the agrarian structure has not been achieved. In fact, only a decrease in appropriate coefficients has been noted – the decrease occurred quite regularly, however, it was quickest in Galicia. As follows from the data contained in Table 3, in all three presented regions both the median of the Gini coefficient as well as its first and third quartile were decreased (at the level of districts). As can be seen, the largest decreases occurred in Galicia which has the lowest Gini coefficient. That results from historical reasons and any attempts to modify them with various political and economic decisions failed. Moreover, regional differences which could be seen in 1921 in the agrarian structure in different parts of the country remain unchanged.

According to the participation of agricultural land in the total area of land it could be said that the arable coefficient was decreased in all the three parts of Poland. However, contrary to the Gini coefficient, this coefficient tends to equalize across the whole territory of Poland. That means that the demand for non-agricultural land is on the increase and is similar in different parts of the country. Spatial volatility of the *Wu* coefficient is not related only to the historical and agrarian conditions but also to other conditions such as, for instance, construction ones (Marks-Bielska and Žukovskis, 2011).

Figures 3 and 4 present spatial differentiation of the agrarian structure at the level of districts. It must be noted, however, that the spatial differentiation of the agrarian structure from 1921 after the passage of almost one hundred years, as a matter of fact, has not changed. The unchanged differentiation of the agrarian structure, despite various activities undertaken within the agrarian policy by the state, constitutes an argument for the verification of the research hypothesis set in the paper. According to the hypothesis, an agrarian structure is a long-term structure in the Braudelian understanding of the concept.

[14] The authors applied the data taken from the Agricultural Census made in 2002. Data published from the Agricultural Census for 2010 did not allow such a detailed analysis.
[15] These areas belonged to Poland's territory also in 2002.
[16] The district seated in the town of Biała was situated in the area of the former Galicia, however, after its annexation to the town of Bielsko (the Russian occupational zone) a new town was formed (Bielsko-Biała). Golub was situated in the Prussian occupational zone and Dobrzyń in the Russian one.

Table 3
Description of agricultural farms, selected years, 1921-2002

Specification	Prussian partition		Russian partition		Galicja	
	1921	2002	1921	2002	1921	2002
The median Gini index (at the level of districts)	0.63	0.60	0.45	0.40	0.33	0.26
Quartile 1 (at the level of districts)	0.59	0.55	0.41	0.36	0.29	0.19
Quartile 3 (at the level of districts)	0.68	0.64	0.51	0.45	0.39	0.32
The average area of agricultural land, in ha	17.04	13.59	7.73	7.16	3.96	3.46
The arable coefficient	0.72	0.57	0,62	0.59	0.49	0.44

Source: own study.

Table 4
The agrarian structure in Poland in 1950, 1960, 1980, 1990, 1996, 2002 and 2010

The agricultural area, in hectares	Number of farms						
	1950, in thousand	1960, in thousand	1980, in thousand	1990, in thousand	1996	2002	2010
0-1	406.2	654.6	X	X	1 000 160	960 041	702 002
1-2	415.1	523.0	448	378	462 206	516 836	342 189
2-5	991.8	1 091.9	884	751	667 588	629 462	519 252
5-7	477.5	475.7	366	319	260 713	216 644	178 572
7-10	499.0	462.0	350	318	260 103	209 876	172 889
10-15	246.3	283.6	240	242	217 202	182 505	152 173
over 15	132.6	101.1	102	130	173 568	196 403	193 338
Total individual farms	3 169	3 592	2 390	2 138	3 041 540	2 911 767	2 260 415
Socialized economy (state farms and cooperatives of agricultural production)*	n/a						
The agricultural area, in hectares	The agricultural area in hectares						
	1950, in thousand	1960, in thousand	1980, in thousand	1990, in thousand	1996	2002	2010
0-1	189.2	272.7	X	X	378 639	396 482	256 324
1-2	567.6	681.7	683	564	650 632	725 041	500 256
2-5	3 169.2	3 287.2	2 962	2 536	2 199 043	2 037 957	1 687 551
5-7	2 680.4	2 529.8	2 180	1 868	1 541 816	1 278 301	1 056 106
7-10	3 941.8	3 453.9	2 945	2 723	2 171 528	1 750 830	1 444 929
10-15	2 696.2	3 044.9	2 896	2 996	2 631 550	2 213 800	1 847 422
over 15	2 522.7	1 878.4	1 988	2 713	5 064 957	6 456 013	6 867 820
Total individual farms	15 767	15 149	13 654	13 400	14 638 165	14 858 425	13 660 408
Socialized economy (state farms and cooperatives of agricultural production)*	4 399	4 401	4 422	4 240	4 307 000	3 126 000	2 099 000

Note: in 1996 and 2002 agricultural land owned by the Agricultural Property Agency of State Treasury; in 2010 agricultural land owned by Agricultural Property Agency.

Source: [Rocznik Statystyczny 1956, GUS, Warszawa 1956; Rocznik Statystyczny 1961, GUS, Warszawa 1961; Rocznik Statystyczny 1967, GUS, Warszawa 1967; Rocznik Statystyczny 1981, GUS, Warszawa 1981; Rolnictwo i Gospodarka Żywnościowa. 1986-1990, GUS, Warszawa 1992; Rocznik Statystyczny Rolnictwa i Obszarów Wiejskich 2007, GUS, Warszawa 2007; GUS 2011b, Powszechny Spis Rolnych. Użytkowanie gruntów, Warszawa].

The analysis of graphs illustrating the deployment of the Gini coefficient in the year 1921 and in the year 2002 indicates a possibility of distinguishing the areas with a high (or low) concentration of the agrarian structure. This may prove the existence of the properties of the positive spatial dependence for the phenomenon of the agricultural land in Poland. In 1921 the Global Moran's I statistics at the level of districts was 0.65 (p-value 0.00) and in 2002 it was 0.77 (p-value 0.00). A positive statistically significant autocorrelation proves the existence of strong spatial dependence of the concentration of agricultural land in the analysed years in Poland. From the point of view of the agrarian policy, the measure indicates a possibility of mechanisms that can be impeding the intended policy of the improvement and the related to it changes in the agrarian structure.

Table 5
The agrarian structure in Poland in 1921

The agricultural area, in hectares	Number of farms	The agricultural area, in hectares
0-1	600 301	300 285
1-2	500 321	735 945
2-3	377 561	898 345
3-4	344 575	1 113 269
4-5	275 830	1 122 340
5-10	731 441	4 524 321
10-20	310 487	3 598 477
20-50	75 984	1 768 468
over 50	29 811	6 308 167
Total individual farms	3 246 311	20 369 617

Source: [Statystyka Polski, Tom XI, zeszyt 2, Warszawa 1928; Statystyka Polski, Tom XI, zeszyt 3, Warszawa 1928; Statystyka Polski, Tom XI, zeszyt 4, Warszawa 1928; Statystyka Polski, Tom XI, zeszyt 5, Warszawa 1928].

Figures 5 and 6 present the spatial deployment of the local I_i Moran's statistics. Number 2 represents the regions where Moran's statistics proved statistically insignificant. In regions marked with numbers 1 and 3 had a positive statistically significant local Moran's statistics. Regions marked with 1 additionally had high values of the Gini coefficient. These are the regions of high concentration with a significant positive local autocorrelation. Regions marked with number 3, in turn, had the lowest values of the coefficient. Moreover, they have a significant local autocorrelation and low values of the con-

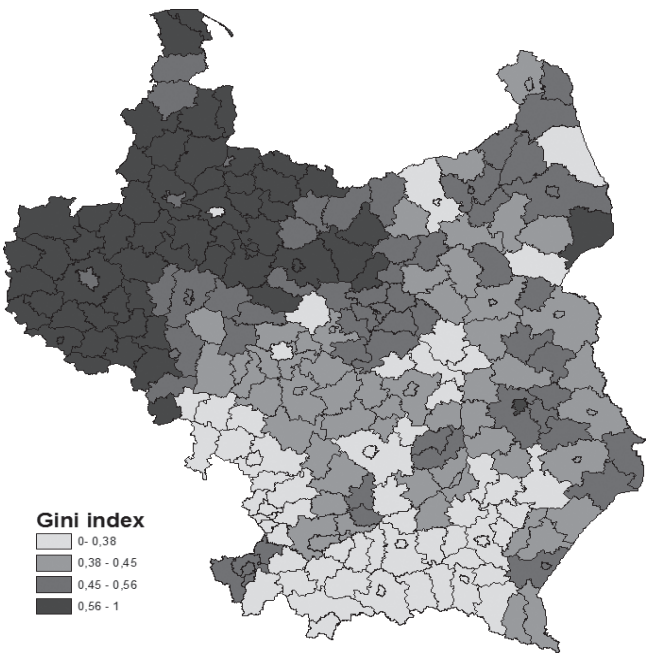

Fig. 3. The Gini coefficient in specific districts, 1921
Note: Classes determined based on the quartiles, class 1 (min, Q_1), class 2 (Q_1, Q_2), class 3 (Q_2, Q_3), class 4 (Q_3, max).
(*Source:* own study)

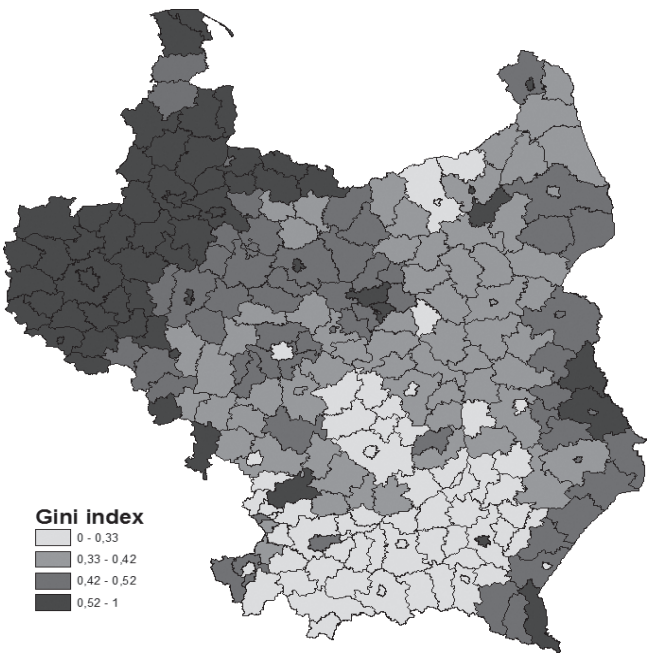

Fig. 4. The Gini coefficient in specific districts, 2002
Note: Classes determined based on the quartiles, class 1 (min, Q_1), class 2 (Q_1, Q_2), class 3 (Q_2, Q_3), class 4 (Q_3, max).
(*Source*: own study)

Table 6
Characteristics of agricultural holdings in the former Prussian partition

	District	District	Gini index	Gini index	The agricultural area, in hectares	The agricultural area, in hectares	Number of farms	Number of farms	District area together, km²	District area together, km²
	1921	2002	1921	2002	1921	2002	1921	2002	1921	2002
1	Brodnica	Brodnica	0.63	0.53	80 395	64 610	5 008	5 205	1 061	1 040
	Wąbrzeżno	Wąbrzeżno	0.61	0.55	58 990	40 566	3 950	2 475	708	502
	X	Golub-Dobrzyń	X	0.51	X	44 579	X	3 732	X	613
2	Bydgoszcz (rural district)	Bydgoszcz (rural district)	0.64	0.65	79 478	59 044	4 542	4 456	1 337	1 394
3	Chełmno	Chełmno	0.7	0.57	60 284	40 160	3 018	2 808	726	527
4	Grudziądz (rural district)	Grudziądz (rural district)	0.69	0.63	66 986	53 182	3 037	3 409	780	728
5	Ino-wrocław	Ino-wrocław	0.69	0.59	80 269	86 597	3 073	5 054	1 030	1 225
6	Mogilno	Mogilno	0.60	0.54	67 647	44 680	2 775	2 736	733	675
	Strzelno	Strzelno	0.71	X	53 306	X	1 775	X	615	X
7	Sępolno Krajeńskie	Sępolno Krajeńskie	0.60	0.59	50 076	46 553	2 526	2 165	616	791
8	Żnin	Żnin	0.58	0.63	64 492	71 387	2 534	3 310	741	985
9	X	Nakło	X	0.64	X	68 242	X	3 258	X	1 120
	Szubin	X	0.64	X	69 424	X	3 519	X	917	X
	Wyrzysk	X	0.67	X	100 552	X	3 869	X	1 162	X
10	Świecie	Świecie	0.62	0.61	99 173	70 798	7 246	5 487	1 670	1 474
11	Toruń (rural district)	Toruń (rural district)	0.68	0.57	60 948	63 378	3 154	5 419	884	1 230
12	Tuchola	Tuchola	0.61	0.61	46 016	42 735	2 887	3 204	858	1 075
13	Bydgoszcz (urban district)	Bydgoszcz (urban district)	0.46	0.64	2 597	1 664	567	280	71	176
14	Grudziądz (urban district)	Grudziądz (urban district)	0.53	0.50	281	1 283	33	285	20	58
15	Toruń (urban district)	Toruń (urban district)	0.34	0.56	453	758	110	141	36	116
16	Wejherowo	Wejherowo	0.59	0.56	50 592	47 991	3 278	4 244	789	1 285
17	Kartuzy	Kartuzy	0.53	0.49	91 581	65 828	6 559	6 973	1 323	1 121
18	Kościerzyna	Kościerzyna	0.56	0.51	78 123	45 246	4 059	4 288	1 177	1 161
19	Starogard	Starogard Gdański	0.67	0.61	64 648	59 923	4 061	4 827	1 055	1 345
20	Tczew	Tczew	0.64	0.65	29 053	46 022	506	2 328	351	697
	Gniew	Gniew	0.75	X	30 991	X	1 435	X	417	

Table 6 continued

21	Chojnice	Chojnice	0.59	0.56	98 080	47 132	5 417	3 646	1 853	1 364
22	Działdowo	Działdowo	0.65	0.63	42 184	54 785	1 721	3 030	486	954
	Lubawa	X	0.60	X	78 720	X	4 770	X	986	X
	X	Nowe Miasto Lubawskie	X	0.56	X	46231	X	2895	X	693
23	Puck	Puck	0.68	0.66	37 235	28 152	1 861	1 992	590	572
24	Chodzież	Chodzież	0.60	0.72	60 564	33 278	3 407	1 716	898	684
25	Czarnków	Czarnków	0.59	0.63	38 435	62 655	3 075	5 096	772	685
26	Gniezno	Gniezno	0.57	0.60	52 519	84 511	2 242	4 411	565	1 255
	Witkowo	Witkowo	0.61	X	46 945	X	2 004	X	588	X
27	Gostyń	Gostyń	0.70	0.62	53 308	65 578	3 046	3 884	601	810
28	Grodzisk	Grodzisk	0.73	0.62	34 995	42 594	1 712	3 063	430	642
29	Jarocin	Jarocin	0.74	0.63	58 953	41 333	2 863	2 978	721	587
30	Kępno	Kępno	0.66	0.53	57 525	40 436	4 582	3 645	707	608
31	Kościan	Kościan	0.71	0.67	53 235	55 787	2 516	3 053	608	722
	Śmigiel	X	0.67	X	47 488	X	2 976	X	554	X
32	Krotoszyn	Krotoszyn	0.59	0.47	38 112	51 494	3 001	4 051	498	714
	Koźmin	X	0.65	X	40 275	X	2 278	X	453	X
33	Leszno	X	0.67	X	57 247	X	3 167	X	740	X
	X	Leszno (rural district)	X	0.63	X	48 514	X	3 391	X	806
	X	Leszno (urban district)	X	0.69	X	1 162	X	97	X	32
34	Międzychód	Międzychód	0.63	0.65	46 917	28 364	1 760	1 498	753	736
35	Nowy Tomyśl	Nowy Tomyśl	0.58	0.63	55 902	45 875	4 155	4 024	843	1 014
36	Oborniki	Oborniki	0.61	0.67	60 314	38 729	3 560	1 884	1 088	711
37	Ostrów	Ostrów	0.67	0.52	31 540	63 050	2 445	7 252	415	1 160
	Odolanów	X	0.49	X	39 173	X	5 081	X	629	X
38	Ostrzeszów	Ostrzeszów	0.51	0.45	38 307	41 174	4 134	4 951	572	773
39	Pleszew	Pleszew	0.70	0.53	42 325	48 249	2 132	4 309	483	713
40	Poznań (urban district)	Poznań (urban district)	0.51	0.62	734	4 929	75	621	34	262
	Poznań-Wschód	Poznań (rural district)	0.63	0.72	47 857	122 714	1 803	5 998	664	1 900
	Poznań-Zachód	X	0.70	X	53 616	X	2 056	X	638	X
41	Rawicz	Rawicz	0.62	0.59	43 040	45 422	3 584	3 425	511	554
42	Szamotuły	Szamotuły	0.73	0.65	73 835	56 611	2 921	3 333	1 094	1 119

Table 6 continued

43	Śrem	Śrem	0.68	0.68	71 080	38 071	3 122	2 018	928	574
44	Środa	Środa Wielko-polska	0.70	0.64	70 064	42 747	2 408	2 211	796	624
45	Wągrowiec	Wągrowiec	0.61	0.60	87 805	66 692	3 350	3 087	1 037	1 040
46	Wolsztyn	Wolsztyn	0.59	0.60	54 502	39 765	4 903	3 576	740	680
47	Września	Września	0.66	0.58	49 481	44 770	1 848	2 900	562	704
48	Bielsko	X	0.52	X	43 053	X	6 845	X	734	X
	Biała	X	0.39	X	27 650	X	6 890	X	464	X
	X	Bielsko-Biała (rural district)	X	0.44	X	16 482	X	4 785	X	459
	X	Bielsko-Biała (urban district)	X	0.31	X	2 154	X	791	X	125
49	Cieszyn	Cieszyn	0.53	0.43	16 466	26 159	2 712	7 259	270	730
Total	X	X	X	X	3 235 836	2 540 825	189 943	186 954	44 382	44 344

Source: [Statystyka Polski, Tom XI, zeszyt 2, Warszawa 1928; Statystyka Polski, Tom XI, zeszyt 3, Warszawa 1928; Statystyka Polski, Tom XI, zeszyt 4, Warszawa 1928; Statystyka Polski, Tom XI, zeszyt 5, Warszawa 1928].

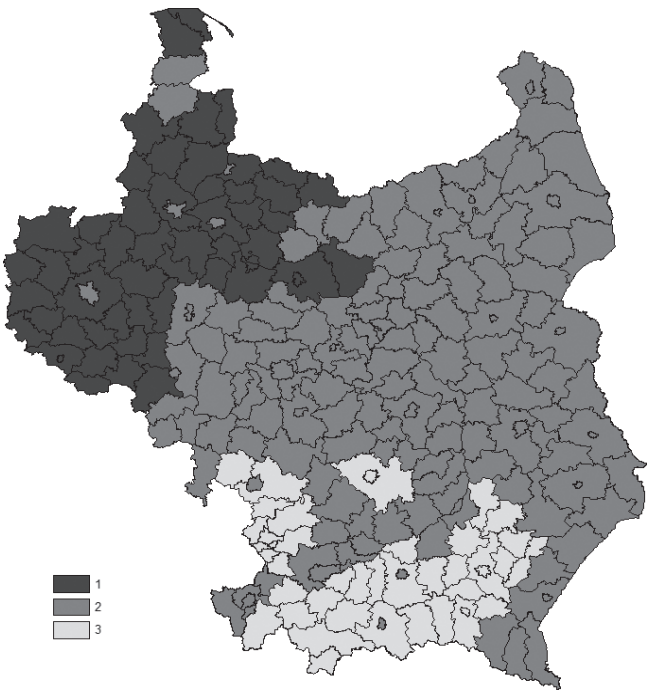

Fig. 5. The results of the analysis of Moran's local autocorrelation made for 1921
(*Source:* own study)

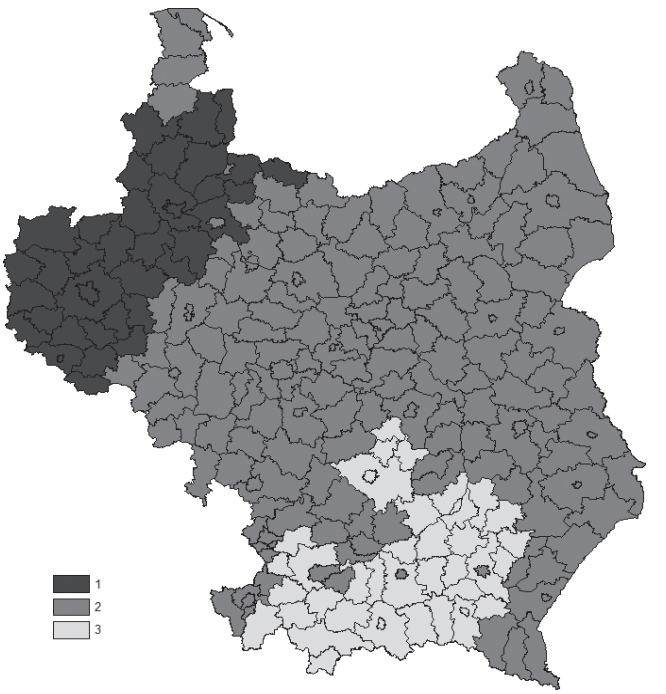

Fig. 6. The results of the analysis of Moran's local autocorrelation made for 2002
(*Source*: own study)

Table 7
Characteristics of agricultural holdings in the former Russian partition

	District	District	Gini index	Gini index	The agricultural area, in hectares	The agricultural area, in hectares	Number of farms	Number of farms	District area together, km²	District area together, km²
	1921	2002	1921	2002	1921	2002	1921	2002	1921	2002
1	Augustów	Augustów	0.46	0.39	77 259	67 100	8 492	5 559	2 060	1 659
2	Będzin	Będzin	0.32	0.3	69 706	13 271	17 397	4 383	1 426	364
	X	Myszków	X	0.26	X	23 794	X	7 301	X	479
	X	Zawiercie	X	0.58	X	60 171	X	8 705	X	1 003
	X	Dąbrowa Górnicza	X	0.17	X	3 156	X	1 372	X	189
	X	Sosnowiec	X	0.43	X	257	X	89	X	91
	X	Jaworzno	X	0.36	X	1 358	X	539	X	153
3	Biała	X	0.45	X	81 304	X	8 237	X	1 492	X
	X	Biała Podlaska (rural district)	X	0.46	X	160 346	X	16 616	X	2 755
	X	Biała Podlaska (urban district)	X	X	X	X	X	X	X	49
4	Białowieża	Hajnówka	0.6	0.52	24 748	54 776	2 538	7 427	1 602	1 624
5	Białystok	X	0.46	X	136 585	X	15 900	X	2 904	X
	X	Białystok (rural district)	X	0.52	X	134 632	X	16 233	X	2 975
	X	Białystok (urban district)	X	0.41	X	1 282	X	339	X	102
	X	Mońki	X	0.38	X	74 758	X	5 725	X	1 382
6	Bielsk	Bielsk Podlaski	0.42	0.48	155 526	89 546	21 170	9 437	3 562	1 385
	X	Siemiatycze	X	0.41	X	81 242	X	7 663	X	1 459
7	Biłgoraj	X	0.36	0.35	75 836	86 584	12 757	1 4704	1 708	1 681
8	Błonie	X	0.53	X	85 981		8 929	X	1 079	X
	X	Grodzisk Mazowiecki	X	0.45	X	20 070	X	4 024	X	367
	X	Żyrardów	X	0.45	X	29 696	X	5 274	X	533
9	Brzeziny	Brzeziny	0.43	0.43	82 131	23 927	10 848	3 438	1 117	359
	X	Tomaszów Mazowiecki	X	0.39	X	54 542	X	9 253	X	1 025
10	Chełm		0.44	X	107 442	X	15 483	X	2 030	X
	X	Chełm (rural district)	X	0.54	X	106 704	X	13 440	X	1 887
	X	Chełm (urban district)	X	0.48	X	1 061	X	276	X	35

Table 7 continued

11	Ciechanów	Ciechanów	0.58	0.47	97 391	75 323	6 394	5 761	1 129	1 060
12	Częstochowa	X	0.36	X	107 744	X	20 121	X	1 924	X
	X	Częstochowa (rural district)	X	0.37	X	72 395	X	17 938	X	1 521
	X	Częstochowa (urban district)	X	0.33	X	5 850	X	1 995	X	160
	X	Kłobuck	X	0.37	X	48 654	X	10 650	X	889
13	Garwolin	Garwolin	0.36	0.34	119 342	73 773	17 101	13 519	1 831	1 285
	X	Ryki	X	0.34	X	34 732	X	6 646	X	615
14	Gostynin	Gostynin	0.51	0.46	82 993	39 668	8 531	4 459	1 211	615
15	Szczuczyn	Grajewo	0.52	0.4	81 665	64 346	6 669	3 969	1 467	968
16	Grójec	Grójec	0.54	0.39	130 233	96 594	12 275	15 390	1 670	1 268
17	Hrubieszów	Hrubieszów	0.51	0.45	114 771	89 548	14 146	9 238	1 564	1 268
18	Jędrzejów	Jędrzejów	0.45	0.4	83 911	78 952	12 316	11 986	1 270	1 257
19	Kalisz	X	0.51	X	107 023	X	12 354	X	1 480	X
	X	Kalisz (rural district)	X	0.41	X	79 868	X	10 627	X	1 160
	X	Kalisz (urban district)	X	0.6	X	5 053	X	737	X	69
20	Kielce	X	0.3	X	89 389	X	20 052	X	1 954	X
	X	Kielce (rural district)	X	0.28	X	104 222	X	26 445	X	2 246
	X	Kielce (urban district)	X	0.17	X	2 537	X	1 050	X	110
21	Kolno	Kolno	0.4	0.33	82 838	69 714	9 484	4 763	1 529	940
22	Koło	Koło	0.54	0.45	101 929	75 270	9 931	8 289	1 290	1 011
23	Konin	X	0.47	X	83 840	X	9 674	X	1 122	X
	X	Konin (rural district)	X	0.46	X	99 783	X	13 193	X	1 578
	X	Konin (urban district)	X	0.6	X	2 978	X	524	X	82
24	Końskie	Końskie	0.39	0.32	73 290	37 851	17 624	9 858	1 895	1 140
	X	Skarżysko - Kamienna	X	0.11	X	7 371	X	3 502	X	395
25	Kozienice	Kozienice	0.36	0.38	93 469	44 189	15 752	7 559	1 883	916
	X	Zwoleń	X	0.37	X	40 151	X	6 326	X	573
26	Kutno	Kutno	0.64	0.48	81 920	70 951	6 274	6 442	916	887
27	Lipno	Lipno	0.59	0.44	110 249	63 382	8 906	5 989	1 565	1 016
28	Łask	Łask	0.44	0.43	90 307	38 327	13 540	5 575	1 403	618
	X	Pabianice	X	0.47	X	26 871	X	4 132	X	492
29	Łęczyca	Łęczyca	0.5	0.37	108 820	61 997	10 658	6 772	1 316	773
	X	Poddębice	X	0.38	X	60 361	X	6 731	X	881
30	Łomża	X	0.46	X	98 356	X	10 844	X	1 809	X
	X	Łomża (rural district)	X	0.38	X	93 277	X	7 982	X	1 355
	X	Łomża (urban district)	X	0.57	X	1 717	X	275	X	33
	X	Zambrów	X	0.55	X	57 213	X	3 753	X	733

Table 7 continued

31	Janów (Konstantynów)	X	0.5	X	95 902	X	9 350	X	1 437	X
	X	Łosice	X	0.39	X	53 120	X	5 313	X	772
32	Janów	Janów Lubelski	0.41	0.32	113 301	42 714	18 098	7 419	1 964	875
	X	Kraśnik	X	0.36	X	63 750	X	12 062	X	1 005
33	Krasnystaw	Krasnystaw	0.49	0.43	103 854	75 803	150 26	11 004	1 513	1 031
34	Lubartów	Lubartów	0.4	0.38	92 485	79 884	13 937	13 586	1 370	1 289
35	Lublin (rural district)	Lublin (rural district)	0.5	0.41	143 041	119 062	17 838	21 176	1 910	1 680
	Lublin (urban district)	Lublin (urban district)	0.63	0.05	2 022	6 539	268	1 055	9	147
	X	Łęczna	X	0.47	X	43 973	X	6 656	X	637
	X	Świdnik	X	0.46	X	31 798	X	5 473	X	468
36	Łódź (rural district)	Łódź (rural district)	0.4	0.47	63 300	29 921	8 932	4 721	902	500
	Łódź (urban district)	Łódź (urban district)	0.35	0.33	1 538	7 776	344	2 232	37	293
	X	Zgierz	X	0.46	X	51 507	X	7 372	X	855
37	Łowicz	Łowicz	0.35	0.4	89 059	77 352	10 752	9 123	1 209	988
38	Łuków	Łuków	0.42	0.37	127 055	90 997	17 094	14 424	1 885	1 394
39	Maków	Maków Mazowiecki	0.43	0.38	68 880	68 460	6 843	5 877	1 153	1 065
40	Miechów	X	0.45	0.38	115 882	46 962	18 701	7 594	1 371	676
	X	Proszowice	X	0.32	X	33 114	X	6 581	X	415
41	Mińsk Mazowiecki	Mińsk Mazowiecki	0.44	0.39	81 712	68 977	11 363	13 152	1 272	1 164
42	Mława	Mława	0.56	0.44	115 667	78 088	8 944	5 675	1 488	1 182
43	Nieszawa	X	0.58	X	110 335	X	8 255	X	1 296	X
	X	Aleksandrów Kujawski	X	0.47	X	35 806	X	3 528	X	475
	X	Radziejów	X	0.46	X	50 252	X	4 086	X	607
44	Olkusz	Olkusz	0.31	0.25	78 322	25 813	17 014	8 161	1 347	618
45	Opatów	Opatów	0.46	0.39	107 519	61 184	16 347	9 274	1 653	911
	X	Ostrowiec Świętokrzyski	X	0.43	X	30 407	X	5 899	X	617
46	Opoczno	Opoczno	0.41	0.33	90 030	57 305	17 465	11 137	1 853	1 040
	X	Przysucha	X	0.33	X	40 713	X	8 222	X	801
47	Ostrołęka	X	0.37	X	83 486	X	9 887	X	1 621	X
	X	Ostrołęka (rural district)	X	0.33	X	127 919	X	11 809	X	2 097
	X	Ostrołęka (urban district)	X	0.24	X	576	X	198	X	29
48	Ostrów Mazowiecka	Ostrów Mazowiecka	0.43	0.4	86 428	74 684	11 395	8 960	1 565	1 160
49	Pińczów	Pińczów	0.47	0.35	86 412	38 828	14 249	6 428	1 154	613
	X	Kazimierza Wielka	X	0.33	X	33 450	X	5 584	X	422

Table 7 continued

50	Piotrków	X	0.42	X	127 414	X	20 124	X	2 088	X
	X	Piotrków Trybunalski (rural district)	X	0.39	X	86 170	X	12 742	X	1 429
	X	Piotrków Trybunalski (urban district)	X	0.38	X	2 370	X	711	X	67
	X	Bełchatów	X	0.39	X	46 832	X	9 287	X	968
51	Płock	X	0.64	X	124 966	X	7 690	X	1 433	X
	X	Płock (rural district)	X	0.46	X	122 486	X	12 021	X	1 796
	X	Płock (urban district)	X	0.7	X	3 849	X	473	X	88
52	Płońsk	Płońsk	0.59	0.44	105 552	99 193	6 763	9 932	1 327	1 380
	Pułtusk	Pułtusk	0.51	0.41	107 696	54 751	9 766	5 490	1 526	827
	X	Nowy Dwór Mazowiecki	X	0.46	X	33 669	X	5 191	X	695
	X	Wyszków	X	0.37	X	44 225	X	7 426	X	876
53	Przasnysz	Przasnysz	0.48	0.39	72 224	76 291	6 749	5 682	1 397	1 219
54	Puławy	Puławy	0.44	0.39	96 455	49 076	17 107	10 380	1 698	934
	X	Opole Lubelskie	X	0.32	X	467 41	X	10 080	X	810
55	Radom	X	0.4	X	132 409	X	20 014	X	2 026	X
	X	Radom (rural district)	X	0.37	X	86 806	X	17 815	X	1 530
	X	Radom (urban district)	X	0.2	X	3 083	X	1 233	X	112
	X	Lipsko	X	0.35	X	47 546	X	7 626	X	740
	X	Szydłowiec	X	0.29	X	19 157	X	5 334	X	452
	X	Białobrzegi	X	0.35	X	34 914	X	5 506	X	639
	X	Starachowice	X	0.19	X	19 283	X	6 407	X	523
	Wierzbnik and Iłża	X	0.35	X	100 238	X	18 462	X	1 802	X
56	Radomsko	Radomsko	0.45	0.44	127 792	76 537	21 024	12 079	2 113	1 443
57	Radzymin	X	0.39	X	61 351	X	8 807	X	1 071	X
	X	Wołomin	X	0.34	X	446 14	X	9 445	X	954
58	Radzyń	Radzyń Podlaski	0.46	0.41	109 886	64 554	11 670	8 283	1 608	965
	X	Parczew	X	0.52	X	53 023	X	5046	X	952
59	Rawa	Rawa Mazowiecka	0.50	0.37	90 102	46 230	10 214	6 821	1 299	646
60	Rypin	Rypin	0.58	0.41	100 999	38 390	7 475	3 777	1 245	586
61	Sandomierz	Sandomierz	0.44	0.31	75 910	45 339	12 614	11 017	1 194	676
	X	Staszów	X	0.29	X	47 553	X	10 796	X	925
62	Sejny	Sejny	0.47	0.38	30 159	38 426	2 728	2 960	857	855
63	Sieradz	Sieradz	0.42	0.39	106 440	97 748	15 962	12 778	1 613	1 491
	X	Zduńska Wola	X	0.45	X	21 856	X	3 488	X	369
64	Siedlce	Siedlce	0.43	0.42	86 333	107 775	10 861	14 681	1 287	1 603

Table 7 continued

65	Sierpc	Sierpc	0.52	0.42	90 760	62 056	6 876	4 913	1 089	852
	X	Żuromin	X	0.40	X	54 827	X	4 817	X	807
66	Skierniewice	X	0.42	X	58 997	X	6 666	X	763	X
	X	Skierniewice (rural district)	X	0.4	X	48 668	X	7 148	X	755
	X	Skierniewice (urban district)	X	0.43	X	1 762	X	461	X	33
67	Słupca	Słupca	0.56	0.51	88 319	55 826	8 362	5 085	1 204	838
68	Sochaczew	Sochaczew	0.51	0.48	74 172	48 915	7 465	7 183	1 061	735
69	Sokołów	Sokołów Podlaski	0.49	0.42	79 692	73 505	10 202	8 113	1 291	1 131
70	Sokółka	Sokółka	0.35	0.42	100 939	130 175	14 267	10 380	2 606	2 055
71	Stopnica	Busko-Zdrój	0.38	0.36	101 120	67 254	18 994	12 380	1 598	968
72	Suwałki	X	0.39	X	92 179	X	8 364	X	1 714	X
	X	Suwałki (rural district)	X	0.43	X	91 800	X	5 849	X	1 307
	X	Suwałki (urban district)	X	0.59	X	3 587	X	424	X	66
73	Tomaszów	Tomaszów Lubelski	0.48	0.52	88 453	92 802	12 881	12 390	1 286	1 489
74	Turek	Turek	0.45	0.43	95 732	55 142	11 119	7 703	1 248	929
75	Warszawa (rural district)	Warszawa (rural district)	0.50	0.54	95 307	25 852	12 801	4 089	1 698	534
	Warszawa (urban district)	Warszawa (urban district)	0.52	0.45	4 782	9 041	937	2 229	X	517
	X	Legionowo	X	0.45	X	14 302	X	2 816	X	390
	X	Otwock	X	0.31	X	26 456	X	6 674	X	616
	X	Piaseczno	X	0.4	X	20 975	X	4 848	X	621
	X	Pruszków	X	0.53	X	10 535	X	1 884	X	246
76	Węgrów	Węgrów	0.43	0.40	78 261	70 255	10 551	9 844	1326	1 221
77	Wieluń	Wieluń	0.38	0.37	124 943	57 223	21 990	9 311	2 101	926
	X	Pajęczno	X	0.37	X	47 307	X	8 383	X	804
	X	Wieruszów	X	0.38	X	35 238	X	5 457	X	577
	X	Olesno	X	0.53	X	50 764	X	6 038	X	973
78	Włocławek	X	0.64	X	95 962	X	6 309	X	1 313	X
	X	Włocławek (urban district)	X	0.44	X	884	X	191	X	84
	X	Włocławek (rural district)	X	0.46	X	94 356	X	8 532	X	1 474
79	Włodawa	Włodawa	0.45	0.56	98 446	53 252	11 957	5 035	2 175	1 256
80	Włoszczowa	Włoszczowa	0.44	0.35	73 414	41 919	11 788	7 123	1 368	908
81	Wysokie Mazowieckie	Wysokie Mazowieckie	0.44	0.36	82 815	94 935	9 204	8 053	1 118	1 289
82	Zamość	X	0.44	X	103 723	X	17 011	X	1 786	X
	X	Zamość (rural district)	X	0.42	X	120 025	X	19 081	X	1 870
	X	Zamość (urban district)	X	0.50	X	1 246	X	289	X	30
Total	X	X	X	X	7 976 170	7 577 296	1 032 273	1 058 883	129 546	128 147

Source: [Statystyka Polski, Tom XI, zeszyt 2, Warszawa 1928; Statystyka Polski, Tom XI, zeszyt 3, Warszawa 1928; Statystyka Polski, Tom XI, zeszyt 4, Warszawa 1928; Statystyka Polski, Tom XI, zeszyt 5, Warszawa 1928].

centration in the agrarian structure. Identifying these areas is vital for the agrarian policy since regions marked with 1 will tend to obtain further self-improvement of the agrarian structure. Regions with number 3, in turn, will have mechanisms that will counteract the improvement of the agrarian structure, even during the realization of an active agricultural policy. Also, the differences between specific parts of the country in the scope of the spatial dependence for the phenomenon of the concentration of agricultural land which occurred in 1921 can still be observed. An analysis of Figures 5 and 6 allows the formulation of a conclusion that the spatial differentiation of the local spatial dependence established in 1921 is much similar to the differentiation from 2002. The implication is that in the Polish agriculture there is strong spatial dependence that strengthens and counteracts changes in the agrarian structure. The findings concerning the local spatial dependence for the agrarian structure constitute another argument for the verification of the hypothesis which says that the agrarian structure is a long-term structure in the Braudelian understanding of the concept.

Conclusion

The subject of the paper concerned the analysis of spatial differentiation of the agrarian structure in Poland. The agrarian structure is essential for the country's policy, since it provides agricultural production at an appropriate level, which, in turn, translates into the country's security. A unique feature of the Polish agricultural sector is the dispersion of farms and the significant spatial differentiation.

Table 8
Characteristics of agricultural holdings in the former Austro-Hungarian partition (Galicja)

	District	District	Gini index	Gini index	The agricultural area, in hectares	The agricultural area, in hectares	Number of farms	Number of farms	District area together, km²	District area together, km²
	1921	2002	1921	2002	1921	2002	1921	2002	1921	2002
1	Bochnia	Bochnia	0.28	0.21	45 523	31 441	13 945	10 227	877	649
2	Brzesko	Brzesko	0.29	0.26	52 081	34 212	14 706	10 800	853	591
3	Brzozów	Brzozów	0.34	0.19	40 960	26 121	11 587	8 903	684	539
4	Cieszanów	Lubaczów	0.39	0.44	41 328	44 761	10 132	7 300	1 136	1 308
5	Chrzanów	Chrzanów	0.31	0.26	29 240	7 375	9 194	3 210	722	372
6	Dąbrowa	Dąbrowa Tarnowska	0.23	0.30	36 621	35 180	9 923	8 227	650	530
7	Gorlice	Gorlice	0.30	0.29	43 784	38 986	11 628	11 414	916	966
8	Jarosław	Jarosław	0.44	0.46	67 899	57 925	15 452	11 360	1 347	1 029
9	Jasło	Jasło	0.31	0.20	45 060	38 679	11 609	13 497	820	831
10	Kolbuszowa	Kolbuszowa	0.29	0.24	45 962	36 881	10 603	9 009	868	774
11	Kraków (urban district)	Kraków (urban district)	0.44	0.44	1 613	7 061	399	2 031	47	327
	Kraków (rural district)	Kraków (rural district)	0.42	0.33	32 083	72 232	7 957	2 1951	478	1 231
	Podgórze	X	0.36	X	13 315	X	4 068	X	221	X
12	Krosno	X	0.31	X	41 174	X	11 418	X	719	X
	X	Krosno (rural district)	X	0.27	X	35 605	X	12 959	X	926
	X	Krosno (urban district)	X	0.16	X	1 147	X	592	X	44
13	Lisko	Lesko	0.45	0.48	81 362	15 830	12 814	2 934	1 832	835
	X	Ustrzyki Dolne	X	0.61	X	16 938	X	1 877	X	1 139
14	Limanowa	Limanowa	0.28	0.17	37 952	44 903	10 831	14 101	952	951
15	Łańcut	Łańcut	0.25	0.20	38 932	23 939	12 577	8 735	865	452
	X	Leżajsk	X	0.27	X	26 523	X	7 856	X	584

Table 8 continued

16	Mielec	Mielec	0.40	0.31	51 767	48 192	10 530	12 033	908	880
	Myślenice	Myślenice	0.23	0.12	42 387	29 266	13 804	11 507	1 046	673
17	Nisko	Nisko	0.32	0.26	36 670	32 462	8 567	8 446	973	586
	X	Stalowa Wola	X	0.21	X	20 156	X	6665	X	832
18	Nowy Sącz	X	0.37	X	58 757	X	13 119	X	1262	X
	X	Nowy Sącz (rural district)	X	0.20	X	59 369	X	18 787	X	1 549
	X	Nowy Sącz (urban district)	X	0.15	X	1 196	X	552	X	58
	Grybów	X	0.36	X	34 478	X	7 295	X	585	X
19	Nowy Targ	Nowy Targ	0.28	0.24	49 141	65 732	12 246	19 184	1 306	1 474
	X	Zakopane	X	0.15	X	14 498	X	5 668	X	472
	Spisz Orawa	X	0.32	X	29 500	X	4 620	X	583	X
20	Oświęcim	Oświęcim	0.48	0.42	23 492	17 258	4 592	5 098	336	406
21	Przemyśl	X	0.46	X	48373	X	11617	X	1002	X
	X	Przemyśl (rural district)	X	0.45	X	48 301	X	9 793	X	1 211
	X	Przemyśl (urban district)	X	0.31	X	960	X	366	X	46
22	Przeworsk	Przeworsk	0.39	0.32	26 552	37 519	6 855	10 012	403	697
23	Ropczyce	Ropczyce	0.35	0.24	45 997	29 480	10 785	8 832	800	548
	Pilzno	X	0.34	X	34 879	X	7 509	X	573	X
	X	Dębica	X	0.26	X	43 395	X	12 017	X	777
24	Rzeszów	X	0.31	X	60 683	X	17 587	X	977	X
	X	Rzeszów (rural district)	X	0.25	X	65 907	X	21 820	X	1 157
	X	Rzeszów (urban district)	X	0.98	X	31 006	X	375	X	117
25	Sanok	Sanok	0.36	0.47	55 796	37 334	13 034	7 599	1 261	1 224
26	Strzyżów	Strzyżów	0.32	0.19	32 966	26 519	8 808	8 904	532	504
27	Tarnobrzeg	X	0.43	X	38 475	X	9 295	X	956	X
	X	Tarnobrzeg (rural district)	X	0.16	X	18 737	X	6 295	X	521
	X	Tarnobrzeg (urban district)	X	0.14	X	2 849	X	1 187	X	85
28	Tarnów	X	0.36	X	44 514	X	10 162	X	772	X
	X	Tarnów (rural district)	X	0.25	X	74 917	X	22 768	X	1 412
	X	Tarnów (urban district)	X	0.27	X	1 670	X	687	X	72
29	Wadowice	Wadowice	0.29	0.19	39 785	30 469	11 918	11 778	666	644
30	Wieliczka	Wieliczka	0.33	0.33	28 680	19 820	8 242	6 836	458	411
31	Żywiec	Żywiec	0.20	0.10	42 158	26 914	14 321	12 356	1 153	1 040
	X	Sucha Beskidzka	X	0.12	X	25 669	X	9 836	X	686
Total	X	X	X	X	1 519 939	1 405 334	383 749	406 384	30 539	32 160

Source: [Statystyka Polski, Tom XI, zeszyt 2, Warszawa 1928; Statystyka Polski, Tom XI, zeszyt 3, Warszawa 1928; Statystyka Polski, Tom XI, zeszyt 4, Warszawa 1928; Statystyka Polski, Tom XI, zeszyt 5, Warszawa 1928].

The research objective was to analyse changes in the agrarian structure in Poland with a special consideration of the years 1921 and 2002 as well as to analyse the situation in strengthening the agrarian structure as a result of the partitions of Poland in the years 1772-1795. A comparison of spatial differentiation of the agrarian structure in the years 1921 and 2002 was made within the analysis conducted. The results of the analysis allowed the formulation of a statement that despite running an intense agrarian policy for many years, the agrarian structure in 2002 has much in common with that found in 1921 soon after the partitions period. Researching the spatial differentiation of the agrarian structure was enriched by the analysis of the existing spatial dependence. Also, in that case one could observe a significant similarity in the local spatial differentiation of spatial dependence. Therefore, the authors drew a conclusion that Polish agriculture is characterized by strong spatial dependence which strengthens it and counteracts changes in the agrarian structure.

The hypothesis set in the paper says that the agrarian structure is a long-term structure in the Braudelian understanding of the concept. The obtained results of the research concerning spatial differentiation of the agrarian structure and the existing spatial dependence allowed the verification of the research hypothesis.

The analysis conducted within the paper also showed that it is significant to consider the character of the agrarian structure while formulating plans for the agrarian policy. On a larger scale the agrarian structure is more dependent on the regional and historical factors than on the state's undertaken activities. Attention should be paid to the difficulties related to a change in the agrarian structure. Also, it must be remembered that changes implemented are irreversible over a long period of time.

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Received November, 6, 2013; accepted for printing July, 20, 2014.