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PROGRESS AND CHANGES IN THE INDUSTRIALIZATION OF POLAND

The basic idea of Professor Leszczycki's paper can be summarized as the need for concentration of research activity in applied geography around definite problems[1]. I think that economic growth should be one of these problems. We have a good example of this in the "Essays on Geography and Economic Development", a volume published in 1960, in Chicago[2].

The main aim of this paper is to stimulate the discussion on geography of industrial growth which is the most important process in the economic development.

My paper consists of three parts. The first part is an attempt to outline the characteristic features of three industrial revolutions taking place in the last hundred years on the Polish territory. The second part presents the geographical structure of industrial economy of Poland in 1960 and the place of industries of our country in the world economy. The third part describes the basic trends of change in the geographical pattern of the Polish industry in the 35-year period /1946-1980/.

I. Three industrial revolutions on Poland's territory

An industrial revolution, in my opinion, is the economic and social process based on technological changes in production, leading up in a comparatively short period of time to a definite raise in the level of development and the change of structure of national economy. Such a revolution can be observed by changes in the following indices:

/1/ absolute and relative growth of secondary and tertiary occupations;

/2/ growth of per capita national income and the share of industrial sector in its creation;

/3/ growth of interregional and international trade and in-

crease in relative importance of raw materials in imports and of industrially processed goods in exports;

/4/ growth of urban population".

It is possible to distinguish three distinct stages of industrial economic growth which may be called industrial revolutions within Polish territory. The first one "The take-off"[x] revolution was started in the middle of the 19th century when the present Poland's territory was divided between three different states - Prussia, Austria and Russia. At that time the great agrarian reforms /abolition of serfdom and granting of land ownership to the liberated peasants/ broke the enforced link between the landlord and the peasant enabling the latter to migrate and creating in this way an army of cheap labour force for the growing industries. Construction of railway lines /1000 km. about 1860, 22 000 km about 1910/ created the necessary condition for the development of inter-regional and international trade.

The industries located on the present Polish territory found their place in the international division of labour of this time. An important item in this development was the political division of the territory leading to the incorporation of these industries into three "common market" areas of Germany, Austria and Russia.

Thus in the last years prior to the World War I more than a million of industrial workers existed on the present Poland's territory. The studies of Pounds[4], Straszewicz[5] and Misztal[6] present a detail evidence that the present pattern of the industrial regions of Upper Silesia, Łódź and Warsaw were established in the last 50 years prior to the World War I /see: the maps presenting the historical evolution of the Warsaw Industrial Region/.

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x/ In spite of our critical attitude towards the general direction of thinking presented in the publication of W.W. Rostow - I shall use some notions introduced by this author because of their brevity in describing the basic features of some phenomena of economic growth. /See: W.W. Rostow - The stages of economic growth. Cambridge, Mass., 1960/.

The period between 1918 and 1939 did not introduce basic changes into the volume of industrial activity and share in national economy. Nevertheless the industry in the reconstructed Polish State was partly successful in the adaptation of its output to the demand of the integrated national market and in the construction of some new plants starting the production of industrial commodities which had not been produced on this territory in the 19th century /some products of the machine-tool, electrotechnical, chemical and food industries/.

The most important was the second industrial revolution of the years 1946-1960. The system of socialistic planning was able to create the conditions for a "big push" of our national economy /see table 4 and 5/. The main effect of this "big push" is the fact that Poland crossed the threshold of 400 dollars per capita national income[x]. This crossing is generally recognized as the necessary condition of self-induced economic growth. This means that national economy in Poland generates at present sufficient amount of capital to establish a proper equilibrium between the capital necessary for investment and the volume of commodities and services necessary for the present consumption.

The perspective plan of the development of Poland's economy in the years 1960-1980 provides for the development of economy which I have called "the achievement of industrial maturity". This third stage of the industrial revolution is illustrated by the following main features:

/1/ crossing of the threshold of 1000 dollars per capita national income

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x/ Using data on national income in international comparisons we should not forget the difficulties existing in this field. There are three most important causes of these difficulties:

1/ different methods of computation and especially the fact that the services are not recognized as a factor creating the national income in the socialist countries

2/ different price systems

3/ different methods of computations of the relative value of national currencies

/2/ achievement of a high level in the efficiency of industrial labour; if we put the data for 1960 as 100 the following target indices for 1980" are proposed:

industrial employment - about 180
labour efficiency - about 440
value added by manufacture - about 550

/3/ achievement of a relatively high level of per capita turnover in international trade /see table 6/.

These main features of the already described industrial revolutions are illustrated in detail in Table I.

II. The geographical pattern of Polish industrial economy in 1960

The data presented in the first part of my paper supply a sufficient background for discussion of the historic perspectives of industrialization of Polish territory. Tables 7 and 8 present materials illustrating the position of Poland among the world industries and comparison of some economic indices for the United Kingdom and Poland. We may say with certain amount of precision that the total volume of UK industrial production is 5,5 times bigger than the Polish one, and the per capita production about 3 times bigger /estimates for 1960/. Let us consider now the geographical pattern of Polish industrial economy. To establish this pattern seven indices were compiled. These are:

1/ density of population
2/ percentage of urban population
3/ industrial employment per 100 sq.km. /density of industrial employment/
4/ industrial employment per 1 thousand inhabitants
5/ per capita national income 1959
6/ the share of industry in national income
7/ the areal intensity of industrialization as defined by the percentage of the area of poviats with density of industrial employment above the country's average in relation to the total area of the voivodship.

These materials were gathered in order to establish two classifications of the 17 voivodships /into which Poland is divided/. The criterion of the first classification is the level of industrialization /see Table 9/ as expressed by the above-mentioned indices, the criterion of the second classification is the regional position /see Table 10/.

For the sake of our discussion let us call the first classification - "economic" and the second classification - "geographical", although I recognize the fact that both classifications are economic and geographical at the same time.

Let us consider the economic classification presented in Table 9, in which the indices were compiled in such a manner that they are comparable with the average for Poland. Naturally this classification is a consequence of the set of indices chosen as significant. The exclusion of indices describing the infrastructure of the invested capital especially in the transportation network and communal services - disguises important differences between such voivodships as Białystok, Lublin, Kielce or Rzeszów and such voivodships as Olsztyn, Koszalin, Bydgoszcz or Poznań.

The exclusion of indices describing the level of agricultural production disguises important differences between the voivodships of Rzeszów, Kielce and of the voivodships of Bydgoszcz and Poznań. The first are known as areas with a low intensity of agriculture, the latter as areas with high level of intensity.

Taking into account these deficiencies of our classificationswe have to stress that this classification is from the point of view of industrial and not from the point of view of total economy of a given voivodship.

The geographical classification distinguishes four groups of voivodships - the northern, the west-central, the east-central and the southern. In Table 10 we have presented indices for each voivodship and the results of the economic classification. A summary of these two classifications can be presented in the following way:

Economic / Geographical	Level of industrialization				Total number of voivodships
	low	middle	high	very high	
northern voivodships	2	2	-	-	4
west-central voivodships	-	3	-	-	3
east-central voivodships	2	2	1	-	5
southern voivodships	-	1	3	1	5
Poland	4	8	4	1	17

III. The basic trends of change in the distribution of Polish industry 1946-1980

The data presented in Table 11 establish some interesting trends in the change of the spatial pattern of Poland's industry during the 35-year period under consideration.

The most important one may be described as diminishing disparities in the levels of industrialization as between different parts of our country. The data of Table 11 support the conclusion that during our second industrial revolution this problem did not disappear completely and the creation of a more balanced distribution of Poland's industry had to be incorporated into the premises of our perspective i.e. long-term plan. In my opinion, it is possible to summarize the Polish experience in the industrialization of underdeveloped areas, as follows: The industrialization although a very important, is not the only tool in the promotion of economic development. The assumption of our economic policy in the early fifties that the total development of the regional economy will follow automatically from the location of some industrial plants in a backward area - has proved to be incorrect. We have some examples of "parachute" locations which created new

plants without the regionally multiplied effect. Some of these plants have rather high operational costs in comparison with the older plants of the traditional industrial districts. The economic losses on this account are however very small, among others because the non-industrialized areas got a relatively small share of total industrial investments in 1951-1960.

Generally it may be said that the second industrial revolution had in backward areas in Poland only the take-off effect. The "big push" is to take place within the framework of the perspective plan which will provide the proper setting for the development of backward areas, which was missing during the past 15 years.

On the other end of scale in the industrial development there is a problem of the optimum level of development of already highly industrialized areas. In Poland this is expressed in the relative overdevelopment of the voivodship of Katowice, including the most important industrial area in Poland - the Upper Silesian Industrial District.

The difficulties characteristic for overcongested areas /air and water pollution, water shortage, strangulation of transportation system/ raise the level of the social costs of industrial production in Upper Silesia. That is why in the last ten years a policy of passive deglomeration in this areas was adopted in form of restrictions on new industrial locations which were limited to cases where a new plant is closely technologically and economically associated with the extraction of coal. Nevertheless there exist numerous industrial plants for which the proximity of Upper Silesia is of some importance. These plants were located in the fringe area around Upper Silesia. The results can be seen on maps summarizing the geographical development of Polish industry during the II Industrial Revolution. These maps show the emerging pattern of the very large conurbation, perhaps the beginnings of a megalopolis - the new large-scale areal unit of the Upper Silesian and Cracow Region.

The basic tendency towards the diminishment of regional disparities in the level of industrialization can be traced too in the geographical classification /see Table 11/. The most

important group of voivodships is the southern one. The data of Table 11 reveal a slow, relative decrease of the share of this group in Poland's industrial production /52,6% in 1946, 49,0% in 1960 and 44% in 1980/.

The main asset of the industrial development of this group of voivodships is their location in the vicinity of deposits of the most important, known mineral resources of Poland.

The last years brought some important changes into the geography of mineral resources in Poland. Some large-scale mining was undertaken in Central Poland, outside of the traditional regions of extractive industry. The development of a new industrial region of Konin, specializing in the power-consuming industry, using lignite as fuel for production of electricity, is the most important.

According to the data of Table 11 the industrial development of the west-central group is very close to the rate of growth of the country as a whole.

The construction of a pipeline linking the Wołga Oil Region - "The second Baku", and the industrial centres in Poland, German Democratic Republic, Czechoslovakia and Hungary provides the basis for erection of a big petrochemical plant in Płock which will influence very strongly the industrial development of the East-Central Poland.

The east-central group did not change its share considerably in 1946-1960 and will gain only slightly in next twenty years.

The northern group of voivodships is the area of the most rapid relative industrial growth although this group is rather moderate in importance if we take absolute figures into consideration. The data of Table 11 reflect the lack of full use of opportunities of sea-shore industrial locations in the years 1946-1960 and perhaps too in the years of our coming plans. In my opinion, the necessity for rapid development of our maritime economy will quicken the industrial growth of that part of the country.

In conclusion it should be said that the targets for 1980 have to be considered still as preliminary. Especially in the area of the physical development of the country there are at present many problems to be solved. Some of them would be easier to deal with on the basis of an econometric model supplying quantitative data necessary for locational decisions and finding solutions of the maximum efficiency both from the point of view of our national economy and of other socialistic countries. The advantages of cooperation between various countries constist mainly of the extension of the economies of scale in industrial and agricultural productions and may be obtained by joint planning of the economic development.

The second concluding remark may be outlined as follows: the initial industrial pattern as created by the take-off revolution is rather stable.

The distribution of the national resources, the existing transportation and settlement network, the initial advantages of early start - create a considerable power of inertia, acting for the development of Polish industrial economy without basic changes in its geographical pattern. Nevertheless the big push of the second industrial revolution has created some important new nodal points for the development of different industrial geography which will take shape in the course of the next 20 years.

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Table 1

Three industrial revolutions in Poland

Specification	The "take-off" revolution		The "big push" revolution		The achievement of industrial maturity	
	1860	1910	1946	1960	1960	1980 xx
Population in millions	15 x	26 x	24	30	30	38 xx
Urban population in millions	3 x	8 x	7,5	14	14	23 xx
Industrial employment in millions	0,5 x	1,2 x	1,2	3	3	5,2 xx
Industrial production - value added including depreciation	no data	no data	100 x	500-550 x	100	550 xx
Per capita national income /in American $ 1960/	no data	no data	100-150 x	400-500 x	400-500 x	1100-1300

x/ rough estimates of the author

xx/ data of the perspective plan

Sources: Statistical Yearbook 1961. Central Statistical Office, Warsaw 1961.

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Table 2

Industrial employment in the present territory of Poland in 1907/10

Specification	Area		Population		Industrial employment		Persons employed in industry per 1000 inhabitants
	1000 sq km	%	millions of persons	%	thousands of persons	%	
Territories incorporated into Prussia	149	47,7	11,2	42,1	710	59,6	63
Territories incorporated into Austria	33	10,6	3,5	13,2	70	5,9	20
Territories incorporated into Russia	130	41,7	11,9	44,7	410	34,5	34
Territory of Poland total	312	100	26,6	100	1190	100	45.

Sources: Gewerbliche Betriebsstatistik /Berufs- und Betriebszählung vom 12.Juni 1907/. Bd 218, Berlin 1909, Bd 215, H.1, Berlin 1910.
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Table 3

Industrial employment in the present territory of Poland in 1907/10 and 1937/39

Specification	Recovered territories		Other territories[x]		Poland	
	1907/10	1939	1907/10	1937	1907/10	1937/39
Area thousands sq. km.	101	101	211	211	312	312
Population millions of persons	7,4	8,5	19,2	23,6	26,6	32,1
Industrial employment thousands of persons	530	680	660	820	1190	1500
Persons employed in industry per thousand inhabitants	72	80	34	35	45	47

x/ together with the Free City of Gdańsk

Sources: - data for years 1907/10 see Table 2.
- data for years 1937/39 - Industrial Statistics 1937, "Statistics of Poland" Seria C, z.97, Warsaw 1938.
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Table 4

Investment outlays in Poland - from 1946 to 1960

Specification	1946-1950	1951-1955	1956-1960	1946-1960	1946-1950	1951-1955	1956-1960	1946-1960
	in million Zl. according to 1956 prices				by basic branches in percentages of the total outlays in the national economy			
T o t a l	90 715	210 518	308 158	609 391	100,0	100,0	100,0	100,0
Socialized economy	70 825	202 944	274 611	548 380	78,1	96,4	89,1	90,0
of which:								
Industry	26 443	96 287	127 058	249 788	29,2	45,7	41,2	41,0
Agriculture and forestry	7 576	14 719	21 765	44 060	8,4	7,0	7,1	7,2
Transport and communications	16 095	25 786	29 645	71 526	17,7	12,2	9,6	11,7
T r a d e	2 857	7 082	9 777	19 716	3,1	3,4	3,2	3,2
Communal services and housing	3 482	31 086	52 340	86 908	3,8	14,8	17,0	14,3
Private economy	19 890	7 574	33 547	61 011	21,9	3,6	10,9	10,0

Source: Statistical Yearbook 1961, p.68. Central Statistical Office, Warsaw 1961.

Table 5

Annual per capita investment outlays in Poland - in comparison to other socialist countries

Country	Investment outlays in 1956-1960 in Polish zlotys		Annual averages of the number of population in thousands persons	Annual averages per capita	
	total	annual averages		in Polish zloty	in percentages of the Polish outlays per capita
Poland	308 158	61 632	28 746	2 144	100
Soviet Union	3 253 580	650 716	206 842	3 146	147
Czechoslovakia	259 955	51 991	13 455	3 864	180
German Democratic Republik	178 464	35 693	17 437	2 047	95
Bulgaria	29 080	5 816	7 725	753	35
Rumania	98 546	19 709	18 826	1 093	51
Hungary	69 996	13 999	9 919	1 411	66
States - Members of Mutual Economic Aid Council	-	840 138	303 659	2 767	129

Source: B. Zielińska - Investments in socialist countries in ten-year period /1950-1960/. Gospodarka Planowa /Planned Economy/, Warsaw, 3/1962.

Table 6

Turnover of international trade per capita
/in conventional zlotys for intenational trade/

Country	Year	Turnover per 1 inhabitant	of which: machines and transport equipment per 1 inhabitant
Poland	1958	318,2	82,4
	1960	365,0	101,0
	1960x	1180,0	479,0
Socialist countries:			
USSR		164,8	35,6
German Dem.Rep.	1958	823,0	245,0
Czechoslovakia		847,0	269,0
Capitalistic countries:			
Italy		469,2	76,0
France		973,6	148,0
German Fed.Rep.	1958	1265,2	304,0
Great Britain		1469,6	309,0
Average for the above-given capitalistic countries	1958	1035,0	216,0
U.S.A.	1958	702,8	156,0

x/ forecast

Source: K. Secomski - On the problems of the Perspective Plan for the Development of Poland. Ekonomista /Economist/, Warsaw, No.2/1962.

Table 7

Position of Poland in the world production

Specification	percentages	
	1937[x]	1960
Population	1,6	1,0
A r e a	0,3	0,2
Total industrial production /estimated/	1,3	1,9
Output of:		
electric energy	0,8	1,2
coal	2,8	5,5
crude steel	1,1	1,9
zinc	6,2	6,9
seagoing vessels	-	2,5
sulphuric acid	1,1	1,6
cement	1,6	2,0
cotton yarn	1,4	2,0
raw sugar	2,1	2,8
Agriculture		
cereals	4,1	3,2
potatoes	16,8	12,6
sugar beet	3,7	6,6
cattle	1,5	1,0
pigs	2,5	3,3
Foreign trade		
total turnover	0,8	1,2
exports	0,8	1,1
imports	0,7	1,3
Merchant sea fleet	0,2	0,5

x/ within the boundaries of 1937

Source: "15 years of work for economical development of Poland, Facts and Figures", Planned Economy /Gospodarka Planowa/, Warsaw, No.3/1961.

Table 8

Comparison between the United Kingdom and Poland /1960/

Specification	Units	Poland	United Kingdom	Relation Poland: United Kingdom
A r e a	thousands of sq.km.	312,0	244,0	1 : 0,8
Population	millions	29,7	52,4	1 : 1,8
Employment in industry x	millions	3,0	9,8	1 : 3,3
Coal production	million tons	104,0	197,0	1 : 1,9
Electric energy	1000 millions kwh	29,3	137,0	1 : 4,7
Crude steel	million tons	6,7	24,7	1 : 3,7
C a r s	thousands of pieces	12,9	1352,0	1 : 105
Trucks	thousands of pieces	23,9	458,0	1 : 19
Radio receivers x	million pieces	0,75	1,84	1 : 2,5
Sulphuric acid x	million tons	0,57	2,3	1 : 4
Cement	million tons	6,6	13,5	1 : 2
Paper x	million tons	0,46	2,6	1 : 6
Cotton yarn	thousand tons	153,0	269,0	1 : 1,8

x/ 1959

Sources: Statistical Yearbook 1961, Central Statistical Office, Warsaw 1961.

Statistical Yearbook 1960, U.N., New York 1960.

Geographical pattern of the Polish industrial economy in 1960

/average for Poland = 100/

Level of development / Voivodships	Density of population per 1 sq.km.	Percentage of urban population	Density of industrial employment per 100 sq.km.	Percentage of industrial employment per 1000 inhabitants	National income as created per 1 inhabitant /1959/	Part of industry in the creation of regional income	Index of regional intensity of industrial development
Low							
Białystok	50	63	19	37	75	47	0
Olsztyn	44	75	19	43	80	53	0
Koszalin	40	93	19	46	81	60	0
Lublin	76	52	31	40	87	48	26
Moderate							
Rzeszów	90	50	54	60	86	71	116
Kielce	98	56	69	70	82	86	153
Bydgoszcz	86	99	73	85	100	93	153
Zielona Góra	56	100	54	96	90	99	132
Poznań	94	97	77	82	101	93	53
Szczecin	62	129	47	76	100	86	42
Warszawa	122	112	94	77	111	95	42
Gdańsk	117	138	111	95	116	100	142
High							
Kraków	166	86	166	100	95	102	158
Wrocław	123	127	168	136	103	123	184
Łódź	140	109	195	139	106	127	147
Opole	102	78	119	116	110	103	305
Very high							
Katowice	362	156	800	222	123	144	389
Poland - total	100	100	100	100	100	100	100

Source: Data of the Central Statistical Office.

Table 10

Regional pattern of the Polish industrial economy in 1960

Group of voivodships / Level of development	Density of population per 1 sq.km.	Percentage of urban population	Employment in industry: per 100 sq.km.	Employment in industry: per 1000 inhabitants	National income as created per inhabitant	Part of industry in the creation of national income	Index of intensity of industrial development
A. Northern voivodships							
Gdańsk M	111	66,3	1098	99	13,7	40,3	0,27
Olsztyn L	42	35,9	187	45	9,4	21,5	0,00
Koszalin L	38	44,6	184	48	9,5	24,2	0,00
Szczecin M	59	62,2	468	79	11,8	34,7	0,08
B. West-Central voivodships							
Bydgoszcz M	82	47,8	719	88	11,8	37,4	0,29
Poznań M	89	46,8	758	85	11,9	37,2	0,10
Zielona Góra M	53	47,9	537	100	10,6	39,7	0,25
C. East-Central voivodships							
Białystok L	47	30,1	186	39	8,9	18,8	0,00
Warszawa M	116	53,7	927	80	13,1	38,0	0,08
Łódź H	133	52,5	1930	145	12,5	50,9	0,28
Kielce M	93	27,1	683	73	9,7	34,6	0,29
Lublin L	72	24,8	304	42	10,3	19,5	0,05
D. Southern voivodships							
Wrocław H	117	61,1	1664	142	12,2	49,4	0,35
Opole H	98	37,7	1181	121	13,0	41,4	0,58
Katowice VH	343	75,2	7910	231	14,5	58,1	0,74
Kraków H	158	41,5	1645	104	11,2	40,8	0,30
Rzeszów M	85	23,9	530	62	10,1	28,6	0,22
Poland-total	95	48,1	989	104	11,8	40,2	0,19

L - low; M - moderate; H - high; VH - very high.

Source: Data of the Central Statistical Office.

Table 11

Changes in the geographical pattern of Polish industry from 1946 till 1980

Groups of voivodships	percentages of industrial employment					percentage of total industrial investment
	1946	1950	1955	1960	1980	1951-1960
by level of industrialization						
l o w	4,0	4,1	5,8	6,5	11,0	5,9
moderate	31,9	30,4	35,4	37,0	39,9	34,5
high	33,5	36,1	33,4	32,8	30,7	33,6
very high	30,6	29,4	25,4	23,7	18,4	26,0
Poland	100	100	100	100	100	100
by regional position						
northern	5,3	6,2	7,8	8,3	11,5	6,2
west-central	15,0	12,8	14,0	14,5	14,4	10,8
east-central	27,1	27,4	27,2	28,2	30,1	23,6
southern	52,6	53,6	50,5	49,0	44,0	59,4
Poland	100	100	100	100	100	100

Table 12

Geographical structure of Poland's industry in 1960

Group	Level of industrialization	Index I	Index II
A	high	1500 and over	100 and over
B	moderate	330 - 1500	75 - 150
C	l o w	330 - 1000	25 - 75
		160 - 330	50 - 75
D	non-industrialized	below 330	below 50
Average for Poland		990	104

Index I - Number of persons employed in industry per 100 sq.km. of a given poviat /county/

Index II - Number of persons employed in industry per 1000 inhabitants of a given poviat /county/.

Table 13

Spatial structure of Poland's industry in 1960
/poviat used as a basic unit/

Level of industrialization	Number of poviats	Area in		Population on 5.XII.1960 in		Employment in industry				Employment in industry per		Index of increase of employment in industry /1946=100/
						1946		1960				
		1000 sq.km.	%	1000 persons	%	1000 persons	%	1000 persons	%	100 sq.km.	1000 persons	
A. High	52	379,0	12,2	11417,7	38,1	935,9	75,8	2153,6	69,9	5689	189	230
B. Moderate	54	49,5	15,9	4394,8	14,8	147,1	11,9	440,7	14,3	890	100	300
C. Low	61	60,6	19,4	4525,8	15,2	78,7	6,4	256,4	8,3	423	57	326
D. Non-industrialized	161	163,8	52,5	9022,9	30,3	73,8	5,9	231,9	7,5	142	26	314
Poland total	328	311,7	100,0	29731,0 x	100,0	1235,5	100,0	3082,5	100,0	989	104	250

x/ of which 369,8 thousand persons non-accounted for in territorial division.