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DETERMINANTS OF THE DEVELOPMENT OF AGRICULTURE AND RURAL AREAS IN KONIŃSKI AND LESZCZYŃSKI SUB-REGIONS IN THE YEARS 2002 AND 2010. COMPARISON ATTEMPT

Summary: Rural areas and their development constitute an important area of research and policy on the local scale as well as the entire EU Community. Therefore, the work was undertaken to determine the determinants of the development of rural areas and agriculture in the Konin and Leszno subregions. The aim of the work is to comprehensively determine the level of development of agriculture and rural communes in the Konin and Leszno subregions during the period of the Universal Agricultural Censuses (2002, 2010) based on the results of factor analysis and to examine the main reasons for changes occurring in given periods. The research will allow to determine the socio-economic situation and the resulting determinants of the development of municipalities.

Key words: rural development, agricultural development, economic changes, factor analysis.

1. INTRODUCTION

Rural areas and their development constitute an important area of research and policies both in local and the whole EU scale. The work attempts to describe development of rural areas and agriculture in *koniński* and *leszczyński* subregions. It is defined as a set of processes generating direction and speed of changes in social and economic system. The most desirable development, especially in such differentiated area as eastern and western part of wielkopolskie province, is a coherent one understood as a sustainable growth, i.e. development that harmonizes both its economic and social aspects. Consequently, the need of developing research on a local scale is emphasized, which results from the reform of public administration and changing of competence range of regional authorities. Local scale research is to a large degree made more difficult by limited access to statistical data as many numerous variables describing social and economic situation are only gathered during General Censuses. As a result, the survey of

development degree of rural areas at the level of a commune was carried out by making use of the last census data. The work deals with coherence of development in *koniński* and *leszczyński* subregions that have not been statistically well examined so far. It is to determine widely perceived structures describing the areas facing changes that have taken place in the census years. The conducted research will allow to determine their social and economic situation as well as determinants of the commune's development resulting from it. The aim of the work is a comprehensive detemination of the level of development of agriculture and rural areas of the subregions of *koniński* and *leszczyński* in the period of carrying out the General Agricultural Censuses (2002, 2010) basing on the results of factor analysis and examination of main reasons of changes taking place in the periods in question. Studying of specialist literature was aimed at explaining the method used as well as indicating methodology necessary to apply the factor analysis. It is the method used to describe main determinants of development of rural areas and possesses one important function from the point of view of the research, namely allows to reduce huge amount of fator variables to a few not connected with each other ones that retain most information contained in the factor variables and moreover complete them with additional content revealed during their analysis [Panek 2002]. It is a linear, mathematical model, so its solving is based on model specialization [Czyż 1971]. In most cases the factor analysis refers the research problem to one period of time [Czyżewski 1976], however there is not much research characterizing dynamic of spatial units development with the aid of the above method. The procedure of factor analysis consists of two stages: specifying factors and interpreting distinct feature pattern. The data are then standardized, which makes it possible to apply full comparisons. The factor analysis may be divided into two groups: analysis of main components and classical method of factor analysis. As a result of the conducted research, it will be possible to determine structures of farms on a local scale and indicate developmental factors of rural areas as well as all factors determining changing structures in such farms.

2. DESCRIPTION OF BASIC DATA CONCERNING THE EXAMINED COMMUNITY

The research comprises 65 communes from two subregions of *koniński* and *leszczyński*. Selection of the research sample was intentional and was dictated by social and economic differences that have been taking place in eastern and western part of *Wielkopolska* province. The analysis was conducted for the years when the General Agricultural Census was carried out (2002, 2010) and the gathered data were of original character. Statistical data contained in the census information on social and economic situation of that area provided information for the present work that deals with social and economic aspects of development of rural areas and agriculture in the area of *koniński* and *leszczyński* subregions. In order to

answer the question of what factors and to what extent shape the relations between outlays and results in the communities in question, the above mentioned method of factor analysis was applied. The starting point for the research is creation of an observation matrix that is an ordered collection of factors illustrating various features of examined problems [Czyżewski 1976]. It is important that such set of starting features would enable a multi-aspect analysis of developmental processes from the point of view of the discussed problems of the development of rural areas and agriculture in those subregions. The following indicators were assumed as being representative for development in that area: area of arable land, their use structure, size of outlays, production worth, employment and some other coefficients. In order to eliminate differences, intead of absolute values of features, relevant indicators of structure and intensification were chosen that have the form of meters per capita [Czyżewski 1976]. According to the value of factor data that in the statistical interpretation take the form of correlation coefficient between a factor and its variables, one may identify patterns of the variables correlated with some specific factors.

Table 1. Examined matrix of observation

Feature no	Fatctor/feature name
1	Budget spending for 1 inhabitant
2	Budget income for one inhabitant
3	Average monthly total gross salary for 1 inhabitant
4	Average monthly gross salary in agriculture for 1 inhabitant
5	Price of 1 ha of land
6	Average combined price of purchasing 1 ton of basic grain products (barley, wheat, oats, corn in thousands of PLN)
7	Average price of purchasing of 1 kg (bulls, heifers, fattening pigs)
8	Number of farms with income from agricultural business for 1000 inhabitants
9	Number of farms with income from extra-agricultural activities for 1000 inhabitants
10	Number of cattle and cows for 1000 farms
11	Number of pigs for 1000 inhabitants
12	Number of poultry for 1000 inhabitants
13	Total area sown with basic grain (barley, wheat, oats, corn) for 1000 farms
14	Area of arable lands for 1000 farms
15	Area of orchards for 1000 farms
16	Area of meadows for 1000 farms
17	Area of forests for 1000 farms
18	Area of farms with area of 1-5 ha for 1000 farms
19	Area of farms with area of 5-10 ha for 1000 farms
20	Area of farms with area of 10-15 ha for 1000 farms

cd. Table 1.

Feature no	Factor/feature name
21	Area of farms with area of 15 ha for 1000 farms
22	Percentage ratio of forest areas
23	Communal roads with hard surfaces for 100 km2
24	District roads with hard surfaces for 100 km2
25	Toral number of vehicles (passenger cars, buses, trucks) for 1000 inhabitants
26	Number of agricultural machines for 1000 inhabitants
27	Water consumption for 1 inhabitant
28	Gas consumption for 1 inhabitant
29	Electricity consumption for 1 inhabitant (kWh)
30	Switching network for 100 km2
31	Percentage of general public installation users
32	Population density for 1km2
33	Number of inhabitants in a commune
34	Percentage of flats equipped with installations (water, bathrooms, central heating) for all inhabitants
35	Migration balance for permanent stay
36	Migration in the direction of city- the countryside
37	Migration in the direction of the countryside – city
38	Number of libraries for 1000 inhabitants
39	Number of pharmacies and pharmacy units for 1000 inhabitants
40	Number of outpatient clinics (infirmaries) for 1000 inhabitants
41	Numbers of pupils in primary schools for 1000 inhabitants
42	Number of pupils in junior secondary schools for 1000 inhabitants
43	Number of people with primary-level education for 1000 inhabitants
44	Number of people with higher-level education (university) for 1000 inhabitants
45	Average total employment for 1000 inhabitants
46	Average employment in agriculture for 1000 inhabitants
47	Number of unemployed people for 1000
48	Natural population growth for 1000 inhabitants
49	Number of solemnized marriages for 1000 inhabitants
50	Amount of realized JPO payments for 1000 inhabitants
51	Amount of realized ONW payments for 1000 inhabitants
52	Number of realized payments in the activity of Facilitating start for young farmers comprised in PROW for 2007-2013 for 1000 inhabitants
53	Number of realized payments in the activity of Modernization of farms comprised in PROW for 2007-2013 for 1000 inhabitants
54	Number of realized payments in the activity of Creating and developing of micro-enterprises comprised in PROW for 2007-2013 for 1000 inhabitants

cd. Table 1.

Feature no	Fatctor/feature name
55	Amount of physical person tax revenues
56	Amount of company-related tax revenues
57	Investment spending on assets connected with environmental protection for 1 inhabitant
58	Investment spending in enterprises for environmental protection for 1 inhabitant
59	Amount of assets in enterprises for 1 inhabitant
60	Physical persons running businesses
61	Total business entities registered with REGON database
62	Agricultural business entities registered with REGON database
63	Income of farms acc. to FADN agricultural type
64	Income of farms acc. to FADN economic type
65	Income of farms acc. to FADN cultivation area type

Source: one's own elaboration according to data from GUS Local Data Bank.

The collection of variables used in the survey was presented in table 1. As the starting values of features were mainly expressed in absolute or average numbers, it was necessary to reduce the indicators to a form enabling comparison of such features. The variety of measures were corrected by standardization (normalization), i.e. referring of a specific unit indicator of observation to average value of the whole collection. Standard deviation was accepted as a measuring unit. The set of normalized variables is presented in table 2. Analysis of normalized values of 65 features allows for a general perception as regards the level of their variability [Czyżewski 1976]. Relatively low level of variability characterizes phenomena connected with an area (area of arable lands, area of meadows) or the structure of cultivated lands. There are no distinct deviations which suggest proportionality of occurring changes. On the other hand, other features are characterized by higher dispersion of values around average ones.

Table 2. Variability ranges of normalized features

Feature no	2002		2010		Feature no	2002		2010	
	minimum	maximum	minimum	maximum		minimum	maximum	minimum	maximum
1	-1,02	3,32	-2,09	4,54	34	-2,25	1,93	-1,48	3,11
2	-0,67	3,70	-0,96	2,41	35	-1,71	1,67	-1,20	3,15
3	-1,42	1,63	-1,95	1,22	36	-1,02	2,72	-2,57	1,78
4	-1,47	1,80	-1,44	1,89	37	-1,23	2,94	-2,24	1,72
5	-1,28	2,30	-1,03	2,33	38	-1,22	1,73	-1,18	1,94

cd. Table 2.

Feature no	2002		2010		Feature no	2002		2010	
	mini-mum	maxi-mum	mini-mum	maxi-mum		mini-mum	maxi-mum	mini-mum	maxi-mum
6	-1,04	1,17	-1,59	1,40	39	-0,47	1,18	-1,17	2,07
7	-1,59	1,72	-1,57	2,24	40	-0,65	2,07	-1,15	1,79
8	-1,78	2,10	-2,10	1,87	41	-2,66	2,00	-1,06	2,25
9	-1,77	2,78	-1,36	3,31	42	-2,90	2,21	-0,29	0,66
10	-1,70	2,15	-1,69	3,50	43	-1,51	3,07	-2,30	1,04
11	-1,15	2,72	-0,94	2,56	44	-0,65	2,77	-2,97	1,57
12	-0,39	1,76	-0,20	1,80	45	-1,57	1,48	-1,13	1,50
13	-1,16	1,68	-1,12	3,82	46	-1,24	1,20	-1,31	1,20
14	-0,18	-0,02	-1,59	2,19	47	-0,83	1,49	-1,16	1,12
15	-0,36	1,85	-1,91	2,30	48	-0,70	0,41	-1,11	1,34
16	-1,26	2,43	-1,87	2,50	49	-4,42	2,45	-0,79	0,84
17	-1,10	2,93	-0,38	1,72	50	-	-	-2,09	1,89
18	-0,74	1,10	-1,26	3,76	51	-	-	-2,13	1,18
19	-2,05	1,79	-1,15	3,01	52	-	-	-1,14	1,01
20	-2,17	2,45	-1,49	2,41	53	-	-	-1,35	1,80
21	-1,06	1,31	-1,84	1,93	54	-	-	-2,18	1,38
22	-1,49	1,55	-2,33	2,97	55	-	-	-1,54	0,99
23	-1,14	1,10	-1,28	2,25	56	-	-	-1,41	1,87
24	-1,80	1,44	-1,61	2,08	57	-1,42	1,49	-0,68	0,74
25	-0,67	0,89	-0,64	2,47	58	-1,31	0,99	-0,55	0,57
26	-2,05	1,66	-0,76	1,84	59	-1,34	1,96	-0,54	0,98
27	-1,72	2,41	-2,69	1,72	60	-0,90	0,86	-1,18	0,32
28	-0,62	1,60	-2,32	1,41	61	-0,91	1,09	-1,17	0,44
29	-1,29	1,19	-3,54	3,19	62	-0,70	1,65	-0,36	0,70
30	-0,52	2,38	-0,65	1,90	63	-1,47	1,80	-1,37	1,50
31	-2,56	2,43	-2,76	1,63	64	-1,17	1,72	-1,36	1,27
32	-0,35	0,21	-0,49	2,88	65	-1,12	1,50	-1,04	1,20
33	-1,19	2,96	-1,40	2,60					

Source: one's own elaboration according to standardization of the matrix of observation

It concerns the features revealing the biggest differences in the surveyed collection and constituted by such features as budget income for 1 inhabitant, budget spending or in demographic variables such as the number of solemnized marriages. The conducted analysis of the correlation between variables proved some significant relations between the described variables. It is characterized

by high complexity due to the complicated area of connections and its spatial character. In the case of the surveyed community, 4 factors independent from each other have been singled out, respectively for each year. They explain 70% of joint variability as regards every single analysis. The structure of this solution was presented in table 3. The criterion decisive for variable sequence within a specific pattern was the size of the factor load [Czyżewski 1976].

It is worth noting that when interpreting the factors, Kaiser's criterion was applied indicating that for further analysis only such factors should be used whose own value is higher than 1 [Panek 2009]. In the surveyed cases all factors meet that criterion. In the census years of 2002 and 2010 an increase within the examined factors was observed ($F_1 - F_4$) in the overall collection of factor variability. Cumulated percentage of joint variability increased from 54% in the year 2002 to over 58% in 2010. The biggest increase took place in the case of the first factor – F_1 and the second one – F_2.

Table 3. Factor solutions for the census years (2002, 2010)

Factor	2002	2010
	Matrix own value	
F_1	14,52	27,62
F_2	7,95	11,23
F_3	4,88	9,52
F_4	4,10	6,24
Percentage of overall variations		
F_1	25,04	29,77
F_2	12,08	13,72
F_3	8,41	10,24
F_4	7,08	6,71
Cumulated percentage		
F_1	25,04	29,70
F_2	38,76	41,85
F_3	47,17	52,10
F_4	54,26	58,80

Source: one's own elaboration according to the results of factor analysis for the matrix of observation in the years 2002, 2010.

In statistical interpretation loads have the form of a correlation coefficients (negative or positive) between specific factors and the variables, so the size of factor loads makes it possible to identify the pattern of connected variables with the specific factors. As a result, they are considered to be the reasons of found correlations in a specific sub-set [Czyż 1971]. Positive loads inform of positive influence on that factor (simulant), and negative one of inversely proportional relation (desimulant).

3. FACTOR (F$_1$) FINANCIAL AND OBJECT RESOURCES IN PLANT AND ANIMAL PRODUCTION

F$_1$ Factor of financial and object resources was the leading one across the whole period, when taking into account plant and animal production. It explained the biggest set of examined joint variability from 25,4% in 2002 to 29,77% in 2010 and had its own value at 14,52 and 27,62 respectively. Its construction comprises a set of basic data characterizing the process of development in the communes. In the analyzed period, the factor had the form of a simulant, i.e. it contributed to the development of rural areas. Besides, indicators directly describing production potential of farms such as number of bred animals or the area of sown lands, there were also factors connected with area cultivation or obtaining EU means in the form of direct subsidies or investment operations. Due to a different construction of a factor for a given cross-section survey, this factor will be analyzed in the following stages. The first stage will include analysis as regards plant and animal production, then factors concerned object resources and finally the financial resources. Table 4 presents analysis concerning the situation connected with plant production and way of using land. It results that the biggest influence on the functioning and development of communes in *koniński* and *leszczyński* subregions was exerted by such variables as amount of cattle and cows as well as the area of farms of 10-15 ha in size. It should be noted that in the surveyed period of time, the factors mostly increased and only in some cases, such as in total area of basic grains or in the area of farms of over 15 ha, the factors' value decreased. It was also observed that in that period a decrease of area of land with sowing of basic grains took place (barley, wheat, oats, corn), which meant the decrease in grain production. With relatively low price of purchasing, the crop decrease resulted in diminishing goods value of grains in the total structure of income. When analyzing object resources, one may see that the biggest value of the factor is ascribed to consumption of electricity for 1 inhabitant. This factor in the years 2002 and 2010 was of the biggest importance for the surveyed group of variables. One may observe that there was an increase in the case of almost every factor, with the exception of the number of people seeking medical help and gas consumption, and every feature is strongly correlated with the factor as they have factor value of over 0.7. Definitely, important elements for *koniński* and *leszczyński* subregions were the features connected with using of media, consumption of energy, water and gas. It proves increasing demand for these means but also that they contributed to improvement in the standard of living in that area. The last element in the analysis of the factor of financial and object resources taking also into account plant and animal production (F$_1$) was examining features concerning the financial resources in communes of *koniński* and *leszczyński* subregions. In this element the following variables were examined: price of 1 ha of land, investment outlays in enterprises or investment into environmental protection. The analysis was also accompanied by some selected

Table 4. (F_1) Factor – Factor loads of some selecteed features

Factor F_1 – Financial and object in plant and animal production	2002	2010
Price of 1 Ha of land	0,69	0,72
Average combined purchase price of basic grains	0,71	0,75
Average combined purchase price of 1 kg of animal production	0,70	0,72
Number of farms with income from agriculture	0,67	0,71
Number of farms with income from extra-agricultural activities	0,63	0,69
Number of cattle and cows	0,72	0,78
Number of pigs	0,75	0,77
Number of poultry	0,77	0,72
Average total area of sowing with basic grains	0,81	0,79
Area of arable land	0,76	0,77
Area of orchards	0,72	0,73
Area of meadows	0,69	0,70
Area of forests	0,70	0,70
Forest to overall land ratio	0,72	0,73
Area of farms with 1-5 ha area	0,69	0,72
Area of farms with 5-10 ha area	0,79	0,80
Area of farms with 10-15 ha area	0,75	0,74
Area of farms of over 15 ha area	0,74	0,70
Water consumption	0,75	0,76
Gas consumption	0,77	0,74
Energy consumption	0,79	0,81
Number of pharmacies	0,69	0,70
Number of pharmacies and pharmacy points	0,65	0,72
Number of outpatient clinics (infirmaries)	0,70	0,69
Investment outlays for assets into environmental protection	0,79	0,83
Investment outlays in enterprises for environmental protection	0,77	0,85
Income of farms according to FADN agricultural type	0,79	0,92
Income of farms according to FADN economic size type	0,76	0,84
Income of farms according to FADN area of cultivation	0,77	0,85
Amount of realized JPO payments	0,00	0,90
Amount of realized ONW payments	0,00	0,89
Number of realized payments in the activity of Facilitating start for young farmers comprised in PROW for 2007-2013 for 1000 inhabitants	0,00	0,79
Number of realized payments in the activity of Modernization of farms comprised in PROW for 2007-2013 for 1000 inhabitants	0,00	0,82
Number of realized payments in the activity of Creating and developing of micro-enterprises comprised in PROW for 2007-2013 for 1000 inhabitants	0,00	0,75

Source: one's own results of factor analysis for examined matrix of observation in the program of Statistica 13.1.

elements of the EU Common Agricultural Policy, where Poland has been a member since 2004. This element includes such variables as the amounts of realized JOP an ONW[1] payments as well as amounts obtained from selected investment activities such as modernization of farms, facilitating start for young farmers or creating and developing of micro-enterprises. One should note here that the features connected with EU Common Agricultural Policy concern only the examined period, i.e. the year 2010.

When analyzing this part of F_1 factor one may notice such features as incomes related to farms, incomes according to their types or investment outlays in enterprises for environmental protection, where the factor values are the highest. In 2010, variables concerning amounts obtained from EU funds also reach a high level, such as for example the amount of realized JPO payments (0,90) or some selected investment activities, where the factor load exceeded the level of 0,80. It testifies to the fact that after Poland joined the EU structures both *koniński* and *leszczyński* subregions have been active beneficiaries of EU funds, which has allowed them to obtain additional source of income to modernize agricultural farms and is reflected in increasing incomes by such farms. It is worth noting that in the course of time, in the periods in question there has been a considerable increase of investment and outlays for environmental protection as well as for investments connected with obtaining assets for that purpose. By obtaining external means also quality of plant and animal production has improved, which is reflected in price increase of both plant and animal products. One may also observe that in the period of 2002 and 2010 there has been increase of land prices and improvement on the agricultural market with most farms getting their incomes from cultivating land. In summary, determinants having most influence on the development of the rural areas and agriculture in the communes of *koniński* and *leszczyński* subregions that account for about 30% of joint features variability in the years 2002 and 2010 were financial and object resources with plant and animal production resulting from conditions of available production means as well as economic structures.

4. (F₂) FACTOR OF ECONOMIC AND SOCIAL ACTIVITY IN THE AREAS OF KONIŃSKI AND LESZCZYŃSKI SUBREGIONS

In all analyzed periods, this factor had a positive value so it was a simulant in character. It consistently contributed to the development of rural areas in the surveyed subregions. As the factor's structure was determined in the years 2002 and 2010 by set of variables close to each other, so the factor was described in the area of *koniński* and *leszczyński* subregions as economic and social activity. It explained respectively 12,08% and 13,72% of the examined joint variability

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[1] JPO – Uniform Area Payment.
ONW – payment for areas with natural limitations or other specific limitations.

resource and had its value of 7,95 and 11,23. This indicates a variable force of influence in the years in question, with increase in value and importance in 2010. Due to the similar set of variables making up the factor, they will be analyzed together in all the years. The factor was created from the variables describing economic and social activites, i.e. average employment in agriculture and in general, businesses in REGON database, physical person and company-related taxes (PIT and CIT) or the number of unemployed people. All variables had an important positive relation with the factor, which indicated a similar direction of changes.

One may assume that the growth of economic and social activity has led to the increase of population's income and improved business activities of enterprises in communes as well as increased employment. In both the examined cases the strongest relation with the distinctive factor was found in the variables characterizing level of enterprising and economic activity: business entities registered in REGON database, physical persons running businesses or average employment. Between the years 2002 and 2010, the intensity of these features increased, though with one exception being the variable of business entities registered with REGON database where a decrease was observed. Following features that were closely connected with the factor they included the amount of tax from physical persons (PIT) and company-related tax (CIT). The role of these variables also increased in the period in question, which testifies to the improvement in wealth of the inhabitants of *koniński* and *leszczyński* subregions as well as rising importance of the communes' budget for the development of such rural areas. In contrast, variables that had little importance in those years included budget spending for one inhabitant.

Table 5. (F_2) Factor – factor loads of selected features

F_2 Factor – Economic and social activity in the area of koniński and leszczyński subregions	2002	2010
Average total employment	0,51	0,89
Average employment in agriculture	0,48	0,87
Average total monthly salary gross	0,67	0,70
Average total monthly salary gross in agriculture	0,59	0,69
Number of unemployed people	0,72	0,82
Physical persons running businesses	0,85	0,79
Business entities registered with REGON database	0,82	0,80
Business entities registered with REGON database – agriculture	0,80	0,77
Budget spending for 1 inhabitant	0,55	0,45
Budget income for 1 inhabitant	0,49	0,47
Size of assets in enterprises	0,54	0,56
Amount of physical person tax (PIT)	0,73	0,78
Amount of company-related tax (CIT)	0,72	0,73

Source: according to results of factor analysis for the examined matrix of observation in the program of Statistica 13.1.

From among all communes, the ones with the highest positive values were selected and those where economic and social activity mostly stimulated development. Most of the communes that are characterized by the highest factor values represented *koniński* subregion, the districts of *kolski and koniński* as well as communes from *leszczyński* subregion with *leszczyński* and *rawicki* districts. One should note that the communes representing these districts recur in each of the surveyed periods and that each of these them recorded growth in comparison to the year 2002. The majority of communes with high economic and social activity was located in the eastern part of the region. It is worth noting that in the case of such commune as *Stare Miasto* with motorway access, large service and production enterprises developed over the period of the years in question and a large trade centre was opened there. Investment in infrastructure and relations of local authorities with business circles development provide greater opportunities for sustainable growth. It was generally observed that communes with higher values of F_2 factor were characterized by larger amount of business entities registered with REGON database, higher PIT and CIT incomes or lower unemployment. On the other extreme were communes located in both subregions with the lowest factor values and in 2002 they included the areas of *koniński* and *leszczyński* districts. In 2010 a certain change was observed as the communes appearing in the previous period were joined by such as Golina, Ślesin and Kościan from *wolsztyński* district (in both time periods). Therefore, it may be supposed that those units exhibited relatively lower economic and social activity. The conducted analysis of features making up the factor revealed that the biggest influence on spatial distribution of economic and social activity of communes in *koniński* and *leszczyński* subregions in all examined periods was exerted by the variables of business entities registered with REGON database and average employment.

5. FACTOR (F_3) OF HUMAN CAPITAL IN THE COMMUNES OF KONIŃSKI AND LESZCZYŃSKI SUBREGIONS

Loads of all variables were correlated positively with the highlighted factor so in the period in question it had the character of a simulant. The factor of economic and social activity in the area of *koniński* and *leszczyński* subregions in the years 2002 and 2010 was determined by a set of similar variables. In the above period, it explained 8,41% and 10,24% of joint resource of examined variability and had its own value of 4,88 and 9,52. In all years of analysis, 3 variables were strongly correlated with the factor and they concerned the inhabitants' level of education in that community as well as the number of population in a given area. Variables recurring in a few factors were ascribed to that factor in which they assumed the highest loads. Therefore in the analyzed factor such features as the number of solemnized marriages or population birth rate could be found.

Table 6. Factor (F₃) – Factor loads of some selected features

Factor F₃ – Human capital in the communes of koniński and leszczyński subregions	2002	2010
Density of population	0,35	0,62
Number of commune inhabitants	0,71	0,69
Migration balance	0,34	0,40
Migrations in the direction of the countryside-city	0,52	0,71
Migrations in the direction of city-the countryside	0,55	0,88
Pupils in primary schools	0,41	0,42
Pupils in junior secondary schools	0,39	0,45
People with primary-level education	0,76	0,80
People with higher-level education	0,73	0,84
Birth rate	0,33	0,43
Number of solemnized marriages	0,29	0,32

Source: according to results of factor analysis for the examined matrix of observation in the program of Statistica 13.1.

An important element of that factor were the features connected with population migrations in the direction of the countryside-city and vice versa. According to the research and comparison of factor loads one may suppose that increasing unmber of people with higher education in the period in question resulted in not adapting of the type of eduction to the needs of the local market, which gave rise to unemployment and migration of the population, especially young people from smaller towns to bigger cities. From all communes, the table below presents those where the factor values were the highest. As may be observed in the specific years, commune representation is different. In the first of the examined years, all communes with the highest values were represented by *koniński* subregion: the distrcts of *turecki, słupecki* and *kolski*. In the second period, a change occurred and the highest value of F₃ factor was also found in the district of *gostyński* that replaced the districts of *kolski* and *turecki*. As a result of analyzing the factor's value one may claim that the eastern part of the region represented by *koniński* subregion was characterized by higher level of the stimulating role of human capital in the communes of *koniński* and *leszczyński* subregions, especially in the first period to the year 2002, before Poland joined the EU structures. Changes that took place after 2002 indicate growing importance of migration and employment both in the communes located in eastern and western parts of the region, especially in the period after Poland joined the EU. In the case of communes with average values, none of the examined units has retained its position throughout the whole period of observation. It was observed that in some communes, such as in *Golin, Ślesin* or *Lipno* for example, the importance of such factors as having people with higher education or migration balance increased. Improvement connected with such communes as *Korbia, Śmigiel* or *Powidz* is a result of lower decrease of such factors as birth rate and migration. Units with the lowest values

were located both in the year 2002 and 2010 in the west, in *leszczyński* subregion. One may notice that spatial distribution of communes according to their factor values in the period in question was similar. Analysis of the communes made it possible to claim that human capital in the communes of *koniński* and *leszczyński* subregions in the western part was relatively lower evaluated than in the eastern part, which indicates much lower importance of the factor in the areas located in that part of the region.

6. FACTOR (F_4) ROAD AND TECHNICAL INFRASTRUCTURE NETWORK IN THE COMMUNES OF KONIŃSKI AND LESZCZYŃSKI SUBREGIONS

Loads of main variables making up the factor were negatively correlated with it, which makes it a desimulant. In the years of conducted agricultural censuses (2002, 2010) the factor was mainly made up of communal or district roads with hard surfaces for 100 km^2, number of agricultural machines, vehicles or switching networks for 100 km^2 as well as percentage of population using general access installations. So, F_4 factor was determined as *Network of road and technical infrastructure in the communes of koniński and leszczyński subregions*. It explained respectively 7,08% and 6,71% of joint resource of variability and had the value of 4,10 in the year 2002 and 6,24 in 2010. It indicates a changing force of its influence. Due to the same set of variables making up the factor in all years of the analysis, they will be examined together.

Table 7. Factor (F_4). Factor of some selected feature loads

Factor F_4 – Development of road and technical infrastructure in the communes of koniński and leszczyński subregions	2002	2010
Communal roads with hard surface for 100 km^2	-0,64	-0,59
District roads with hard surface for 100 km^2	-0,67	-0,62
Total number of vehicles	-0,61	-0,61
Agricultural machines	-0,45	-0,52
Switching network for 100 km^2	-0,35	-0,55
Percentage of users of general access installations	-0,39	-0,42
Percentage of flats equipped with installations	-0,57	-0,62

Source: according to results of factor analysis for examined matrix of observation in the program of Statistica 13.1.

Applying the adopted assumptions, one should claim that in the years 2002 and 2010 features that exceeded a threshold size of the factor load (0,7) included such features as communal and district roads with hard surfaces for 100 km^2. In the situation when in the factor's structure certain variables recurred, they were ascribed to the solution where they reached the highest loads. In order to make a more precise interpretation of the factors, also other variables were applied

whose load value exceeded 0,7 but were similar to them. Below, one may find communes with the highest factor values. In the period in question, units with the highest values were located in *leszczyński* subregion and belonged to *wolsztyński* district (*Wolsztyn, Siedlce*), with one commune belonging to *rawicki* district (*Rawicz*), whereas in 2010 the only commune that recurred was *Wolsztyn*, with a new one of *Osiak Mały* and *Chodów*, both from *Kolski* district, subregion of *koniński*. One may notice that cross-section analysis of the commune of *Wolsztyn* appeared, which proves a stable share of the factor in explaining joint variability.

In the case of communes finding its place within average values of F_4 factor, it was observed that the factor values in the case of some communes decreased in the first period and then inceased or vice versa. Only in the commune of *Strzałkowo*, a constant level of the factor was observed both in 2002 and 2010, whereas the factor's decrease was found in the communes of *Golina, Grodziec* or *Lipno*. It may have been the effect of decreasing incomes in the communes or population migrations to bigger cities. The communes from the lowest quarter in 2002 were located in the districts of *kolski, koniński* and *gostyński*, and in 2010 these were the districts of *leszczyński* and *kościański*. It is hard to notice any regularity patterns in this element as in contrast to the scale of communes with the highest values, on this scale no commune appeared again. The situation may have resulted from locating of expressways outside some communes' borders. The indicator of road and technical infrastructure in the communes of *koniński* and *leszczyński* subregions was differentiated and to a large extent was reflected in the location of the examined communes in relation to centres of local development.

7. SUMMARY

The main aim of the work was the comprehensive determination of the level of development of communes in *koniński* and *leszczyński* subregions, taking into account its determinants during the census years of 2002 and 2010. The subregions were analyzed in a comprehensive way basing on the specialist literature and available research of rural areas and according to factor analysis with the help of which determinants of development for census years were established. The factor analysis made it possible to select determinants of the development of rural areas and agriculture, which are common for all analyzed years, explaining a similar level of joint variation that indicates stability of commune development determinants in the examined subregions. The first F_1 factor explaining in the whole period of 29% of joint variability was co-created by variables connected with the financial and object aspects, incomes from agricultural business or obtaining means from the EU funds and plant and animal production. One may, therefore, determine these features as main determinants of local changes in agriculture. The second factor explained over 13% of relevant variability resource. In this factor, one may find variable social and economic activities such as average employment, number of unemployed people, average gross monthly salary or business

entities registered with REGON database. The third factor explained 10,24% of relevant variability resource and comprised human capital, number of school pupils, education or birth rate. The fourth factor that explained 6,71% of relevant joint variability included features concerning road and technical infrastructure. One may, therefore, conclude that the factors of development of rural areas and agriculture in *koniński* and *leszczyński* subregions were similar in all analyzed years and explained a similar level of joint variability, which indicated constant character of the development determinants in various periods. In conclusion, I would like to point out that:

- in *koniński* and *leszczyński* subregions the development of agriculture and rural areas was induced by the level of enterprising, situation on the labour market, plant and animal production as well as human capital;
- EU funds have contributed to the development of rural areas of *koniński* and *leszczyński* subregions by increasing investments and level of enterprising, which resulted in diminishing of historical differences in the development of the examined subregions that were inherited from belonging in the past to different partitions of Poland (Russian and German ones, respectively);
- variables connected with road and technical infrastructure had a destimulating influence on the communes' development.

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DETERMINANTY ROZWOJU ROLNICTWA I OBSZARÓW WIEJSKICH W PODREGIONIE KONIŃSKIM I LESZCZYŃSKIM W LATACH 2002 I 2010. PRÓBA PORÓWNANIA

Streszczenie: Obszary wiejskie i ich rozwój stanowią ważny obszar badań i polityki w skali lokalnej jak i całej Wspólnoty UE. Dlatego w pracy podjęto się określenia determinantów rozwoju obszarów wiejskich i rolnictwa w subregionach konińskim i leszczyńskim. Celem pracy jest kompleksowe określenie poziomu rozwoju rolnictwa i obszarów wiejskich gmin w podregionach konińskim i leszczyńskim w okresie przeprowadzenia Powszechnych Spisów Rolnych (2002, 2010) w oparciu o wyniki analizy czynnikowej oraz zbadanie głównych przyczyn zmian zachodzących w danych okresach. Przeprowadzone badania pozwolą na określenie sytuacji społeczno-ekonomicznej oraz wynikające z tego determinanty rozwoju gmin.

Słowa kluczowe: rozwój obszarów wiejskich, rozwój rolnictwa, zmiany gospodarcze, analiza czynnikowa.

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