APPLICATION OF THE WEIGHED POINTS METHOD FOR THE ANALYSIS OF THE ADMINISTRATIVE-TERRITORIAL DIVISION OF THE LARGEST CITIES

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The article deals with the theoretical review and the analysis of the practical problems of intercity division of large and largest cities. The city of Samara is an example of these cities. Hence in the description of main principles and factors of territorial division the city of Samara is given.

The author suggests using a method of mark estimation. The author widely uses a mark estimation of optimum borders of existing division into districts of city Samara. The system of parameters for mark estimation is suggested. This system consists of a common, economic, social and territorial parameters divided into 4 blocks. Most of them are calculated by the author with using of GIS-technology. As a result of the analysis the conclusion about not optimal modern territorial division of city Samara is done. For correction of this situation it is necessary to reconsider existing administrative-territorial division on the basis of the offered parameters.

The city is a special object in the common population system. It has the features, principles of growth and development. For creation of effective city system of local self-management, it is necessary to consider following factors:

1) Natural and climatic conditions of district;

2) Planning structure of city;

3) Functional planning organization of a transport network;

4) Functional territory zoning;

5) Preservation of city economic space;

6) Preservation of the environment.

The system of the city territorial division has the purpose to connect the hierarchy of local authorities with the certain territories. There are certain physical (transport), economic and social connections on the city territory. The administrative borders of city districts demand the account of the existing connections. Otherwise division of territory into different administrative districts will result in their destruction or complexities in management of these units.

In modern conditions of the Russian cities when city areas have developed historically, one of the major tasks becomes an estimation of the territorial division.

Now the territory of city Samara is divided into 9 administrative- territorial units - city districts: Zheleznodorozhnyj, Kirovsky, Krasnoglinsky, Kujbyshevsky, Leninsky, Oktjabrsky, Promyshlennyj, Samarsky, Sovetsky. Districts considerably differ by a population (a difference almost in nine times), by the area (a difference in seven times), by amount of economic, social objects. Each city district has its own features, depending on their districts' share on residential zones, industrial, the historical centre, business centre etc. Such division imposes the print on a management system of district.

The objective estimation of existing territorial division that represents a special case of one of the major geographical problems - divisions into districts is necessary for increased efficiency of management. Studying this problem has been conducted intensively for many years in our country and abroad. However quality of the majority of schemes of division into districts mismatches the increased inquiries of a today's science and practice. In A.M. Trofimov's opinion " process of division into districts is studied, in general, poorly, and search of new, more perfect methods of partitioning of territory noticeably lags behind the requirements facing to a geographical science, and through it and before other sciences ".

Existing in science and practice methods of division into districts promote acceptance of subjective decisions which can lead to a not optimum variant of territory partitioning. Therefore applications of the scientifically-proved approaches to the decision of the given prob-

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lem is a paramount task in intercity administrative-territorial division.

In this case mathematical methods act as one of such objective methods. The task of optimization of intercity division into districts can be successfully resolved with presence of the sufficient objective statistical information and effective ways of its automated processing.

For definition of a degree of an optimality both existing, and perspective, administrative-territorial division of city of Samara we chose one of the most effective mathematical methods applied in geography - a method of the "weighed points". Application of this method has been used in works on Russian Federation's subjects' administrative-territorial division. With reference to city territories the mark estimation allows us to compare objectively with various factorial characteristics of a life of city, such as public transport saturation, a saturation of an engineering infrastructure, a degree of an accomplishment of territory, a level of comfort etc.

For carrying out of a mark estimation of city districts we develop a system of parameters grouped on 4 blocks: the common, economic, social and territorial. In our opinion parameters from these blocks most objectively characterize the various sides of a district's life and will allow us to estimate it as complexly as possible.

In N.F.Timchuk's opinion, the set of parameters " should be interconnected and, thus, form the certain system ". The system of parameters should " characterize ... industrial economic and welfare relations of territorial objects; demographic development of cities and districts; use of natural resources and preservation of the environment ".

It is important that the set of estimation parameters should include indicators describing all of the factors of city territorial division listed above.

The mark estimation is calculated in a complex for whole district and on each parameter separately. The complex estimation allows us to make a conclusion on efficiency of existing borders of districts. We believe that it is possible to use following gradation of a mark estimation of existing intercity division into districts of city of Samara: the most optimal - 5 points, optimal - 4 points, satisfactory - 3 points, unsatisfactory - less than 3 points.

Inside of a complex estimation quantitative parameters on each indicator listed in table 1 are distributed into 6 intervals: "very high" - 5 points, "high" - 4 points, "average" - 3 points, "low" - 2 points, "very low" - 1 point, "critical" - 0 points. If complex mark estimation has 0 or 1 point it testifies to the subjective approach in an establishment of district's borders.

The analysis of city districts on such parameters, as: the area of district, extent of routes of passenger transport, length of the main streets, the area of housing, industry, recre-

Table 1

System of parameters for a mark estimation of city administrative district

I. The common block	**III. The social block**
1. Population size, thou. persons	8. The share of inhabitants is more younger able-bodied age, %
2. District area, sq. km	9. Share of inhabitants at able-bodied age, %
II. The economic block	10. The share of inhabitants is more senior than able-bodied age, %
3. Cost of a fixed capital of the organisations, including. Commercial, million rbl.	11. Security habitation, sq. m/person
4. Extent of routes of passenger transport, km	12. The relation of number of working inhabitants to number at efficient age, %
5. Total length of the main streets, km	**IV. The territorial block**
6. Habitation input on one inhabitant, sq. m./person	13. The area of an housing land, hectare
7. Shabby habitation counting on one inhabitant, sq. m/person	14. The area of an industry land, hectare
	15. The area of an recreation land, hectare
	16. The geometrical form (length/width)
	17. Share of used territory to an district's total area

ational territories, the geometrical form, relative density of used territory to a total area of district have been calculated with using GIS-technology. For achievement the research purposes we digitize and draw administrative borders of city districts, highways, routes of public passenger transport on an initial electronic map in GIS MapInfo 8.0 environment. The image of the general plan of the city of Samara in 2006 and the transport scheme placed on an official city website has been used as source of graphic information for digitizing. Besides according to "Rules of Building and Land Using" in the city of Samara, approved by the Decision of the Samara Municipal duma №61 from 4/26/2001, there are the certain town-planning rules - set of the established kinds and parameters of use of the land and other objects of the real estate, and also admissible changes of objects of the real estate at realization of town-planning activity within the limits of each territorial zone. These zones are allocated on a map of legal zoning of city and divide all territory within the limits of city feature. All kinds of territorial zones have been digitized and rendered on an electronic map of city in MapInfo environment.

For the analysis of other parameters it is necessary to use statistical data in a cut of city districts. For the purposes of research the information of a statistical year-book "Samara in figures" has been used.

Definition of threshold value of an optimality of separately taken parameters was problematic. Depending on a concrete situation such value can be maximal (security habitation, relative density of used territory), minimal (shabby habitation, relative density of the population is more senior than able-bodied age) or the fixed value certain by specifications or practically (a population, the area, specific weights of routes of transport and the main motorways).

As a result from the points on each parameter of district the average value of a score for all districts has been calculated. As weight of a parameter we use a degree of its influence on an optimality of administrative-territorial division.

Thus, from table 2 it is visible, that the greatest complex estimation in 3,7 points - high optimality - has Oktjabrsky district. Zheleznodorozhnyj, Sovetsky and Leninsky districts have 3 and more points, that allows us to characterize their optimality in existing borders as satisfactory.

Table 2

Results of a mark estimation of districts of city Samara on 1/1/2007

District name	Estimation in points for a parameter №																	wght. avrg.
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
ZHeleznodo-rozhnyj	4	1	5	5	4	1	5	2	2	2	3	3	5	1	1	4	5	3,4
Kirovsky	2	1	2	2	2	2	5	5	1	3	3	1	3	4	5	3	4	2,5
Krasnoglinsky	3	1	0	1	1	1	5	4	1	2	5	1	3	1	5	4	3	2,2
Kujbyshevsky	3	3	1	2	2	0	5	3	5	5	1	1	1	3	5	4	3	2,6
Leninsky	2	1	5	4	4	5	4	1	1	1	5	3	1	5	3	3	2	3,0
Oktjabrsky	4	3	4	3	3	4	5	1	1	1	5	5	4	4	5	4	3	3,7
Promyshlen-nyj	1	4	1	5	3	1	5	3	3	3	3	1	3	5	2	1	3	2,7
Samarsky	1	3	5	2	0	5	1	5	3	3	5	2	3	0	5	3	1	2,4
Sovetsky	4	3	2	3	3	1	5	3	2	3	2	0	5	3	3	5	3	3,2
Parameter weight	1,0	1,0	0,5	0,8	0,8	0,3	0,3	0,1	0,1	0,1	0,3	0,3	0,5	0,4	0,4	0,8	0,4	

Then with use of GIS analytical opportunities samples of various zones in territory of each district have been constructed and the sums of the areas of corresponding territorial zones are calculated.

Kirovsky, Krasnoglinsky, Kujbyshevsky, Promyshlennyj and Samarsky districts have lower mark estimation from 2,2 up to 2,5 points. On a degree of an optimality these districts can be carried to unsatisfactory, revision of their

borders is needed. Characteristic for all districts of city is - wide disorder of values of one parameter for different districts and different parameters for one district.

Thus, as a result of the analysis of the modern territorial division of city Samara it is possible to make a conclusion about the presence of enough distinctions in economic, territorial and social characteristics of each district that proves to be true results of mark estimation. For maintenance uniform and an effective utilization of territory of city it is necessary to balance city districts by changing their today's borders. For change of existing borders of administrative districts of Samara it is necessary to use the same system of parameters with the same of gradation in points. Change of borders will allow us to carry out most successfully management of these districts with an increase in citizens' life quality.

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