Influence of the Social-Demographic Factors on the Gross Regional Product

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Abstract: The study analyzes the influence of the social-demographic factors on the regional economic development. The correlation-regression analysis has revealed the direct significant interrelation between the social-demographic indictors and the economic indicators of the regional development. The analysis results enable to formulate the problems which determine the social-demographic situation and consequently to elaborate the scenarios aimed at solving them. To provide the improvement of the demographic situation, it is necessary to further develop the social sphere, to improve the state system of social guarantees and to implement measures increasing the living standard of the population.

Key words: Regional development, regional policy, economic development, social factors, demographic factors, gross regional product, correlation-regression analysis

INTRODUCTION

Under the modern conditions of the global economy development much attention is paid to the revelation of the region's potential in order to increase the efficiency of their social-economic development. Regional economics is a relatively new branch of economics, its theoretical aspects started to be researched nit earlier than in the 1920-1930's but they were vividly implemented in practice in the EU regional policy. The Treaty of Rome in 1957 led to the necessity to coordinate the EU government's measures aimed at the correction of regional disproportions and misbalance (Abeltina *et al.*, 2015). To use the expression by Abeltina *et al.* (2015), the end of the 20th century was the beginning of important international political processes aimed at forming the new mode of social-economic thinking. The researchers associate this process with sustainable development. In their opinion, sustainable development is the concept which should combine economic growth with such use of natural resources which will benefit the society as a whole.

The researchers view the long-term regional development in three aspects: economic, social and ecological. Having estimated the prospects of sustainable development of the Latvian regions (Abeltina *et al.*, 2015) revealed the main causes of misbalancing in the regional development: differences in the employment, income level and investment.

The concept of the regional sustainable development in the context of revealing the determinants of this process is being rather actively explored by the Foreign scholars (Zaloznik, 2012; Salvati *et al.*, 2014). The dynamics and prospects of the regional development attract attention of the Russian scholars as well which is first of all due to the existing problem of the rather significant regional differentiation both by the economic development indicators and the social and demographic features.

According to most researchers, among the causes of the low social-economic development of many Russian subjects are: low number and density of the population, lack of labor resources, migration of the population to large city agglomerations and to the more economically developed regions. The changes in the demographic development and age-gender composition of the population cause the respective quantitative and qualitative shifts in the economic structure of the region in the structure of the national income in the economic load of the working population in the capacity of the regional labor market in the volume and technical-economic characteristics of the working places in the capacity and structure of the market of educational services, etc. Thus, the structuring of the system and mechanisms of the management of regional development should take these differences into account.

The notion of regional development is rather deeply elaborated in the scientific literature. The fundamental researches by Hansen (1990) interpret the regional development policy as "deliberate actions on the part of government to alter the special distribution of economic and social phenomena including population, income, government revenues, production of various goods and services, transport facilities, other social infrastructure and even political power". At the same time, the researches by Stimson *et al.* (2006) view the regional

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social-economic development from two points: as a product and as a process. The regional economic development as a product is oriented towards the final result of the taken measures in our case this is determined by the direct impact of social-demographic factors on the change of the gross regional product. The policy of regional development as a process is revealed in case of the support of infrastructure, working force, market development and industrial development (Stimson *et al.*, 2006). Then, topical is the issue of using the possibilities to form the own "economic destiny" of each region or territory (Blakely and Leigh, 2009).

The above factors lead to the interest in clusterization of the country's regions by the level of development and in revealing of the most significant social-demographic factors of each cluster which determines the topicality of this research.

The approach viewed by us has been actively elaborated by other scholars. In particular, Chereshnev *et al.* (2010) comprehensively research the interrelation of the impact of social-economic factors on demographic results of the Ural Federal District development. For example, the sharp deterioration of the living standards, the loss of effective labor motivation and the growth of social stress have led to the downfall of medical-demographic indicators. The scholars conclude that the synergetic impact of the above factors directly influenced the reduction of the gross regional product of the Ural Federal District. Hence, "the basis for predicting the social-demographic development of a region is the integral comprehension of the impact of social-economic factors on the main demographic indicators".

In this context, Cherepanova (2009) proposes to introduce the notion of effective social-demographic development of a territory of a regional level (subject of the Russian Federation, Federal District) (Chereshnev *et al.*, 2010). The latter is such development of the social-demographic system which provides the optimal processes of the population reproduction in a region by effective use of the limited social-economic resources which can be achieved by the effective management of synergetic impact of the social-economic and demographic systems. In compliance with that, Chereshnev *et al.* (2010) elaborate their own methodology of forecasting assessment of the social-economic development of the Ural Federal District up to 2025 and propose the probable scenarios of this process. At the same time, as a result of the carried out correlation analysis, the scholars have selected the factors characterized by the high positive correlation with the demographic indicators of the region. Among them are the indicators related to birth rate (efficacy of the state support of maternity and childhood after the birth of the second and subsequent children, the total area of living space per one resident, the number of marriages per one

thousand people), death rate (ratio of average annual income to the cost of living, ratio of average monthly wage in healthcare to the cost of living, unemployment level) and migratory increase/loss of the population (retail trade turnover per capita, share of gross regional product of the territory in the Russian GDP).

The research of the changes in the social-demographic dynamics and its influence on the development of the French Polynesia in particular is done by Bar *et al.* (2004). Among the main problems which hinder the development of this region they revealed the aging of the population, the low qualification of the labor force and the social diseases such as obesity, diabetes and cancer (Bar *et al.*, 2004). As a result of the carried out analysis, the researchers make conclusion of the crucial role of social-demographic factors in accelerating the economic development of the region and propose its main directions: professional training of the local labor resources, creating additional working places, financing the increased expenditures for social provision: education, healthcare and pension provision.

Among the social-demographic factors, influencing the regional development of the Eastern Croatia, Loncar and Marinkovic (2015) view the number of population, the share of industrial and agricultural workers, the share of the employed and the unemployed in municipalities and the inactive population in the 5 districts of the Eastern Croatia. The Eastern Croatia has significant advantages in social-economic development compared to other Croatian regions; however, the available resources and potential are used with low efficiency. The main problem here, according to the researchers is depopulation-the lack of young and educated people. The analysis carried out by the researchers has confirmed the hypothesis that the well-educated population is the paramount factor of the regional social-economic development: the disadvantageous demographic dynamics and structural characteristics of the Eastern Croatia decrease the potential for its development.

The modern conditions of the Russian economy development require special attention to regional development. This is, first of all due to the current problem of the Russian region's differentiation by the indicators of economic development, social and demographic features.

MATERIALS AND METHODS

The practical basis for the research is the data of 30 indicators of statistical reports which characterize the social-economic development of the Russian regions in 2000-2014. We used the STATISTICA 6.0. Software package for our research. Using the method of principal

Table 1: Names of variables in the initial data of the model

Variables	Names
y	Gross regional product (bln. rub.)
x_1	Average monthly nominal gross payroll of employees of organizations (rub.)
x_2	Average gross pensions (rub.)
x_3	Number of pensioners (thousand people)
x_4	Living wage in the 4th quarter (roubles/month) the whole population
x_5	Average consumer expenditure per capita (rub.)
x_6	Average monthly monetary income per capita (rub.)
x_7	Agricultural production (all categories of economic units (mln. rub.)
x_8	Sown area under all agricultural crops (all categories of economic units; thousand hectares)
x_9	Average total area of dwelling space per citizen (m^2)
x_{10}	Average monthly subsidies per family (rub.)
x_{11}	Number of population with the monetary income less than living subsistence (%)
x_{12}	Retail trade turnover (mln. rub.)
x_{13}	Wholesale trade turnover (mln. rub.)
x_{14}	Volume of paid services to the population (mln. rub.)
x_{15}	Number of population, thousand people
x_{16}	Total coefficients of birth rate
x_{17}	Total coefficients of death rate
x_{18}	Coefficients of babie's death rate
x_{19}	Coefficients of natality
x_{20}	Life expectancy at birth the whole population (years)
x_{21}	Sickness rate by thousand people (units)
x_{22}	Total coefficients of divorce
x_{23}	Deployment of dwelling houses by thousand people (square meters of total area)
x_{24}	Number of registered unemployed (by the end of the year; thousand people)
x_{25}	Level of unemployment (%)
x_{26}	Coefficient of migration growth by ten thousand people
x_{27}	Unit weight of the city population in the total number of population (%)
x_{28}	Coefficient of demographic load (number of dependent population by thousand people of working age)
x_{29}	Innovative activity of organizations (unit weight of organizations which carry out technological, organizational and marketing innovations in the total number of the studied organizations) (%)

Table 2: Eigenvalues for the whole data set

Values	Eigen values	General dispersion (%)	Cumulative eigenvalues	Cumulative of general dispersion (%)
1	7.097681	24.47476	7.09768	24.47476
2	6.623753	22.84053	13.72143	47.31529
3	5.403798	18.63378	19.12523	65.94907
4	1.767563	6.09504	20.89279	72.04412

Table 3: Factor loadings for all significant factors (Varimax normalized)

	Factors			
Variables	1	2	3	4
x_1	0.142538	0.957519	-0.064808	-0.066307
x_2	-0.090795	0.944607	0.061979	-0.110489
x_3	0.917116	-0.073712	0.083549	0.244261
x_4	0.012873	0.909466	-0.054695	-0.256316
x_5	0.626987	0.626123	0.186936	0.207553
x_6	0.252065	0.919809	0.014114	0.112165
x_7	0.224518	-0.329585	0.140598	0.627919
x_8	0.165468	-0.340613	0.157843	0.416370
x_9	-0.127617	-0.000596	0.838907	0.214397
x_{10}	-0.200481	0.767318	-0.081563	-0.271103
x_{11}	-0.265832	-0.335067	-0.415549	-0.604861
x_{12}	0.983496	0.079572	-0.006273	0.050688
x_{13}	0.930448	0.129047	-0.019326	-0.133211
x_{14}	0.983261	0.103139	-0.011237	0.023928
x_{15}	0.949502	-0.033411	0.012232	0.213654
x_{16}	-0.140645	0.058094	-0.888522	-0.093363
x_{17}	-0.043935	-0.385063	0.876865	-0.084528
x_{18}	-0.197642	0.035520	-0.499026	-0.278017
x_{19}	-0.051630	0.238743	-0.948651	-0.004421
x_{20}	0.363290	-0.164010	-0.349674	0.448026
x_{21}	-0.132815	0.449042	-0.005660	-0.091616
x_{22}	-0.244694	0.316763	0.739231	-0.114887
x_{23}	0.028260	-0.161944	-0.021972	0.755357
x_{24}	0.355241	-0.225872	-0.543460	0.161933
x_{25}	-0.226021	-0.294879	-0.808024	-0.211431
x_{26}	0.348077	-0.285517	0.137061	0.618463
x_{27}	0.373310	0.498791	0.532629	-0.084553
x_{28}	-0.057156	-0.781563	0.257219	-0.103150
x_{29}	0.235316	0.171104	0.087518	0.138185
General dispersion	6.002937	6.513610	5.682757	2.693491
Share of general dispersion	0.206998	0.224607	0.195957	0.092879

components, we have built the model which allowed to determine the most significant social-demographic factors influencing the gross regional product per capita in the Russian regions. The resulting indicator is the gross regional product per capita. The independent variables are 29 indicators which characterize the social, demographic and economic development of the Russian subjects (Table 1).

RESULTS AND DISCUSSION

We allocate the main factors with the method of principal components. First we analyze the vectors of eigenvalues with the factor analysis and determine the number of the principal components (Table 2).

As one can see from Table 2, the eigenvalue for the 1st factor is 7.097681; the share of dispersion explained by the first factor is about 24.47%. The 2nd factor explains about 22.84% of the dispersion. The 3rd and 4rth factors explain about 18.63 and 6.09% of the dispersion accordingly. The rest factors comprise <27% of the total dispersion. Thus, the cumulative share of the dispersion explained by the first 4 factors is about 72.045% and these factors contribute the most into the explanation of the resulting indicator.

According to this criterion, the eigenvalues are decelerated and there exists the eigenvalue after which the level of the rest eigenvalues reflects the random noise only (Mustafin and Gira, 2016; Rudaleva and Kabasheva, 2014; Zubakov and Mustafin, 2015).

Further, we analyze the matrix of factor loadings with rotation and determine the factors, associated with the principal components. Table 3 shows the significant loading of Factor 1 for five variables.

Factor 2 has rather significant loadings for the six variables. Factor 3 also has significant loadings. Factor 4

Table 4: Variables of Factor 1 "production and consumption of the material services"

Variables	Names	Factor loadings
x_3	Number of pensioners, thousand people	0.917116
x_{12}	Retail trade turnover (mln. rub.)	0.983496
x_{13}	Wholesale trade turnover (mln. rub.)	0.930448
x_{14}	Volume of paid services to the population (mln. rub.)	0.983261
x_{15}	Number of population, thousand people	0.949502

Table 5: Variables of Factor 2 "incomes of the population"

Variables	Names	Factor loadings
x_1	Average monthly nominal gross payroll of employees of organizations (rub.)	0.957519
x_2	Average gross pensions (rub.)	0.944607
x_4	Living wage in the 4th quarter (rub./month)	0.909466
x_6	Average monthly monetary income per capita (rub.)	0.919809
x_{10}	Average monthly subsidies per family (rub.)	0.767318
x_{28}	Coefficient of demographic load (number of dependent population by thousand people of working age)	-0.781563

Table 6: Variables Factor 3 "social aspects of the population"

Variables	Names	Factor loadings
x_9	Average total area of dwelling space per citizen (m^2)	0.838907
x_{16}	Total coefficients of birthrate	-0.888522
x_{17}	Total coefficients of death rate	0.876865
x_{19}	Coefficients of natality	-0.948651
x_{22}	Total coefficients of divorce	0.739231
x_{25}	Level of unemployment (%)	-0.808024

Table 7: Variables of Factor 4 "dwelling conditions of the population"

Variables	Names	Factor loadings
x_{23}	Deployment of dwelling houses by thousand people (square meters of total area)	0.755357

has only one significant loading. We give the detailed interpretation of all factor elements (principal components) in Table 4-7. The first principal component is characterized by the variables, related to the production and consumption of the material services (Table 4).

The second principal component is characterized by the variables, associated with the incomes of the population (Table 5). The third principal component is characterized by the variables, related to the social conditions of the population (Table 6). The fourth principal component is characterized by the variables, associated with dwelling conditions (Table 7). Then for each component we calculate the coefficients of informativity with the following Eq. 1:

$$K_i = \frac{\sum_i^l x_{sign}^2}{\sum_i^n x_i^2} \qquad (1)$$

Where:
n = Total number of variables
l = Number of significant variables
x_{sign} = Significant variables
x_i = All variables (significant and insignificant)

Table 8: Coefficients of informativity for each component

K_1	K_2	K_3	K_4
38.58	50.41	59.82	21.18

We have found the following coefficients of informativity for the main 4 principal components (Table 8). Table 8 shows that, the largest coefficient of informativity (59.82) belongs to the third component. Hence, solving the problems of the low birth rate, high death rate, level of divorce and unemployment will promote the economic development of the regions (Battalova, 2015; Battalova and Faizrahmanova, 2016; Battalova and Kundakchyan, 2015).

The second principal component has the coefficient of informativity equal to 50.41. This means that providing the sufficient level of the income of the working population and pensions as well as the state social support of the population will promote the economic development of the regions.

The first component has the informativity level of 38.58 and the fourth component -21.18. It should be noted that not all coefficients of informativity are larger than 50% which means that not all factors have the above average loading.

CONCLUSION

The carried out analysis showed the considerable direct interrelation between the social-demographic indicators and the economic indicators of the regional level of development. The results of the analysis enable to determine the problems influencing the social-demographic situation, then to elaborate the scenarios to solve them.

RECOMMENDATIONS

To improve the demographic situation further development of the social sphere is required as well as improving the state system of social guarantees and implementation of measures for the growth of the living standard of the population.

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