

Economic regionalization and choice of strategic development directions of municipalities of the Republic of Tatarstan

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Abstract. This paper shows the results of economic regionalization and zoning of the Republic of Tatarstan, conducted in 2017. The latest experience of economic regionalization and zoning of the Republic of Tatarstan in 2007 – 2015 is exposed. The economic regionalization problem is solved on the basis of new method and algorithm that uses quantitative measures which characterize spatial and economic features of generated economic regions including their internal and average connectivity, homogeneity, compactness, socio-economic development level and life quality of the population. Three nodal and one homogeneous economic region in the Republic of Tatarstan were identified. The results of economic zoning within homogeneous economic region led to the conclusion about two existing economic zones. They have the potential for developing new economic growth pole and three economic centers – growth points with specialization on agro-industrial sector.

1. Introduction

Economic regionalization and economic zoning are designed to evaluate the structure and organization of regional economic space. Economic region (ER) is determined as the territorial part of the economy, characterized by unity of territory and economics, internal economic interconnectivity and existing economic specialization [1, 2]. Economic zone (EZ) is an area within which there is a similar intensity of performance of economic characteristics [3]. The economic region differs from the economic zone, first of all, by the fact that it is formed as a result of the development of socio-economic relations between economic entities. For this reason, when economic regionalization is performed, special attention is paid to the analysis of the commodity, human, information and energy flows, etc. that requires development of special approaches and methods for solving problems of regionalizing.

In economic geography types of nodal and homogeneous economic regions are determined. Nodal region has one or more centers (nodes) which integrate the part of regional economic space. The territory of homogeneous region is characterized by internal economic homogeneity and absence of significant differences between the indicators of economic subjects' activity. Homogeneous region does not have conspicuous centers of territorial development. However, they can be in the initial phase of their genesis, not manifesting themselves at the present time.

2. Experience in economic regionalization of the Republic of Tatarstan

Problems of economic regionalization and zoning of the Republic of Tatarstan (RT) have repeatedly been in focus of the regional authorities and scientists since the late 1920-ies. Among the



most important studies in the field of economic regionalization and zoning the RT territory which were obtained in recent years, there must be marked:

I. The Concept of Territorial Economic Policy of the Republic of Tatarstan, established by Department of Territorial Development of the Economics Ministry of the Republic of Tatarstan in 2009. It has identified six economic zones [4]:

1. Kazan agglomeration. It includes the urban district of Kazan and six municipal districts: Verkhneuslonsky, Vysokogorsky, Zelenodolsky, Laishevsky, Pestrechinsky and Atninsky.

2. Predvolzhskaya economic zone. It includes six municipal districts – Apastovsky, Buinsky, Drozhzhanovsky, Kaybitsky, Kamsko-Ustyinsky and Tetyushsky.

3. Predkamskaya economic zone which includes seven municipal districts – Arsky, Baltasinsky, Kukmorsky, Mamadyshsky, Rybno-Slobodsky, Sabinsky and Tyulyachinsky.

4. Zakamskaya economic zone. It includes seven municipal districts – Alkeevsky, Alekseevsky, Aksubaevsky, Novosheshminsky, Nurlatsky, Spassky and Chistopolsky.

5. Naberezhnochelninskaya agglomeration which includes Naberezhnye Chelny urban district and nine municipal districts - Agryzsky, Aktanyshsky, Menzelinsky, Muslyumovsky, Mendeleevsky, Elabuzhsky, Nizhnekamsky, Tukaevsky and Zainsky.

6. South-East economic zone. It includes 8 municipal districts - Almetyevsky, Aznakaevsky, Bugulminsky, Bavlinsky, Leninogorsky, Sarmanovsky, Cheremshansky and Yutazinsky.

II. The "Development and Allocation of Labor Forces of the Republic of Tatarstan on Basis of Cluster Approach till 2020 and for the Period till 2030" Program, which was developed in 2007. Seven economic regions were identified in this program (Figure 1):

1. Metropolitan region (Kazan, Zelenodolsk cities, and Atninsky, Verkhneuslonsky, Vysokogorsky, Zelenodolsky and Laishevsky Pestrechinsky municipal districts).

2. Kamsky region (Naberezhnye Chelny city, and Nizhnekamsky, Elabuzhsky, Mendeleevsky, Zainsky and Tukayevsky municipal districts).

3. Western region (Apastovsky, Buinsky, Drozhzhanovsky, Kaibitsky, Kamsko-Ustyinsky and Tetyushsky municipal districts).

4. Northern region (Arsky, Baltasinsky, Kukmorsky, Mamadyshsky, Sabinsky, Rybno-Slobodsky and Tyulyachinsky municipal districts).

5. Southern region (Alkeevsky, Alekseevsky, Aksubaevsky, Chistopolsky, Novosheshminsky, Nurlatsky and Spassky municipal districts).

6. Oil region (Almetyevskiy, Bugulminsky, Leninogorsky, Sarmanovsky and Cheremshansky municipal districts).

7. Eastern region (Agryzsky, Aktanyshsky, Menzelinsky, Muslyumovsky, Aznakaevsky, Yutazinsky and Bavlinsky municipal districts).

III. The Strategy of Socio-Economic Development of the Republic of Tatarstan till 2030 (the Strategy 2030) [5]. Economic zones and economic regions do not differ in this Strategy. Economic zoning was undertaken and there were identified three economic zones – Kazanskaya, Kamskaya and Almetyevskaya (Figure 2, Table 1).

Analysis of the existing economic regionalization experience of the Republic of Tatarstan territory highlighted its imperfections caused by improper level of validity. The necessity of organization of multilevel strategic territorial development system in the Republic of Tatarstan, which must include different territorial levels from individual settlements, municipal districts, cities, agglomerations and up to the regional level, caused the development of the quantitative approach based on the systems of economic and spatial indices and criteria. It let to formulate the quantitative framework for finding optimal variant of economic regionalization.

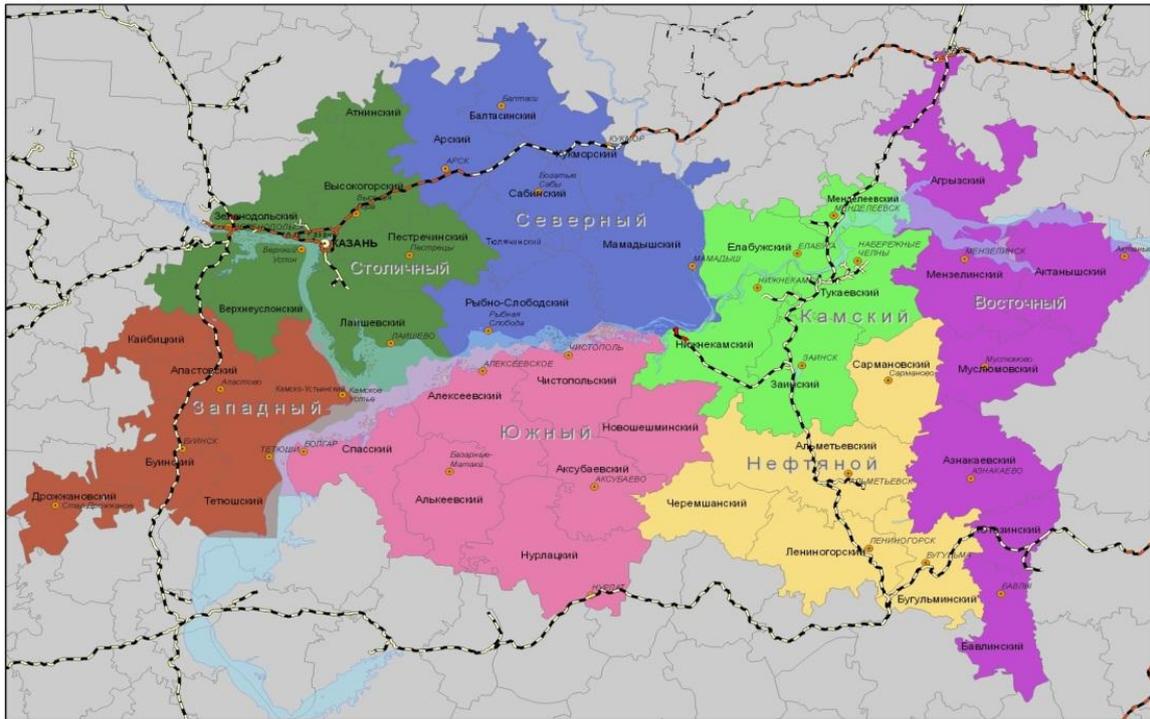


Figure 1. Economic regions of the Republic of Tatarstan in the "Development and Allocation of Labor Forces of the Republic of Tatarstan on Basis of Cluster Approach till 2020 and for the Period till 2030" Program.

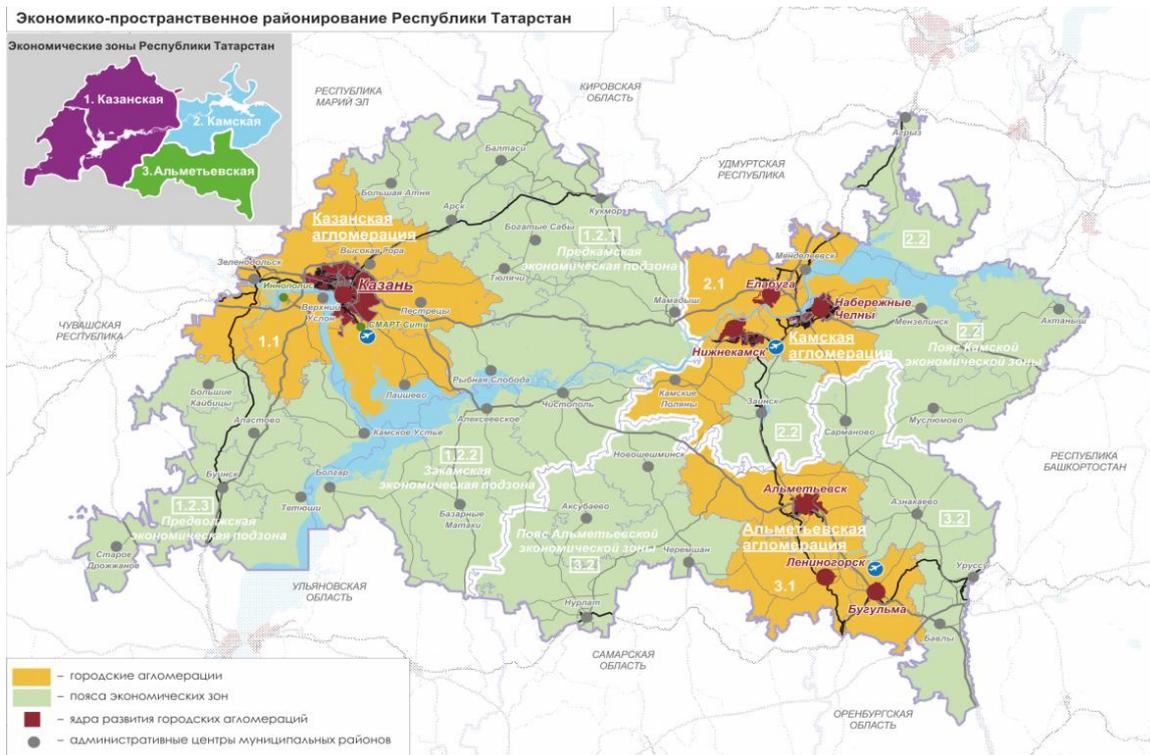


Figure 2. Economic zoning of the Republic of Tatarstan in its Strategy 2030.

Table 1. Economic zones of the Republic of Tatarstan in the Strategy 2030.

1. Kazan Economic Zone			
<i>1.1. Kazan urban agglomeration</i>	<i>Bets of \Kazan Economic Zone</i>		
	<i>1.2.1 Predkamskaya economic subzone</i>	<i>1.2.2. Zakamskaya economic subzone</i>	<i>1.2.3. Predvolzhskaya economic subzone</i>
Kazan	Arsky municipal district	Alekseevsky municipal district	Apastovsky municipal district
Zelenodolsky municipal district	Rybno-Slobodsky municipal district	Chistopolsky municipal district	Kamsko-Ustyinsky municipal district
Vysokogorsky municipal district	Tyulyachinsky municipal district	Spassky municipal district	Buinsky municipal district
Pestrechinsky municipal district	Sabinsky municipal district	Alkeevsky municipal district	Kaibitsky municipal district
Laishevsky municipal district	Kukmorsky municipal district		Tetyushsky municipal district
Verhneuslonsky municipal district	Baltasinsky municipal district		Drozhzhanovsky municipal district
	Mamadyshsky municipal district		
	Atninsky municipal district		
2. Kama Economic Zone			
<i>2.1. Kama urban agglomeration</i>	<i>2.2. Belt of emerging impact of Kama Economic Zone</i>		
Naberezhnye Chelny city		Agryzsky municipal district	
Nizhnekamsky municipal district		Aktanyshsky municipal district	
Elabuzhsky municipal district		Muslyumovsky municipal district	
Tukaevsky municipal district		Menzelinsky municipal district	
Mendelevsky municipal district		Zainsky municipal district	
3. Almetyevsk Economic Zone			
<i>3.1. Almetyevsk urban agglomeration</i>	<i>3.2. Belt of Almetyevsk Economic Zone</i>		
Almetyevsky municipal district		Aznakaevsky municipal district	
Bugulminsky municipal district		Aksubaevsky municipal district	
Leninogorsky municipal district		Bavlinsky municipal district	
		Novsheshminsky municipal district	
		Nurlatsky municipal district	
		Sarmanovsky municipal district	
		Cheremshansky municipal district	
		Yutazinsky municipal district	

3. Methodology

The solution to the problems of economic regionalization of the Republic of Tatarstan territory was based on the author's approach and method [6], as well as on the results of research in the field of identification and analysis "economic center – economic periphery" system of the Republic of Tatarstan.

By reference to the definition of economic region as integrated spatial formation characterized by close internal economic interrelatedness, economic regionalization in the first place should be based on the analysis of the degree of development of socio-economic relations between territorial units included in the region. Therefore, the first stage of economic regionalization is identification of the nodal regions system. For this, a search of territories with high level of interrelation (cohesion) between regional economic centers (nodes) and their peripheral parts [7, 8] is undertaken.

The next stage of economic regionalization is appropriate if there are territorial units that were not included in nodal regions system, i.e. if they are economically weakly associated with their centers. On the basis of their totality, a system of homogeneous regions is formed. The crucial factor and criterion of economic regionalization in this case is the similarity/difference of macroeconomic indicators of socio-economic development level and life quality, spatial differentiation of economic specialization, etc.

Proceeding from this, the method and algorithm of regionalization includes two main stages:

1) Identification of nodal economic regions system. It is based on the analysis of development of socio-economic relations, i.e. the internal economic connectivity of territories of economic regions, as well as their relative economic homogeneity and compactness.

2) Identification of homogeneous economic regions system. It is based on the analysis of degree of their internal economic homogeneity, i.e. on similarities in values of macroeconomic indicators, as well as on compactness of identified homogeneous regions.

To identify the nodal regions system the quantitative measure (coefficient) of connectivity that evaluates the ratio (structure) of economic relations of the municipal district with economic centers was developed. To identify the composition and the borders of nodal region there was used a threshold value of the measure of connectivity, which specifies the lower bound of connectivity, from which municipal district could be included in the economic region. Increasing threshold value during economic region forming specifies the conditions of reduction of composition and size of an economic region.

In the same way a threshold of inner homogeneity of economic region is given. It defines the value below which the quantitative measure of homogeneity, characterizing the degree of macroeconomic indicators similarity of municipal districts that form a part of emerging economic region, could not be decreased. To evaluate homogeneity of groups of municipal regions the mathematical methods of grouping/classification are used.

The measure of compactness allows estimating relative compactness of generated nodal and homogeneous economic regions, avoiding generation variants of regionalization with complex contour boundaries and not enough compact territory.

The combination of threshold values of the measures of connectivity, homogeneity and compactness of economic regions leads to formation of individual variants of economic regionalization. Average connectivity, average homogeneity and average compactness of the nodal economic regions, average homogeneity and average compactness of homogeneous economic regions are calculated for each variant of regionalization.

A comparison of these indicators for which a higher value describes better regionalization variant specifies objective basis for quality assessment of regionalization and zoning, and allows choosing optimal variant of economic regions system.

4. Results

Economic regionalization problem solution was based on the expert estimation system for analysis of commodity and human flows, and given main macroeconomic indicators characterizing behavior of the socio-economic systems of municipal districts in the Republic of Tatarstan in the analyzed period.

Analysis of economic relations was carried out on the basis of the expert estimation system of commodity and human flows between the municipal districts and centers of forming nodal economic regions, including push-pull labor migration. Determining the values of points was carried out in view of volume of economic activity, population, distances between settlements and the quality of connecting transport routes.

Three main economic centers of the Republic of Tatarstan were selected as centers of nodal regions – Kazansky (with cities of Kazan and Zelenodolsk), Kamsky (cities of Naberezhnye Chelny, Nizhnekamsk, Elabuga), South-East (cities of Almetyevsk, Bugulma and Leninogorsk).

Analysis of economic homogeneity/heterogeneity of economic regions and zones was conducted using 35 main macroeconomic indicators, including gross regional product, value added, investment in fixed capital, gross agricultural product, turnover of small and medium enterprises, number of employed in economy, population incomes, level of registered unemployment, etc. All indicators were analyzed in dynamics from 2014 to 2016 and on the forecast period in 2017-2019.

For solving problems of economic regionalization and zoning of the Republic of Tatarstan, R language and its statistical packages were used, with the help of which the software package that provides the implementation of relevant calculations and output the graphic results was developed.

The results of the optimal variant of economic regionalization of the Republic of Tatarstan were chosen by calculations of average connectivity, homogeneity and compactness of economic regions. They are presented in figure 3 (graphic output of the regionalization and classification software package). It is characterized by high value of average connectivity (8.0) along with highest average of homogeneity of the nodal and homogeneous regions (0.945, with a 0.19 and 1.70, respectively, for nodal and homogeneous economic regions) and relatively high degree of compactness of regional territories among all calculated variants.

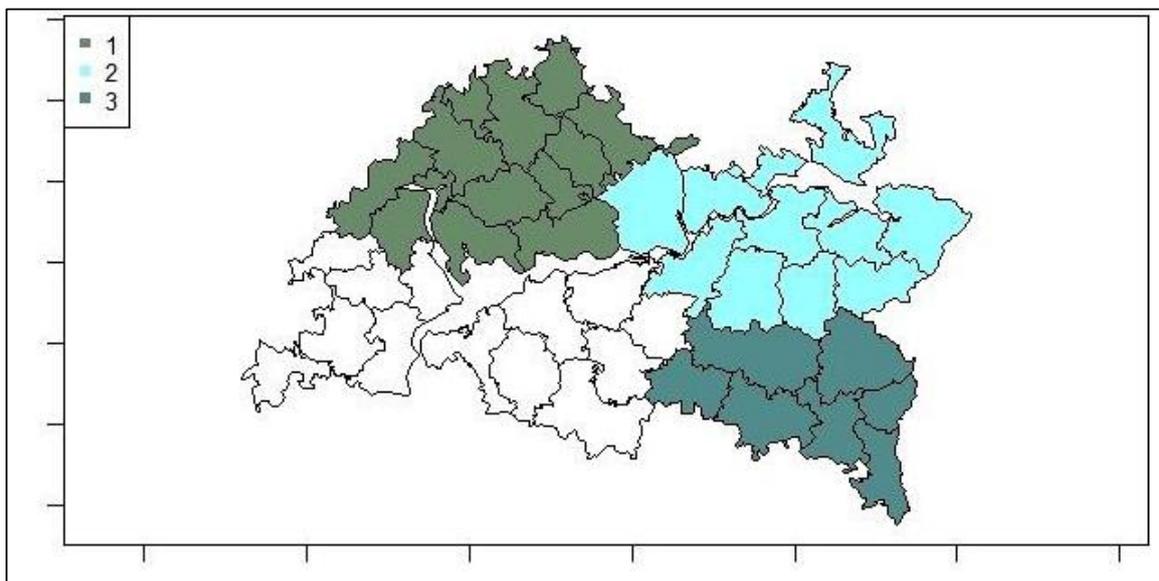


Figure 3. The optimal variant of the economic regionalization of the Republic of Tatarstan (white color highlights the South-West homogeneous economic region).

The results of the economic regionalization allowed identifying three nodal economic regions of the Republic of Tatarstan with strong economic centers, each of which has particular strategic directions of development:

- Kazansky economic region with the economic centers of Kazan and Zelenodolsk cities.
- Kamsky economic region with the economic centers of Naberezhnye Chelny, Nizhnekamsk and Elabuga cities.
- South-East economic region with economic centers of Almetyevsk, Bugulma and Leninogorsk cities.

Analysis of the set of elaborated variants of economic regionalization shows that the optimal variant, obtained according to the parameters of internal connectivity, homogeneity and compactness, includes a special territorial economic formation - South-West homogeneous economic region. It includes Apastovsky, Buinsky, Drozhzhanovsky, Kaybitsky, Kamsko-Ustyinsky, Tetyushsky, Alekseevsky, Alkeevsky, Aksubaevsky, Novosheshminsky, Nurlatsky, Spassky and Chistopolsky municipal districts.

Research in internal homogeneity and revealing homogeneous groups [9] of municipal districts within the territory of South-West homogeneous economic region also shows that within it there are two economic zones – Privolzhskaya and Zakamskaya.

Privolzhskaya economic zone includes Apastovsky, Buinsky, Drozhzhanovsky, Kaybitsky, Kamsko-Ustyinsky and Tetyushsky municipal districts.

Zakamskaya economic zone includes Alekseevsky, Alkeevsky, Aksubaevsky, Novosheshminsky, Nurlatsky, Spassky and Chistopolsky municipal districts.

These economic zones of the South-West economic region in general are characterized by internal economic homogeneity, internal similar level of economic development and life quality of their population. They differ to some extent from each other by natural and economic environment, economic specialization (agricultural in the Privolzhskaya and agro-industrial in the Zakamskaya economic zone).

5. Conclusions

The economic regions and zones were identified with the purpose of forming basis for defining and developing new economic growth poles and economic centers - growth points of the Republic of Tatarstan.

Analysis of main economic parameters of economic dynamics and levels of socio-economic development of municipal districts which were included in Privolzhskaya and Zakamskaya economic zones of the South-West economic region shows certain internal dissimilarity of these economic zones. This led to the identification of future-oriented municipal regions and economic centers – economic growth points and development points of the Republic of Tatarstan economy. These include the Buinsky, Nurlatsky and Chistopolsky municipal districts and Buinsk, Chistopol and Nurlat towns.

Conclusions on special economic status of Chistopolsky, Buinsky and Nurlatsky municipal districts within the South-West homogeneous economic region are confirmed by the results of classification/grouping on 35 main macroeconomic indicators of these municipal areas.

The analysis of the main macroeconomic indicators dynamics of Buinsky, Nurlatsky and Chistopolsky municipal regions in the period of 2014 – 2016 and according to the forecast on 2017-2019 shows that their economy is growing more rapidly than on the average for municipal regions of the South-West economic region.

Conducted research shows that the existing agricultural and industrial potential, favorable conditions and resources for agricultural activities, favorable geographical situation of Privolzhskaya and Zakamskaya economic zones determine the creation of a new agro-industrial centers and agro-industrial clusters in the Buinsky, Nurlatsky and Chistopolsky municipal districts.

Economic growth of agro-industrial branches of these economic semiperipheral centers will have stimulating effect on the development of peripheral areas of their economic zones. It would increase their levels of socio-economic development and life quality of the population, and would reduce the

rate of demographic degradation in rural areas of Predvolzhskaya and Zakamskaya economic zones and would preclude, therefore, the depletion of their periphery.

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