The Development of Polycentric Agglomeration and the Non-agglomeration Territory in the Economic Space of a Region

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Abstract. The uneven spatial development, features and problems of urbanization are important topics of modern research in the field of sustainable development of territories. The authors of the article carried out an empirical verification of the hypothesis, which suggests that within the same administrative region, the agglomeration territory is characterized by better dynamics of the economic space compared to the peripheral territory. The objects of study were the third largest in Russia Samara-Togliatti agglomeration with a polycentric spatial structure and the territory outside the agglomeration (far periphery) of the Samara region. The author's method of comparative analysis included, among others, the stage of selecting groups of indicators that characterize the economic space of the compared territories and, at the same time, are provided with official Russian statistics. The results of the study were quite unexpected: they showed that for the agglomeration, the dynamics in the group of indicators "saturation of the economic space with the activities of economic agents" is worse compared to the periphery. The reasons for this, according to the authors, could be the "deagglomeration" effect, as well as the phenomenon of "immunity of peripheral territories", which prevents the decrease in their viability and resilience.

Keywords: Spatial development · Region · Polycentric agglomeration · Non-agglomeration territory · Periphery · Comparative analysis · Russia

1 Introduction

Russian regions are undergoing significant transformations in spatial development. In the studies of the economic space of the region, there are the following major theoretical developments: the theory of central places, the theory of development poles and growth centers, the concept of a supporting framework, a sub-regional approach [1].

Differences in scientific approaches to the study of economic space cause the presence of several points of view on its most important characteristics – properties and structure. Among the fundamental features of the Russian economic space, Minakir & Demyanenko [2] highlights the fragmentation of the economic space and polarized centralization, emphasizing the special role of urban agglomerations in the formation and organization of economic areas closing on them. Agglomerations condense the economic

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space, create spatial clusters of economic activity, transmit innovations, resources and institutions to the space surrounding megacities.

Agglomeration centripetal trends are determined by enormous opportunities for entrepreneurs, the population, and authorities. These opportunities arise due to the agglomeration effect [3, 4]. This fact has been confirmed by a vast empirical material: for different countries, estimates of an increase in the labor productivity as a result of the doubling of the city, according to Kolomak [5], range from 3 to 16%.

In studies on spatial structure, as a rule, two main types (models) are distinguished: (a) a center-peripheral (concentric) type based on a clear separation of the dominant economic center and the peripheral zone as it moves away from it; (b) a polycentric type, where there are several centers, usually urban ones, between which a system of relations is formed. As for the center-peripheral type, we point out that the center, as a rule, is a large city, the nearest area of influence of which becomes an agglomeration. As for the peripheral territory, Russian researchers have recently been paying increased attention to their studies focusing on the complex problems of the Russian periphery. From the standpoint of the economic and geographical approach, Tsarev gives two definitions of it that are different in their meaning: 1) the territory defining the outer edge of the influence area of the center and adjacent to it from the inside (periphery - the edge of the center); 2) the totality of external territories located outside the influence area of the center, adjacent to it from the outside (periphery - anti-center) [6]. Kazakov, in his works devoted to the methodology of the system-diagnostic approach to the study on issues peripheral territories, systematizes and reveals their key properties and, on the basis of remoteness from the center, distinguishes the far, middle and near periphery [7].

Turning to the second (polycentric type) of spatial structure, we point out the existence of several approaches to the definition of the concept of "polycentricity", for instance, from the point of view of the morphological structure of the region or from the position of the functional approach. In European studies and practice of regional policy, the widely used concept of polycentrism in modern conditions receives a new interpretation and new accents [8]. The results obtained by Wessel, Ouwehand, van Oort & Cortinovis indicate a greater role of urbanization compared to polycentricity and dispersion than it was previously assumed, which allows us to consider it as a less confident support and panacea for reducing regional economic inequality [9].

Based on the above, it can be stated that in the study on the economic space of a region (subject of the Russian Federation) within the administrative boundaries, it is advisable to take into account the following main characteristics of its structure and properties: (1) the presence of two types of territories - agglomeration and non-agglomeration territories; (2) positioning of the agglomeration area as the center, hence the non-agglomeration area as the outer (far) periphery; (3) the complex spatial structure of the territory of each type in the coordinates "monocentricity-polycentricity" and "concentration (localization)-dispersion" which implies several combinations of two spatial dimensions.

The relevance of the research field is determined by the focus on agglomerations as growth poles in the Spatial Development Strategy of Russia [10]. Of particular interest in this case is the choice of an agglomeration area with a polycentric structure as a research object.

2 Materials and Methods

The authors' hypothesis is: do agglomeration territories with a polycentric structure have better characteristics of the dynamics of economic space compared to non-agglomeration (peripheral) territories not taking into account the characteristics of their structure?

The purpose of the study is to verify this hypothesis on the basis of empirical results obtained using the authors' methodology of the comparative analysis of the development of agglomeration of regional and non-agglomeration (peripheral) territories in the economic space of the region (subject of the Russian Federation). Research objectives are: (1) selection and characterization of objects of comparative analysis - agglomeration and non-agglomeration territories within the administrative boundaries of a specific Russian region (subject of the Russian Federation); (2) development of the authors' methodology for the comparative analysis of the development of agglomeration and non-agglomeration territories in the economic space of the region; (3) implementation of the authors' methodology and discussion of the results obtained in relation to the proposed hypothesis.

Two types of territories were selected as objects of the comparative analysis - agglomeration and non-agglomeration territories of a specific subject of the Russian Federation - the Samara region. The agglomeration area – the Samara-Togliatti agglomeration (STA) is the third largest urban agglomeration in Russia (after Moscow and St. Petersburg). The most important feature of the STA is polycentricity, this property is unique for the agglomerations of Russia; the formed cores of the agglomeration are two cities (Samara and Togliatti), the core at the stage of formation is the town of Syzran. The composition and structure of the STA are not officially approved in the regulations, so we will adhere to the composition of the STA according to the Strategy of Socio-Economic Development of the Samara region for the period up to 2030 in relation to the grid of the administrative-territorial division of this subject of the Russian Federation [11].

At the moment, the STA includes the following municipalities: 1 urban district with an inner-city division (Samara), 9 inner-city districts, 7 urban districts (Togliatti, Syzran, Novokuibyshevsk, Chapaevsk, Zhigulevsk, Oktyabrsk, Kinel), 9 municipal districts, 9 urban settlements, 112 rural settlements. The total population of the STA on 01.01.2020 is estimated at 2744306 people. The non-agglomeration area consists of two urban districts (Pokhvistnevo and Otradny) and 18 rural municipal districts respectively. The non-agglomeration area can be positioned as the far periphery.

The authors' methodology of the comparative analysis involves several stages:

1. Selection of indicators used to characterize the spatial development of the compared territories (Table 1).

Table 1. Indicators used to characterize the spatial development of the compared territories

Composition of indicators by groups			
Saturation of the economic space with activities of economic agents	Development of the economic space	Connectivity of economic space	Conditions of social development of territories
• goods of own production shipped, works and services performed by their own forces per capita (without small business entities); • investments in fixed assets per capita	• population density; • migration balance per 1000 population	• length of roads per 1 km^2 of territory	• the average monthly nominal accrued salary of employees of organizations

2. Collection and verification of initial data for each municipality of the Samara region using information from the official website https://www.gks.ru.
3. Calculation of values of these indicators per capita living on the territory of the relevant municipality or on 1 km^2 of its area.
4. Calculation of the average values of each indicator for the STA and for the non-agglomeration area.
5. Comparison of the obtained average values for STA and for non-agglomeration territories in dynamics for the selected study period.

All calculations are performed using the Microsoft Office 2019 Professional Plus (Excel) application software package.

3 Results

The comparative analysis was implemented for the selected period 2016–2019. The analysis of the chain growth rate of investment volumes for two types of territories (Fig. 1) for the period from 2016–2019 demonstrated that initially the growth rate of investment in the STA was higher. The gap between the two types of territories was 12%.

However, since 2017, we have seen a sharp jump in the rate of investment growth in peripheral municipalities (the gap was 209%). Following, in 2018 and 2019, this trend continues.

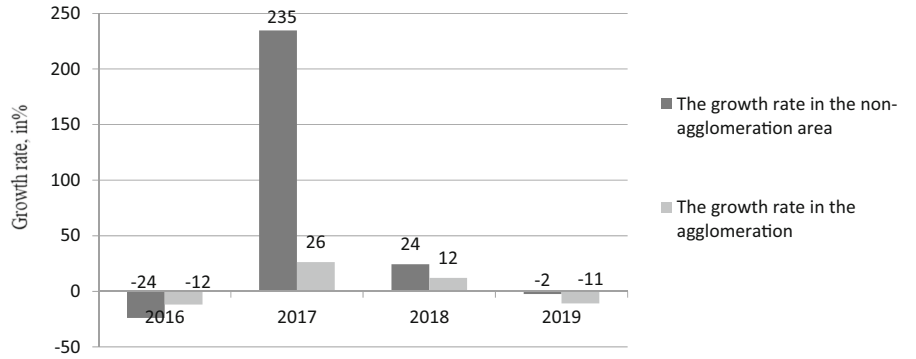

Fig. 1. Dynamics of the growth rate of investments in fixed assets per capita on average in the STA and in the non-agglomeration area in 2016–2019, %

In 2016, the subjects of the non-agglomeration territory shipped, on average, their own goods per capita more than the subjects of the STA by 34%, in 2020 - by 27.4%.

At the same time, from 2016 to 2018, the growth rate of this indicator for the non-agglomeration area is higher than for the STA (Fig. 2). In 2019–2020, the situation has changed, the intensity of growth in the volume of goods shipped by subjects of the non-agglomeration space has slowed down.

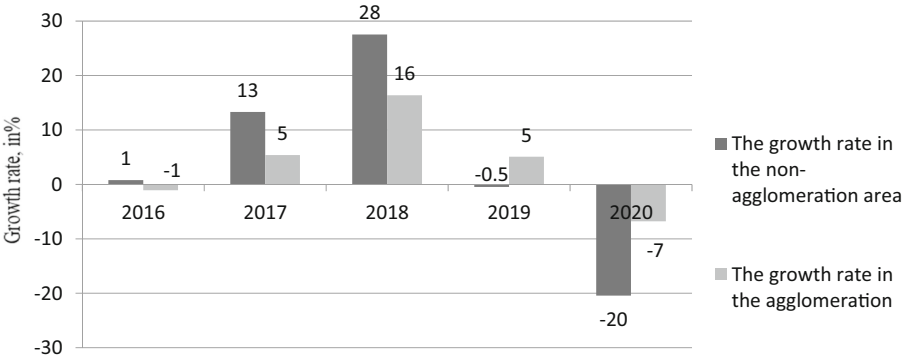

Fig. 2. Dynamics of the growth rate of shipped goods of own production per capita on average in the STA and in the non-agglomeration area in 2016–2020, %

The population density in the STA is extremely high. In 2016, it was 6.8 times higher than the population density of the territory outside the borders of the STA (533 and 78 people per 1 km^2, respectively). By 2019, this gap has not changed (531 and 77 people per 1 km^2, respectively).

The dynamics of the migration balance per 1000 inhabitants of the territory in 2016–2019 shows that the population decreases annually in the non-agglomeration territory, while the opposite situation develops in the STA (Fig. 3). In 2016, the migration gap

between the two types of territories was 13 people per 1000 inhabitants, in 2019 – 7 people.

The analysis of the dynamics of the length of roads showed that in 2016 there were 1.86 km of roads per 1 km^2 of the STA, while in the non-agglomeration space it was 0.71 km (a gap of 2.6 times). In 2019, the gap slightly decreased to 2.4 times.

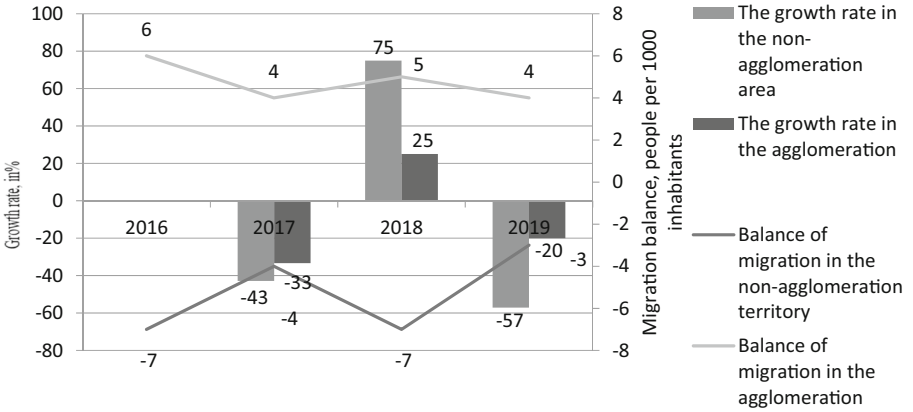

Fig. 3. Dynamics of the growth rate of the migration balance per 1000 inhabitants on average in the STA and in the non-agglomeration area in 2016–2019, %

The average monthly nominal salary in 2016 in the STA amounted to 27,247.7 rubles, in the non-agglomeration territory –23,845.0 rubles (a difference of about 15.2%) (Fig. 4).

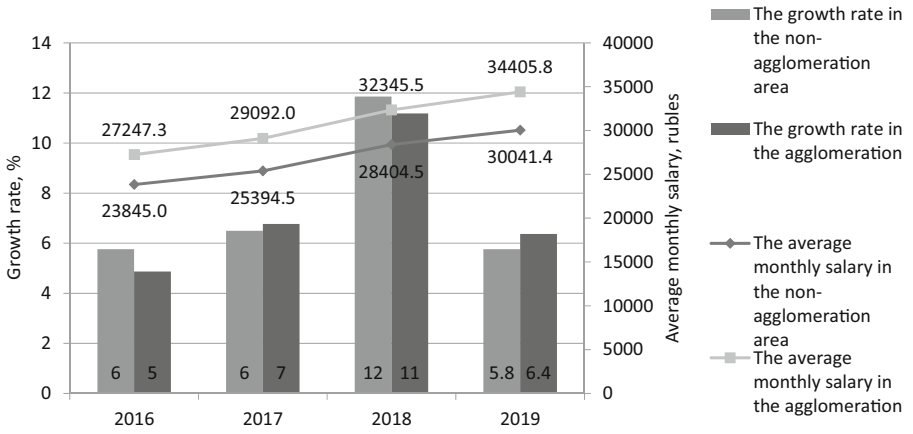

Fig. 4. Dynamics of the growth rate of the average monthly nominal accrued salary on average in the service station and in the non-agglomeration area in 2016–2019, %

In 2019, this ratio is: agglomeration – 34,405.8 rubles, non-agglomeration space – 30,041.4 rubles (a difference of 14.5%). In 2016–2018, the rate of salary growth in the non-agglomeration area is higher than in the agglomeration. Since 2019, the intensity of growth in two types of territories is slowing down, ratio has become the opposite.

4 Discussion and Conclusion

The performed analysis demonstrated that the volume of per capita investments in fixed assets in non-agglomeration territories is more than in the STA, a similar situation is observed with the volume of shipped goods of their own production, it works and services performed on their own.

The results of the analysis in relation to investments may indicate both the insufficient realization of the integration potential of the STA, and the advanced development of non-agglomeration growth points capable of attracting investment flows. As for the average output, it can be assumed that there is an effect similar to "deglomeration". It leads to the fact that the concentrated resources of the agglomeration are used inefficiently [12].

The dynamics of the economic space development indicate that the population is decreasing on the non-agglomeration territory, the STA remains the main attractor of the population of the region. The reason for this may be the insufficiently developed social infrastructure of the peripheral space of the Samara region, which is characterized by a limited set of services provided to the population and their rather low quality. The poorly developed transport infrastructure outside the agglomeration space increases the transaction costs of local producers and continues to slow down the development of the periphery. Low salaries in the non-agglomeration territory, compared with the average for the STA, do not create conditions for the formation of a high-quality human capital, and not only due to external factors that manifest themselves in dissatisfaction with the size of salaries, but also due to internal factors expressed in dissatisfaction with work and life. Thus, the proposed hypothesis of the study has not found unambiguous confirmation. The polycentric STA has the best characteristics of the dynamics of the economic space in comparison with the non-agglomeration territory (periphery) of the Samara region by the most important group of indicators. The most important argument in explaining the obtained and at first glance unexpected results may also be the phenomenon of peripheral immunity, deeply studied and fixed by M.Y. Kazakov in the spatial-economic category "immunity of peripheral territories" within the framework of his concept of spatial adaptalogy. This concept explains the mechanisms of territory adaptability to preserve territorial homeostasis, prevent the disappearance of localities, reduce their viability and resilience [13].

In this regard, it would be interesting to continue the study by taking into account new factors of transformation of urban spatial structures in the conditions of COVID-19 (see, for example, Stuart S. Rosenthal, William C. Strange, Joaquin A. Urrego) [14].

We believe that the obtained results and conclusions will help to form not only a new vision of the prospects for the development of the studied objects - the STA and the peripheral territory of the Samara region, but also a "new look" of both researchers and practical managers at the sustainable development of agglomerations and non-agglomeration spaces in other Russian regions.

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