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regional diversification)**

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INCOME AND EXPENDITURE OF THE POLISH POPULATION IN 2006 (AN ANALYSIS OF REGIONAL DIVERSIFICATION)

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ABSTRACT. Changes in the political system after 1989 have led to the opening up of new areas of study in many fields of research, including socio – economic geography. One such example, undoubtedly, is the regional diversification of income and expenditure of the population, which was the subject of the ongoing studies, whose selected results are presented in this study. An analysis of the level of income and expenditure of the population was important, as it provided information on: the level of socio-economic development, the standard of living, the level of civilization and culture development, consumption structures, consumption patterns, changes in the structure of demand, etc. Therefore, it was significant for understanding the process of changes which have taken place in Poland. The analysis also provided new generic approaches (problems). This article presents, above all, the research results of the regional diversification of income and expenditure levels as well as the consumption structures of the Polish population in 2006 (in an elementary, complex and synthetic section). A further aim of the research, was to determine statistically significant factors which influence the income and consumption patterns – both factors which had a positive impact (the level of urbanization, the efficiency and productivity of the economy, agricultural produce) and a negative one (unemployment, age structure of the population, population growth and industrial production). This resulted from the conviction that, each description is valuable only if it is supplemented with an explanation of the reasons for such a state of affairs.

KEY WORDS: Poland, voivodeships, income and expenditure of the population, the level of income, consumption, consumption structure, consumption patterns.

INTRODUCTION

Studies to date on socio-economic changes have devoted very little space to issues of living conditions, particularly the income and expenditure of the population. Such a situation is not favourable, especially from the perspective of

the analysis of spatial and structural changes that have taken place in Poland after 1989. In an attempt to fill this problematic gap research was undertaken so as to establish the regional diversification of income and expenditure of the Polish population in 2006. The significance of these kinds of issues results mainly from the fact that the income and expenditure of the population: (a) determine the level of socio-economic development, (b) indicate the standard of living, (c) document the level of development of civilization and culture, (d) allow to determine the regional diversification of consumption patterns, and (e) enable to estimate the savings and changes in consumer demand (cf. Frąckiewicz, Zrałek, 2007; Hodoly, 1975; Chojnicki, Czyż, 1991; Zabłocki, 2002; Zborowski, 2004; Mierzejewska, 2004; Nijkamp, 2008).

MODEL OF ANALYSIS

The research procedure involved three levels of spatial analysis, namely: (a) the elementary level – on the basis of the value of the features taken into account, (b) the core structure level – on the basis of the principal component analysis, and (c) the synthetic level – on the basis of multivariate data clustering. The basis for the spatial analysis were appropriate sets of data (geographical matrix), in which the lines stand for data describing the income and expenditure of the population of specific regions of the country while the columns represent features depicting the diversification of income and expenditure of the population in a set of 16 regions.

The primary focus of the research was to determine the regional diversification:

- 1) the level of income,
- 2) wages, as a primary source of income,
- 3) expenditure and its structure in terms of value,
- 4) the structure of expenditure in percentage terms – regional consumption patterns, and also to build a multiple regression model which would define the socio-economic factors of the diversification of income and wage levels. This latter research task was particularly justified in situations where the level of socio-economic development was considered as a key factor in shaping the level of wages and income.

The basic methods of analysis were: indexes of dynamics and structure, multivariate regression analysis, principal component analysis and multivariate data clustering. The study used data from the 2006 CSO, whose statistical description (in a set of 16 voivodeships) is presented in Table 1.

Table 1. Features taken into account when studying the income and expenditure of the population of the voivodeships of Poland in 2006 (statistical description)

Features of the structural analysis	Mean	Standard deviation	Coefficient of variation (%)
Income of the population (zloty/person)	809.52	91.99	11.36
Wages (zloty/worker/employee)	2,297.29	271.73	11.83
	744.81	70.52	11.39
Expenditure of the population (zloty/person) on:			
1) food and nonalcoholic beverages	200.90	9.75	4.84
2) alcoholic drinks and tobacco	19.69	3.12	15.84
3) clothes and footwear	39.10	4.69	11.99
4) household expenses and energy carriers	143.14	14.75	10.30
5) furnishings and household management	37.17	5.22	14.02
6) health care	35.48	4.82	13.58
7) telecommunication	37.02	4.67	12.61
8) transport	62.82	10.76	17.13
9) recreation and culture	49.89	10.99	22.03
10) education	9.70	2.81	29.00
11) restaurants and hotels	13.57	4.11	30.29
12) other goods and services	36.94	5.37	14.54

Source: Own study based on data obtained from CSO

INCOME AND WAGES OF THE POPULATION

The average per capita income in Poland in 2006 amounted to 852.98 zloty, and regional diversification ranged from 646.76 zloty (Podkarpackie voivodeship) to 1048.80 zloty (Mazowieckie voivodeship), with a median 815.30 zloty/person. The statistical coefficient of variation of this feature (monthly income per person) was 11.0%, which made the interregional differences rather small. However, the spatial polarization of this income was clear, since per capita income exceeded the national average value only in three regions of the country (Table 2). The highest income was obtained by inhabitants of the following voivodeships: Mazowieckie, Pomorskie, Dolnośląskie and Śląskie, while the lowest in: the Podkarpackie, Świętokrzyskie, Lubelskie and Warmińsko-Mazurskie voivodeships (Table 2). The structure of regional diversification in income is illustrated in Fig. 1. The average level of income clearly dominates. The voivodeships which stand out are those whose inhabitants received very high, high, medium, low and very low income. Yet, greater diversification in this range was present in the south-east of Poland.

Table 2. Income, wages and expenditure of the population of Poland in 2006

Voivodeship	Income (zloty/person)	Wages (zloty/person)	Expenditure (zloty/person)
Dolnośląskie/Lower Silesia	852.98	2,455.97	759.21
Kujawsko-Pomorskie/Kuyavian-Pomeranian	771.08	2,147.05	674.26
Lubelskie/Lublin	725.10	2,173.08	678.14
Lubuskie/Lubusz	842.29	2,111.25	771.91
Łódzkie/Lodz	836.90	2,143.06	774.12
Małopolskie/Lesser Poland	765.10	2,302.05	702.48
Mazowieckie/Mazovian	1,048.80	3,166.02	901.75
Opolskie/Opole	794.90	2,225.47	762.12
Podkarpackie/Subcarpathian	646.76	2,088.85	624.34
Podlaskie	816.10	2,186.74	708.62
Pomorskie/Pomeranian	910.51	2,472.38	785.06
Śląskie/Silesia	847.92	2,560.33	758.43
Świętokrzyskie	698.44	2,118.00	612.06
Warmińsko-Mazurskie/Warmian-Masurian	746.49	2,118.29	644.12
Wielkopolskie/Greater Poland	814.16	2,262.75	705.45
Zachodniopomorskie/West Pomeranian	834.75	2,225.27	758.17
Poland	853	2,475.88	744.81

Source: Own study based on data obtained from CSO

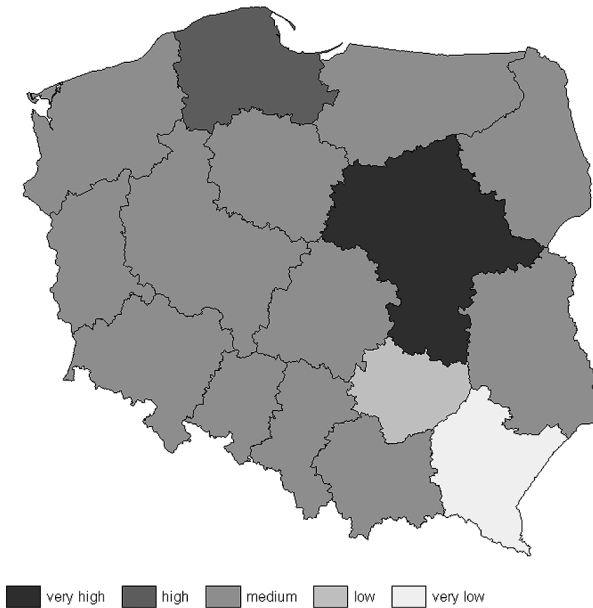


Fig. 1. Average income per capita in 2006

Source: Authors' study

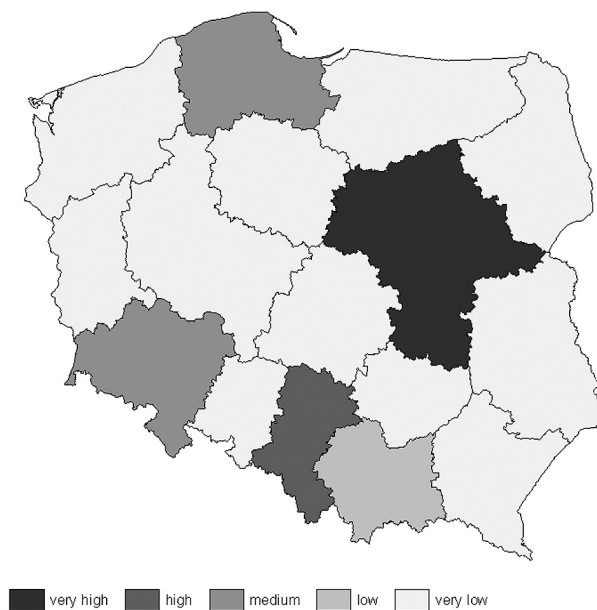


Fig. 2. Average wages in 2006

Source: Authors' study

The average monthly wage in 2006 in Poland amounted to 2,475.90 zloty and ranged from 2,088.85 zloty (Podkarpackie voivodeship) to 3,166.00 zloty (Mazowieckie voivodeship). The median average wage was 2,206 zloty/person (Table 2). Regional diversification of wage and income levels, was low and was defined by the statistical coefficient of variation of 11.83%. Only the salaries of the inhabitants of Mazowieckie (3,166.00 zloty), and Śląskie voivodeship (2,560.30 zloty), exceeded the average national wage level which was also a sign of polarization, yet, in this case, polarization of wages. The lowest wage levels occurred in the following voivodeships: Podkarpackie, Lubuskie, Świętokrzyskie, and Warmińsko-Mazurskie (see Table 2). Regional diversification of wage levels is presented in Fig. 2, the analysis showed that, in general relatively very low wages were dominant in Poland. The wages in only five voivodeships were higher than this level, with a clear dominance of the Mazowieckie voivodeship. This indicates a very high polarization of wages.

EXPENDITURE OF THE POPULATION AND THEIR STRUCTURE

The monthly expenses of the average inhabitant of Poland amounted to 744.81 zloty and accounted for 87.3% of the income. The difference between income and expenditure can be viewed, at least from a theoretical point of view, as the amount of savings which was 108.19 zloty per month. Regional diversification in the level of expenses was even lower than that of wages and income, and was defined by the coefficient of variation of 9.71%. Expenses of inhabitants of individual voivodeships ranged from 612.06 zloty/person (Świętokrzyskie voivodeship) to 901.75 zloty/person (Mazowieckie voivodeship) (Table 2).

As for the balance of income and expenditure, the highest credit balance was obtained by the inhabitants of the following voivodeships: Mazowieckie (147.05 zloty), Pomorskie (125.45 zloty) and Wielkopolskie voivodeship (108.58 zloty), i.e., the regions presenting a high level of socio-economic development; and also: Podlaskie (107.48 zloty) and Warmińsko-Mazurskie voivodeships (102.37 zloty), whose level of economic development was rather low. The spatial diversification

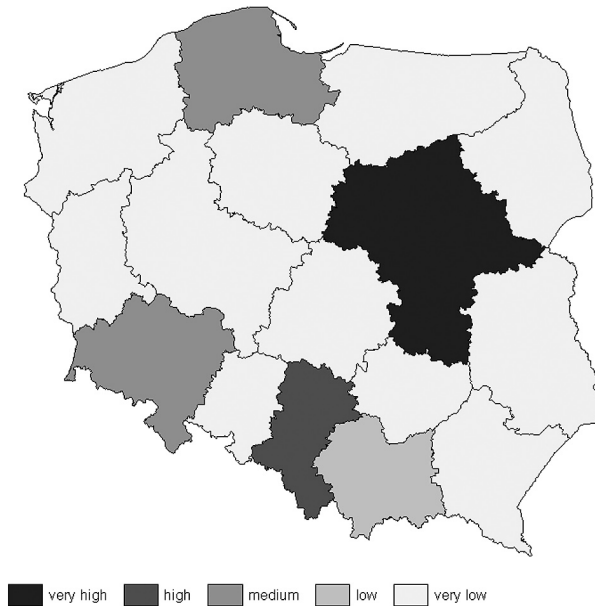


Fig. 3. Average expenditure per capita in 2006

Source: Authors' study

of expenditure is shown in Fig. 3. The analysis showed that the dominant regions, with relatively high average per capita expenditure, were particularly those in the north-west, the west and the south-west of the country. However, in central and eastern regions there was a very large diversification in this respect.

Out of all the expenses (per month for 1 person), the largest amount of money was spent on food and nonalcoholic beverages (202.11 zloty), and then on household expenses (146.94 zloty), telecommunication (65.30 zloty), recreation and culture (53.20 zloty), whereas the least on education (10.44 zloty), hotels and restaurants (14.63 zloty), and alcohol and tobacco (19.99 zloty).

The money spent on food was characterized by the smallest interregional diversification ($Wz = 4.84\%$). Expenses at the average level of interregional diversification were of the following: household expenses ($Wz = 10.31\%$), clothes ($Wz = 11.99\%$), telecommunication ($Wz = 12.63\%$), health care ($Wz = 13.58\%$), furnishings ($Wz = 14.04\%$), other goods and services ($Wz = 14.54\%$), alcoholic drinks ($Wz = 15.83\%$) and transport ($Wz = 17.13\%$). There are relatively large interregional differences in expenses on: restaurants and hotels ($Wz = 30.25\%$), education ($Wz = 28.98\%$), and also recreation and culture ($Wz = 22.03\%$). As indicated by the calculated coefficients of variation, there were relatively small regional differences in expenses on, the so-called, necessities, while large differences in spending on needs of a higher order.

Applying the principal component analysis enabled to determine, the so-called, core structure of expenses. This structure was described by the first two principal components derived from the features of the level of expenditure on the individual categories. The first principal component contained up to 67.34% of variance of all the 12 output features, while the second accounted for only 9.36%, which found its representation in the properties of the obtained components. The properties of the first principal component, primarily determined the expenses on recreation and culture, telecommunication, other goods and services, alcoholic drinks and tobacco products, furnishings and household management, household expenses and energy carriers education, and transport as well as food and nonalcoholic beverages. Therefore, it was a meta-feature which synthesized the level and structure of expenses. However, the properties of the second principal component, defined the expenses on education as well as on restaurants and hotels. Thus, it was a component of education, tourism and social life. It can therefore be assumed, that the first level of regional diversification of expenditure was defined by the outcome of expenses on all the listed categories, while the second level, was defined by expenses on education, culture, tourism and recreation, and social life.

TYOLOGY OF REGIONAL CONSUMPTION PATTERNS

In order to separate the types of regional consumption patterns, expenditure percentages for each of the categories were used. In percentage terms, in 2006 the average Polish citizen spent 27.13% of the total sum of expenses on food and nonalcoholic beverages, and then on housing (19.72%). The share of the other expenditure categories was not large, and the lowest was related to education and culture (1.40%) as well as restaurants and hotels (1.96%). The largest regional diversification of the structure of expenditure was related to expenses on restaurants and hotels ($Wz = 26.19\%$), education ($Wz = 21.76\%$), recreation and culture ($Wz = 12.96\%$) and transport ($Wz = 12.51\%$). The smallest diversification – expenses on telecommunication ($Wz = 4.18\%$), housing ($Wz = 5.74\%$) as well as food and non-alcoholic beverages ($Wz = 7.00\%$).

Also, the levels of core structures were defined, with reference to the percentages of the consumption structure. This was one of the means leading to the typology of regional consumption structures, independent of its level. The first principal component of the rate of consumption structure accounted for 31.19% of the variance of the set of features, the second accounted for 23.41%, the third for

Table 3. Features which define the character of principal components (core structure)

Components	Value	Percentages
V1	- recreation and culture ($r^2 = 0.955, \alpha < 0.001$)	- food and drinks ($r^2 = 0.829, \alpha < 0.001$)
	- telecommunication ($r^2 = 0.931, \alpha < 0.001$)	- recreation and culture ($r^2 = 0.819, \alpha < 0.001$)
	- other goods and services ($r^2 = 0.881, \alpha < 0.001$)	- other goods and services ($r^2 = 0.681, \alpha < 0.001$)
	- alcoholic drinks and tobacco ($r^2 = 0.666, \alpha < 0.001$)	- restaurants and hotels ($r^2 = 0.346, \alpha < 0.05$)
	- furnishings ($r^2 = 0.665, \alpha < 0.001$)	- alcoholic drinks and tobacco ($r^2 = 0.322, \alpha < 0.05$)
	- household expenses and energy carriers ($r^2 = 0.645, \alpha < 0.001$)	
	- education ($r^2 = 0.625, \alpha < 0.001$)	
	- transport ($r^2 = 0.605, \alpha < 0.001$)	
	- food and drinks ($r^2 = 0.600, \alpha < 0.001$)	
	- health care ($r^2 = 0.563, \alpha < 0.001$)	
V2	- restaurants and hotels ($r^2 = 0.264, \alpha < 0.05$)	- transport ($r^2 = 0.582, \alpha < 0.001$)
	- education ($r^2 = 0.250, \alpha < 0.05$)	- household expenses and energy carriers ($r^2 = 0.580, \alpha < 0.001$)
		- health care ($r^2 = 0.627, \alpha < 0.05$)
V3	- health care ($r^2 = 0.248, \alpha < 0.05$)	- education ($r^2 = 0.602, \alpha < 0.001$)
		- furnishings ($r^2 = 0.383, \alpha < 0.05$)
		- clothes and footwear ($r^2 = 0.332, \alpha < 0.05$)

Source: Authors' study

14.74% and the fourth for 12.44%. The first principal component was primarily a component of expenses on food, recreation, culture and on, the so-called, other expenses; the second was a component of expenses on health care, transport and housing, and the third was a component of expenses on education and, to a lesser extent, on furnishings, housing, and clothes (Table 3).

Each of these principal components, given the relatively large variance of the component, can be treated as the next level of core structure. The values of the principal components for each province, allowed to distinguish types of regional consumption patterns, yet, such which referred to core structures.

In this study the regional consumption patterns were defined by simultaneously taking into account the expenses on all the categories, which was possible through the use of multivariate cluster analysis. Cluster analysis enabled the identification of types of regional consumption patterns. The following typological classification was obtained:

Type A: Mazowieckie and Pomorskie voivodeships,

Type B: Łódzkie voivodeship,

Type C: Lubelskie, Podkarpackie, Małopolskie, Podlaskie, Opolskie, Wielkopolskie, Dolnośląskie, Lubuskie, Zachodniopomorskie, Kujawsko-Pomorskie and Śląskie voivodeships,

Type D: Warmińsko – Mazurskie voivodeship,

Type E: Świętokrzyskie voivodeship.

Table 4. The properties of selected types of consumption patterns in 2009

Type of structure	A small share of expenditure on	A large share of expenditure on
A	food, household expenses,	recreation and culture, telecommunication, education, health care, transport
B	close to the average share of expenditure	close to the average share of expenditure
C	health care, transport, recreation and culture,	clothes and footwear, food, household expenses, furnishings and household expenses,
D	alcohol and tobacco, recreation and culture, other goods and services,	health care, transport, food,
E	furnishings and household expenses, transport, recreation and culture	clothes and footwear, food, household expenses

Source: Authors' study

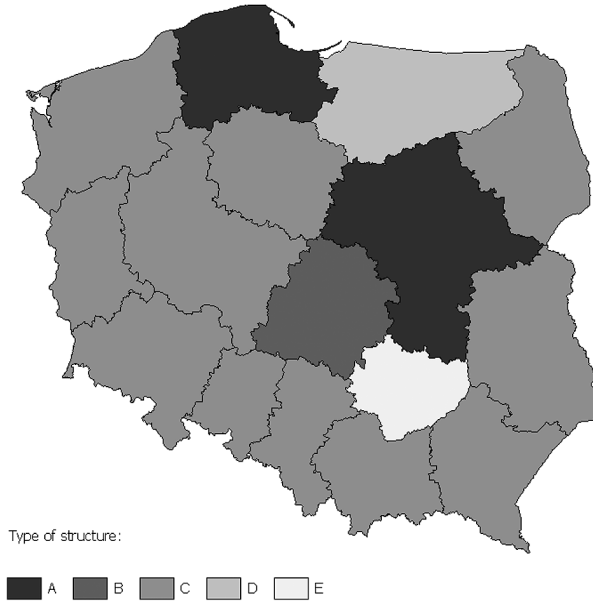


Fig. 4. The typology of consumption patterns in 2006 (in synthetic terms)

Source: Authors' study

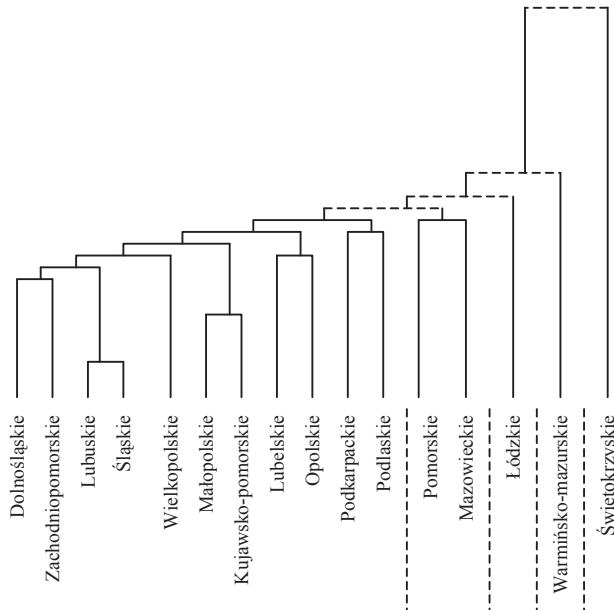


Fig. 5. The similarity of the voivodeships in terms of consumption patterns in 2006

Source: Authors' study

Table 4 contains an approximate description of the properties of the specified consumption structures. Adopting such a solution (the approximate description) was only possible given that the basis for specifying types of consumption structures were not isolated features, but their combinations.

Fig. 4 shows the spatial distribution of specified consumption patterns, while Fig. 5 shows the similarity structures of the country's voivodeships in terms of consumption patterns (dendrogram). Generally, the southern and western voivodeships of the country were dominated by type C consumption structures, while in central, northern and eastern Poland, there was larger topological diversification in this respect.

DETERMINING THE FACTORS AFFECTING INCOME LEVELS

It is widely assumed that the population's income level is determined by the level of socio-economic development, and a synthetic measure of the level of socio-economic development is, among other things, GDP calculated per 1 inhabitant. In a cross section of the 16 voivodeships the correlation coefficient between the level of income and GDP per capita was 0.888. The calculated correlation coefficient confirms the correctness of the data above.

However, the aim of the research was to adopt a multi-feature perspective, namely, to select, from a set of features which describe the level of socio-economic development, those which shaped the income level in a cross section of the 16 voivodeships. For this purpose, a multiple regression equation was estimated, taking into account the 10 typical features which describe the level of socio-economic development on a regional scale. The following regression equation was obtained:

$$y = 2807.88 + 3.07x_1 - 23.36x_2 - 3048.64x_3 - 2.29x_4 + 0.03x_7 + 2.98x_8 - 7.36x_9 - 0.01x_{10}$$

where:

x_1 – the percentage of urban population, x_2 – the birth rate, x_3 – working-age population/total population, x_4 – workers/1000 population, x_7 – GDP per capita, x_8 – the purchase of agricultural produce per 1 ha, x_9 – unemployment, x_{10} – output sold to industry/1 inhabitant. The regression equation was estimated at $r^2 = 0.968$ and a significance of $p < 0.0001$.

As indicated by the form of the regression equation, the following factors had a positive impact on income levels of the population: the urbanization level of voivodeships (percentage of urban population), the productivity of the economy (GDP per capita) and the productivity of the agricultural economy (the purchase of agricultural produce per 1 ha). Yet, the factors which had a negative impact were: birthrate, the proportion of the working-age population, unemployment and industrial production value.

While the positive features which affected the income levels of the population did not raise major objections, there was some doubt about the features which had a negative impact. The impact of the birthrate appeared to be obvious, since it led to enlarging the pre-working age population. The negative impact of the working age population on income levels could be explained by the fact that it was precisely this population group which was suffering from unemployment. The negative effects of unemployment were therefore obvious. The negative impact on income from industrial production could be explained by the decline of this sector of the national economy and by not very high salaries in this sector, which was characteristic of the post-industrial period. While high-technology industries were characterized by a high level of modernity and high wages, they employed relatively few people in relation to traditional industries.

CONCLUSION

The conducted research allows to formulate the following conclusions. The level of income, wages, and expenditure shows regional diversification, which is not large, and is defined by the coefficient of variation at the level of ca. 11%. This indicates a high dependence of income on wages as well as expenditure on wages and leads to the conclusion that wages are a key factor in shaping the population's income. The biggest regional diversification concerns wages, and then income and expenditure.

There is a correlation between income levels and expenditure levels, which is obvious. What is characteristic though is that the increase in income causes an increase in expenditure on those purposes, which are not the basic needs of life, but are associated with luxury spending. The population spends money primarily on food, housing, and telecommunication as well as on recreation and culture.

As for the voivodeships, the country is dominated by the average level of income per capita, while Mazowieckie and Pomorskie are characterized by the higher level, the Podkarpackie and Świętokrzyskie voivodeships are characterized by the lower. In the case of wages, a relatively high wage level of Mazowieckie, Śląskie, Dolnośląskie and Pomorskie means that the low level of wages (polarization of wages and income) is the prevailing level.

Despite these minor differences, the spatial diversification of income, wages and expenditure are, however, distinctive (cf., Fig. 1, 2, 3). It should be noted that the area of relatively high per capita expenditure forms an arch from the Mazowieckie voivodeship to Łódzkie, Śląskie, Opolskie, Dolnośląskie, Lubuskie, Zachodniopomorskie and Pomorskie voivodeships. In the case of income and wages, the spatial situation is more complex.

The core structure at the first level of expenditure is defined by the expenses on recreation and culture, telecommunication, other goods and services, alcoholic drinks and tobacco products, furnishings, household management, household expenses and energy carriers, education, transport, and food and nonalcoholic beverages, while at the second level on: education as well as restaurants and hotels.

The core structure is shaped somewhat differently in terms of percentage. At the first level the structure is defined by expenses on food, recreation, culture and, the so-called other expenses, while at the second level by expenses on: health care, transport, and household expenses, and at the third – by expenses on education and, to a lesser extent, on equipment, furnishings, and clothes.

As a result of the study, 5 types of consumption patterns have been suggested. The type of evenly distributed expenses on the individual categories clearly dominates. This type is generally represented by the western, southern and eastern voivodeships of Poland (Fig. 5).

The income of the population is shaped heavily by the level of socio-economic development, and positively influenced by the following features: the level of urbanization, the efficiency and productivity of the economy and agricultural produce. Yet, negatively influenced by: unemployment, the proportion of the working-age population the unemployed come from this age group, birthrate, and industrial production.

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