Features of the implementation of the transition from a monocentric planning structure to a polycentric one on the example of Kazan

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Abstract. The paper discusses the process of implementing the transition from a monocentric planning structure to a polycentric one on the example of Kazan. In addition, the theoretical concepts of polycentricity presented by the authors of papers were analyzed, as well as the methods of deduction, induction, classification and separation of concepts were used. Then a secondary analysis of the transition to a polycentric planning structure was carried out. For the analysis, the following materials were selected - a sociological survey on the assessment of the quality of life in cities on the website Domofond.ru, Strategy of socio-economic development of the municipal formation of Kazan until 2030, general plan of Kazan, reports on the implementation of national projects and municipal programs. The development of the Small Kazan Ring and the Big Kazan Ring in the city is an important step for the development of polycentricity of urban space in the concept of the city general plan.

1. Introduction

Today, comfortable environment is a product of competent architectural and urban planning decisions. Civil society is also involved in urban planning decisions. In a modern city, urban planning decisions are based on the general plan and it is made taking into account the opinions of citizens, as multi-level public hearings are held on the approval of the construction project [1, 2]. The history and economy of the city also makes its own amendments. Thus, the General Plan of Kazan in 1969 was implemented with several deviations: the area of Kazan grew by 30% of the plan, the Kazan metro was practically not built, but the length of bus routes was higher by 400 km than it was planned. In Kazan, over the past decades, there were events that affect the urban development situation: there was a change in the population, residential complexes were built on the outskirts of the city (in the Soviet and Kirov districts) [3, 4]. In 2020, a new General Plan of Kazan was adopted, which was developed by employees of the Research and Design Institute of the Moscow General Plan. According to the architects, it is necessary to increase transport mobility and remove the dividing urban zones that prevent uniform development.

Transformation of urban space started in Kazan: transition from a monocentric planning structure to a polycentric one. As a problem of this paper, the beginning of the implementation of this process is considered. In the city, a uniform distribution of various functional zones is formed, such as public, residential, and industrial ones. According to the basic idea of scientists, such a decentralization of the city with the allocation of separate districts will allow the formation of several small cities as part of one large one. This concept is called “Urban village” and is considered the optimal decision [5,6]. It
was also assumed that residents live within walking distance of the place of work, social and public infrastructure and, therefore, they do not need to travel to work in other areas of the city. Some experts admit a significant rejection of personal cars [7, 8].

2. Materials and methods
A large number of scientific studies are carried out within the framework of solving individual applied problems in different regions. As a rule, the results obtained allow drawing conclusions about the problem posed. The following documents were selected for analysis: the Strategy of socio-economic development of the municipal formation of Kazan until 2030, the General Plan of Kazan, reports on the implementation of national projects. The analysis of a sociological survey on the assessment of the quality of life in cities on the website Domofond.ru was carried out. More than 90 thousand people participated in the survey. They were asked to rate on a 10-point scale (where 1 indicates categorical disagreement, and 10 indicates complete agreement).

3. Results

3.1 Rating of cities by quality of life
The most acute problem according to Kazan residents is the ratio of income and cost of living. Then the state of the roads comes. And other indicators, such as infrastructure for children, ecology, infrastructure for sports and recreation, the work of public transport is quite highly appreciated by residents.

Table 1. Rating of cities by quality of life.

| City           | Income to cost of living | Ecology | Children | Sport and recreation | Public transport | Roads |
|----------------|--------------------------|---------|----------|----------------------|------------------|-------|
| Moscow         | 5.2                      | 7.2     | 8        | 7.1                  | 7.7              | 5.7   |
| Kazan          | 4.6                      | 6.8     | 7        | 6.5                  | 7.4              | 5.2   |
| Saint-Petersburg | 5                       | 6.8     | 7.4      | 6.9                  | 7.3              | 5.2   |
| Krasnodar      | 4.8                      | 7       | 6.7      | 6.8                  | 6.8              | 4.8   |
| Krasnoyarsk    | 4.5                      | 5.2     | 7.2      | 6.4                  | 6.8              | 4.8   |
| Yekaterinburg  | 4.5                      | 6.4     | 7        | 6.5                  | 7.1              | 4.4   |
| Novosibirsk    | 4.5                      | 6.3     | 7.1      | 6.1                  | 7.1              | 4.6   |

*Based on survey data on domofond.ru [8].

3.2 Development strategy of Kazan
The Strategy of Kazan was developed taking into account the directions of the Strategy of the Republic of Tatarstan until 2030. The Strategy pays great attention to the planning structure of the city [9]. According to FSSS, in 2017, the population of Kazan was 1.243 million people (Figure 1).
The strategy referred to the seven sub-centres, we are talking about the administrative separation of the urban space. And in the sub-goal “Space, real capital-2030” it is said that a high quality of life throughout the city is supported by transport connectivity and taking into account the identity of the districts. And first of all, this is all realized due to the developed transport system, the system of transport and interchange hubs. The key to polycentricity should be the transport framework, which should connect all areas of the city.

3.3. General plan of Kazan
In 2020, a new General Plan of Kazan was adopted as an important stage in the implementation of polycentricity of urban space. An important element of polycentricity is functional zoning. The General Plan of Kazan provides for 4 main groups of types of functional zones:

1) public;
2) residential;
3) industrial;
4) natural.

To increase the transport mobility of the population, the plan provides for the further development of public transport and the unification of the city’s streets into a single radial-ring system. The cornerstone of such a system are two ring highways: the Small Kazan Ring (SKR) and the Big Kazan Ring (BKR). It is expected that the expansion of public transport will reduce the duration of trips. And this takes into account the specifics of the development of the urban transport system in the city, especially the development of transport accessibility of residential complexes on the outskirts of the city (in the Soviet and Kirov districts). The general plan also focuses on the introduction of eco-friendly electric transport – trams, city trains. In the first stage of the general plan, it is planned to extend the route of tram No. 5 and make a line to the Salavat Kupere district. Another innovation of the general plan is transport and transfer hubs. In addition to transport infrastructure development the General plan also includes the social infrastructure development; it is planned to expand the network of schools and kindergartens, particularly in residential areas (in Soviet and Kirov districts).

When developing the general plan, the expert and managerial environment and active citizens were involved. During such sessions, it was possible to identify the main strategic directions for the city. Discussions of the draft general plan with citizens took place twice and in different formats.

3.4. National and municipal programs
As part of the national project “Creating a comfortable urban environment”, several public spaces will be equipped in 2020. The Open Kazan website states that holding a rating vote to determine the priority objects of improvement of public spaces in Kazan in 2021 is one of the requirements for the implementation of the National Project “Housing and Urban Environment”. For the city administration, it is important to know which territories for people in each district seem to be most in demand.
In accordance with the Program of integrated development of transport infrastructure of Kazan for the period up to 2040, the city was planned to have finance from the municipal and federal budgets. The analysis of expenditures on the departmental structure showed that in 2017, almost all funds under the subsection “Road management” (1.5 billion rubles) were allocated for the repair and maintenance of road facilities within the framework of the municipal program “Development and increase of the level of improvement of the territory of the city of Kazan for 2016-2018” (Table 2).

### Table 2. Expenditures of the budget of the city of Kazan under the subsections “Transport” and “Road management” of the section “National Economy” in 2015-2017, billion rubles.

| Budget subsection | 2015       | 2016       | 2017       |
|-------------------|------------|------------|------------|
| Transport         | 1 829 840  | 483 352    | 378 798    |
| Road management   | 250 484    | 1 436 349  | 1 622 296  |

As part of the implementation of the national project “Safe and high-quality highways”, road repairs and construction of the BKR section were carried out. The area from Midhat Bulatov Str. to Technical Str. (stage 2 - from Boriskovskaya Str. to Technical Str.) (Figure 2). In 2020, the formation of a network of highways that unites the streets of Kazan into a single radial-ring system is almost completed.

![Figure 2. Big Kazan Ring, the area from Midhat Bulatov Str. to Technical Str.](image)

The effect of reducing capital investment, $\Delta K_t$, in t-year in road transport was determined by the formula [10]:

$$\Delta K_t = \sum (K_{bt} - K_{tp}) = 1,$$

where: $K_{bt}$, $K_{tp}$ – capital investments in road transport in the t-year, respectively, in the baseline and project scenarios.

As it can be seen from Table 3, the effect of reducing capital investment in road transport is only apparent starting in 2023.

### Table 3. Effect of reduction of capital investments in road transport, thousand rubles.

| Years     | Effect of reduction of capital investments in road transport |
|-----------|-------------------------------------------------------------|
| 2020      | 0,00                                                        |
| 2021      | 0,00                                                        |
| 2022      | 0,00                                                        |
| 2023-2040 | 193 030 317,60                                              |

Resolution of the Executive Committee of Kazan dated 07.09.2020 №2523 [10].
4. Discussion

Based on the analysis, we can say that in Kazan, the transition from a monocentric planning structure to a polycentric one has begun. And first of all, this is realized by improving the connectivity of the urban environment and comfortable mobility of citizens through the development of BKR and the formation of agglomeration transport links.

It should be noted that the general plan of the city refers to the possible transfer of industrial zones to the outskirts, and not near the center, but almost does not mention the areas of cultural and consumer services, which are still numerically predominant in the core of the city center. The process of transition from a monocentric planning structure to a polycentric one has just begun. And it is worth mentioning the anomalous polycentricity.

Instead of the expected autonomy of the districts, a rather confusing picture is emerging of many centers that attract not only the local population. For the first time, such a phenomenon was observed in studies of Paris, that even in the formed subcentres, mostly not local residents work, but visitors. Szabo explains this by saying that people are willing to sacrifice time for a more prestigious job than is available in the nearest neighborhood. Another reason for the abnormal behavior of polycentric systems, as some researchers believe, is the imbalance in the number of residential buildings and places of employment within individual subcentres.

5. Summary

The paper analyzes the theoretical concepts of polycentricity of urban planning and the analysis of secondary data. As a result of this analysis, the main directions and stages of the implementation of this concept were identified on the example of Kazan. The development of BKR and SKR in Kazan is an important step for the development of polycentricity of urban space. And based on the analysis, we can say that the city authorities allocated funds from the municipal budget for the implementation of this goal in 2016 and in 2107. The results of the analysis helped the author to revise the list of challenges and problems that should be monitored by the city authorities.

6. References

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