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**MODERN CONDITIONS OF DEVELOPMENT OF URBAN  
AGGLOMERATIONS IN THE REPUBLIC OF TATARSTAN**

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*Abstract*

The study of world experience in the development of agglomerations shows that managing the natural expansion of agglomeration centers avoids excessive concentration of resources in regional and national centers and forms the basis for the emergence of a positive synergy not only in agglomeration centers, but also within its influence zones. The current high level of polarization in the Russian economic space dictates the need to study foreign experience in managing the development of agglomerations, highlighting key constraints that will allow the algorithms operating in developed countries to adapt to the peculiarities of the Russian socio-economic environment.

Currently, the regions are developing unevenly due to the uncertainty of macroeconomic parameters, which requires the implementation of a strategic approach to managing them. In accordance with the adopted Strategy, the development of Tatarstan should occur on the basis of urban agglomerations, which determined the relevance of the topic of this article. As the analysis of economic literature shows, the development of urban agglomerations makes it possible to ensure accelerated growth rates of territories due to the effective implementation of synergy effects based on a rational interaction of territories. In this regard, the study set the goal of determining the patterns of formation of a regional development management system in conjunction with the characteristics of the formation and development of agglomerations in the regions.

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**Keywords:** Agglomerations, urban agglomerations, development of agglomerations, Republic of Tatarstan, regional advantages.



## **1. Introduction**

The study of world experience in the development of agglomerations shows that managing the natural expansion of agglomeration centers avoids excessive concentration of resources in regional and national centers and forms the basis for the emergence of a positive synergy not only in agglomeration centers, but also within its influence zones. The current high level of polarization in the Russian economic space dictates the need to study foreign experience in managing the development of agglomerations, highlighting key constraints that will allow the algorithms operating in developed countries to adapt to the peculiarities of the Russian socio-economic environment.

In the context of structuring the economy in space, in their vision, the authors repel themselves from the agglomerative development and the tendency of increasing the share of the urban population. In the Republic of Tatarstan, as well as in other regions of the Russian Federation, the population is “tightened” into large urban agglomerations, which are becoming centers of generation of new ideas, new industries and economic activity. Therefore, in the Strategy-2030 of the Republic of Tatarstan, the economic space is structured around three agglomerations: Kazan, Almetyevsk and Kama.

## **2. Problem Statement**

The Republic of Tatarstan is one of the most economically developed subjects of the Russian Federation with a strong industrial potential, stable agriculture and stable dynamics of economic development. The Republic is part of the Volga Federal District, in which the overall rating consistently occupies one of the leading places.

The Republic of Tatarstan accounts for 2.7% of the average annual number of people employed in the Russian Federation (13.5% in the Volga Federal District), the share of the GRP of the Republic of Tatarstan is 2.8 and 18.5% of the corresponding figures for the Russian Federation and Volga Federal District.

The key objective of the concept of spatial development of the Republic of Tatarstan, spelled out in Strategy 2030, is the sound idea of forming the Volga-Kama metropolis, which involves the activation of agglomeration processes in three urban activity zones - Kazan and Kama urban agglomerations, as well as in the emerging Almetyevsk agglomeration. The origins and growth of cities are based on the causes and mechanisms supporting spatial concentration of economic activity. Within the framework of microeconomic theory, two key factors of these processes: increasing returns to scale (economy of scale) and external agglomeration effects (agglomeration economy). The discussion of these reasons for the existence of cities opens the book A. O’Sullivan “City Economy” (O’Sullivan, 2011).

## **3. Research Questions**

At present, it is urban agglomerations that are the dominant form of settlement in the world, rapidly developing and concentrating in itself more and more human and economic resources. City agglomerations become the growth drivers of vast territories. According to scientists, the trend towards the development of urban agglomerations will continue in the future; moreover, in developed countries, the largest urban agglomerations will gradually merge into even larger forms of settlement and concentration of economic potential - mega regions.

For example, E. Hoover describes the border regions as unattractive for locating productions and arguing the need to open borders for international trade, which may make a big difference. Peripheral regions become attractive after the opening of borders due to lower costs foreign markets (Hoover, 1963). Starting point for assessing spatial effects of change cost of labor is the conclusion of P. Krugman about the relationship between regional wages and the capacity of the regional market (Krugman, 1991). Using this conclusion, S. Brakman et al. showed how wages decrease with increasing distance from centers of economic activity. Consequently, the transfer of economic activity from centers to border regions may contribute to wage growth in them (Brakman, Garretsen & Schramm, 2000). This conclusion was empirically proved by G. Hanson in his work on changing the placement of the enterprises of the Mexican clothing industry (Hanson, 1996).

In this regard, the emphasis on the development of agglomerations and the closely related economic zones (Kazan, Kama and Almetyevsk), stated in Strategy 2030, is certainly a step in the right direction. At the same time, we would like to draw attention to two issues that lie in the plane of urban agglomerations.

#### **4. Purpose of the Study**

When writing an article, the goal is to develop and provide scientific background, theoretical and methodological approaches and practical recommendations for the formation of regional development management systems based on ensuring the progressive dynamics of agglomerations.

#### **5. Research Methods**

Comparison of the key characteristics of the Kama agglomeration with the optimal parameters of various types of agglomerations identified in the study made it possible to determine the need to implement in the Kama agglomeration a sectoral type of agglomerative development involving the formation of multiple growth points and using the strengths of municipalities to form a positive synergistic effect of their interaction within the agglomeration. This will allow one, on the one hand, to take into account the geographical limitations of the development of the agglomeration, and, on the other hand, to ensure effective interaction with the Almetyevsk agglomeration, the level of connectivity with which is higher than with Kazan. The sectoral type of agglomeration development also corresponds to the established structure of the agglomeration center, which unites two industrial centers - Naberezhnye Chelny and Nizhnekamsk; and will allow one to form independent development centers in the third agglomeration belt on the basis of the cities of Mamadysh and Chistopol, using the strengths of these cities.

In turn, the analysis of peculiarities of development of the Almetyevsk agglomeration has shown that the optimal for a given, small enough area compared to the two discussed above, sintering of education is a belt type of zoning, which involves the preservation of the ecological recreational areas between the zones of the agglomeration. This approach is consistent with the current structure of the agglomeration, characteristic feature of which is formed on the structure of the basic enterprise agglomeration, the oil company Tatneft is vertically integrated economic and logistics linkages, and ensure a positive forward dynamics based on the activation of existing growth centres with a consequent reduction of the level of spatial polarization in agglomeration. The first of these is finding out the relatively clear, actual boundaries of urban agglomerations and determining the vector of their development. In the current version of Strategy

2030, the boundaries of urban agglomerations are distinguished along the boundaries of municipal districts (Vysokogorsky, Laishevsky, Pestrechinsky, Verkhneuslonsky, Zelenodolsky districts and Kazan), which is largely a convention. For example, in the United States, the criterion for assigning certain areas to a particular urban agglomeration is the analysis of labor travel. Separate districts or, in other words, counties (counties, analogs of districts in the Republic of Tatarstan) are considered to be part of the agglomeration (the so-called Metropolitan Statistical Areas), if at least 25% of the employed from among the residents of this district work within the central district of the area or, on the contrary, 25% of jobs within the district are occupied by residents of the central districts. In the European Union, according to the official definitions of the Eurostat service, large urban zones (Larger urban zones, LUZ) are distinguished by a similar criterion, with the threshold being 15%.

Today with the development of digital technology aimed to track labor and travel to reveal the connectivity between different spatial units between them becomes even easier – with much less effort, but almost with a greater degree of accuracy. For example, you can extend the methodology used in the calculation of the intensity and direction of movement of citizens in the city of Kazan according to the SIM card, adjacent to the Kazan municipal areas. Analysis of the movements of the townspeople, this technique will help to establish the outlines and the boundaries of the Metropolitan area more accurately, figure out what part is adjacent to Kazan territories associated with the city's most labor intensive travel, and it is these "key points" that connect to Kazan more reliable transport links – bus, light rail, commuter rail.

Of course, even the most reliable geo-information data cannot provide exhaustive information about the boundaries of agglomerations, since almost certainly there are all sorts of “transition zones” from agglomeration to “non-agglomeration”. Moreover, the urban agglomerations themselves are in a continuous process of development and transformation of their structure. At the same time, even this kind of analysis will make it possible to determine the outlines of agglomerations more clearly than the simple use of administrative boundaries.

In this case, the first of us raised a question which “organically flows” into the second one: the clarification of the contours of the agglomeration with the help of modern techniques will allow you to identify "clusters of activity" on the periphery of the agglomerations and areas of employment trips. This will give an idea about one or more vectors of the agglomeration. Relatively speaking, if we know where more people drive to work in Kazan – from High Mountains or from Vasilevo and where it ends, the area from which a significant number of people sent to work in the capital of the Republic, it will allow more efficient use of funds when designing the further development of infrastructure, road, transport, housing, shopping, recreation, etc.

Clarifying the actual boundaries of agglomerations can be used as a basis for creating within the city agglomerations deliberative bodies or platforms where the managers of the municipalities (within its identified actual boundaries) municipalities could contribute to the development and implementation of strategies for the development of municipalities as a single social economic body of the relevant agglomeration, and subsequently - the solution and other issues of the development of agglomeration as a whole. “Non-municipal” bodies work effectively in a number of the largest agglomerations of the world (for example, Paris or London). Important factors in the organization of their work: 1) a look at the agglomeration and its needs as a single organism instead of a synthesis of the aspirations of the various

municipalities involved in it; 2) maximizing the right to vote of all the territories of the agglomeration, and not just its core or overwhelmingly large municipal entity; 3) an effective form of organization of activities of such structures is considered a project approach.

The study of the evolution of ideas about the essence of the benefits of regional development has allowed to establish that there is no single approach to its definition. It is customary to single out an absolute, comparative, development, and location of the productive forces of the region, an economic, competitive, and innovative advantage. Blanchard, O., Lawrence F. K. think of states as producing different bundles of goods, all sold on the national market. They assume that production takes place under constant returns and that there is infinite long-run mobility of both workers and firms (Blanchard & Lawrence, 1992). The analysis of regional advantages revealed the factors that stimulate regional development: climatic conditions and the availability of natural resources; location of the region within the state; infrastructure development; availability of skilled labor resources; the presence of innovative industries, the degree of innovation, developed by research and educational organizations in the regional production process; the presence of cluster forms of business organization in the region; energy sufficiency of the region; investment activity of the region; image of the region, etc. Also, factors hindering development were identified: mono-orientation of regional development; low competitive activity of business structures in the region; lack of interest of the consumer sector in goods and services produced within the region; the presence of shadow economic processes in the region; low collection of regional and local taxes; low level of financial and legal culture of the population, etc.

At the same time, in addition to the competitive advantages defined above, a number of advantages associated with the development of urban agglomerations should also be highlighted; in this case, the competitive advantages are synthetic competitive advantages resulting from the interaction of the core and agglomeration belts. Then, in addition to the absolute, comparative economic, competitive and innovative advantages formulated in the literature in the development and distribution of the productive forces of the region, it is necessary to highlight the advantages of logistical cooperation and balanced development. The advantage of logistic interaction determines the competitive position of the region, based on the high accuracy and reliability of the organization of material, transport and other flows in regional agglomerations. The advantage of balanced development involves the formation of a competitive advantage in the region by creating a synergy effect by supplementing the competitive advantages of the agglomeration center with the advantages of interacting with them belts of agglomerative formations, which creates the basis for reducing the level of spatial polarization.

Further, agglomeration has a key feature - the presence of dense interaction and interconnectedness of all its components. At the same time, there are various criteria for identifying the agglomeration: the presence of close production ties between business structures that are located within the framework of various administrative and territorial entities; a close relationship in the industrial and social infrastructure; continuity of development, as well as high density of the population living in the main city; the presence of intensive trade and other flows, including the intensity of domestic trips; the presence of a large city, which is the center of the agglomeration; the volume of able-bodied population forced to move to work in neighboring administrative and territorial entities as part of the pendulum migration; the volume of the population that is not engaged in agriculture, etc.

The new' economic geography focuses on the footloose-labor and the vertically-linked-industries models. Both are complex since they feature demand-linked and cost-linked agglomeration forces. Baldwin R. present a simpler model where agglomeration stems from demand-linked forces arising from endogenous capital with forward-looking agents (Baldwin, 1999).

In addition to the above, based on the analysis of the theory and practice of regional management, it is also necessary to single out several parameters of micro-level interaction, which, when adapted to the conditions of the regional economy, determine the presence of conditions for the emergence of agglomeration: rigidity and reliability of logistic links in the agglomeration. At the same time, the criterion for the rigidity of logistic relations presupposes the presence of more than one way of organizing material, informational and other flows subject to the implementation of effective control of entry and exit. The criterion of reliability of logistics links implies a higher effectiveness of contacts between economic agents within an agglomeration than in the case when one or several agents of the logistics chain are outside the agglomeration. It should be noted that these two criteria allow us to identify not only the agglomeration itself, but also agglomeration formations, including not only the first and second impact zones, but also the third and subsequent zones of influence of the agglomeration centre.

Urban areas can be divided into monocentric and polycentric models of cities. Monocentric city, as planned by William Alonso (1964) was the first a model of urban spatial planning (Alonso, 1964).

Polycentric structure of the city is represented by two models. One of the models shows that the city has several sub-centres, each sub-centre generates trips from all over the city. Another model is that there are also different subcentre employment, but one sub-centre is more concentrated than others (Bertaud, 2009).

Optimization of the type of development belt of the city center requires consideration of a number of factors, including both qualitative and quantitative criteria. The study of the experience of the development of existing agglomerations and the economic policy of their formation made it possible to formulate a set of indicators characterizing the positive and negative sides of the choice of an approach to the formation of agglomeration in a particular case. They include: the presence of geographical features that prevent the expansion of agglomeration in one or several directions, the level of differentiation of monetary incomes of the population in the city center and satellite territories, the presence of satellite cities formed by natural means, the possibility of forming artificial satellite cities, differentiation by the level of industrial production, differentiation in terms of significance of the service sector, differentiation of environmental security in the center and satellite cities, as well as the level of communication logical flows between the center and the satellites. The combination of these factors determines the priority type of urban agglomeration development - belt zoning, sector development, parallel city or directional development. The choice of the optimal for the territory under the consideration approach to the formation of agglomeration is determined, therefore, by the combination of characteristics in favor of the type of agglomeration development for which there are the greatest number of identified positive effects, which will ensure high efficiency of the agglomeration policy and form a basis agglomeration.

In order to separate the remaining municipalities into the belts of these three agglomerations, the authors conducted a hierarchical cluster analysis of indicators of the socio-economic development of the municipalities of Tatarstan (population, gross territorial product, value added, share of small and medium

enterprises in the total number of business entities, share of innovative products in the total volume of output, the volume of shipped goods of own production, turnover of small and medium enterprises about business, agricultural production, investment in fixed assets, turnover of retail enterprises, the volume of paid services, the number of people employed in the economy, wage fund, wage fund excluding public sector employees, the average number of municipal enterprises, average wage, the average level of remuneration in the public sector, cash incomes of the population, cash income per capita, revenues to the local budget, the amount of the collected tax on personal income, independent user of unemployment).

Based on the cluster and graphical analysis, the authors formed the following three agglomerations: Kazan centre in Kazan with Kamsky doubles the center in the city of Naberezhnye Chelny and Nizhnekamsk, and Almetyevsk with the center in the city of Almetyevsk. The first zone of the Kazan agglomeration is Zelenodolsk and Laishevsky regions; a second belt - Verkhny Uslon, Vysokaya Gora and Pestretsy regions; the third zone – the centers of subaponeurotic Arsk and Buinsk; the fourth zone – municipal areas associated close economic contacts with the centers of subaponeurotic (atna, Buinsk, Baltasi, Arsky, Kukmorsky, Verkhneuslonsky, Drozhzhanovsky, kaybitsky and Tetyushsky districts); the fifth belt, alkeevsky and Kamsko-ustyinsky districts. The first zone of the Kamsky agglomeration are Elabuga, Nizhnekamsk and tukayevsky areas; the second belt – Agryz, Aktanysh, Menzelinsk, Mendeleevsk and musulmovsky municipal districts; the third zone – the centers of subaponeurotic Mamadysh and Chistopol; the fourth zone – the Mamadyshsky, Rybno-Sloboda, Tyulyachi, Sabinsky, Chistopol, Aksubaevsky, Alexis and Novosheshminsky municipal districts; the fifth zone – the Spassky district.

Finally, the Almetyevsk agglomeration includes the center in Almetyevsk, the first belt is Almetyevsk, Aznakaevsky, Bugulminsky, Zainsky, Leninogorsk and Nurlatsky municipal districts, and the second belt is Bavlinsky, Sarmanovsky, Yutazinsky and Cheremshansky districts. That is, Kazan agglomeration unites the city of Kazan and 16 municipal districts; Kama metropolitan area - the city of Naberezhnye Chelny and 17 municipalities; Almetyevsk agglomeration - 10 municipal areas. Despite the uneven distribution of the number of regions by agglomerations, the proposed option will allow for a balanced management of the development of agglomerations on the basis of established economic and logistical ties.

Thus, the proposed approach suggests the need for re-zoning as compared to the development zones proposed in Strategy-2030.

The systematization of municipal development projects shows that at present almost every one of them, regardless of the formulated priorities and target indicators of socio-economic development, includes the implementation of at least one large-scale project in the production sector and one significant project in the agricultural sector; also a significant part of municipalities plans to implement social projects. Thus, in fact, when developing long-term development plans, neither the set of target indicators of promising socio-economic dynamics, nor the level of impact and the degree of influence of agglomeration processes on the formation of complexes of long-term actions to ensure the development of municipalities using synergies within agglomerative formations are taken into account. This circumstance dictates the need to choose the type of development that is optimal for each of the considered agglomerations according to the selection mechanism of the type of agglomeration formed in this study. To solve this problem, we will

conduct a comparative analysis of the agglomerations formed by us based on the analysis of the strategies of municipal formations and the proposed method of choosing the optimal type of agglomeration.

## 6. Findings

When comparing the characteristics of Kazan agglomeration with typical characteristics of agglomeration development mechanisms, the greatest number of matches is observed with the “parallel city” type, which implies the need to develop agglomeration based on the principle of forming parallel cities in the first agglomeration zone (the cities of Zelenodolsk and Innopolis and the corresponding municipal districts), and also parallel to the cities-centers of subagglomerations, Arsk and Buinsk, cities - according to the level of development of the social infrastructure tours. Such approach will allow one to ensure the development of agglomeration despite the high level of internal spatial polarization and to form growth points independent of the state of a large center in Kazan.

In determining the most significant factors, defining the dynamics of targets, a regression analysis of key output parameters was carried out. In most cases, when building a regression model, no significant factors were identified, which implies first of all the need to expand the collected information on the development of municipalities, significant from the point of view of the positive translational dynamics of agglomerations - the closeness and reliability of economic and logistical relations of entities that are residents of different municipalities, connectivity of transport and energy infrastructure and several others.

## 7. Conclusion

As shown by the statistical analysis, when forecasting revenues to the local budget of municipal districts, four key factors must be taken into account - the number of people employed in the municipal area, the total wage fund, the average wage of public sector employees and the share of innovative products in total output, while turned out to be statistically insignificant. In turn, the regression analysis of the share of innovative products in total output shows that the only significant predictor for this target parameter is the average level of remuneration in the public sector, which is explained by the priority development of innovative products in the framework of cooperation between private enterprises and scientific or educational centers related to the budget sphere.

The constructed model allows one with sufficient accuracy to predict the share of innovative products produced in the municipality on the basis of currently collected state statistics .

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