Key Factors of Unsustainable Development of the Urban Environment in Samara and Tolyatti (Russia)

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Abstract. Factors that prevent improving the quality of life in the two largest cities of Russia – Samara and Tolyatti, analyzed. From the perspective of sustainable development, the historical background of the problems that arose in the 21st century is considered. The compliance of the properties of the planning structure, development and environment of these cities with the most important criteria that used in some systems for indicating sustainable development revealed. The most important areas for improving the quality of the living environment that allow achieving economic well-being, improving the environmental situation and ensuring social stability have been identified. The following conclusions are made: comprehensive strategies for sustainable development, considering the position of Samara and Tolyatti in the national and regional settlement systems, should be developed; the tendency to strengthen economic and social ties between megacities, high scientific and industrial potential, the presence of natural environment distinctiveness, the urban planning and architectural features should be taken into account.

1. Introduction

In the Russian Federation, the main economic potential of the regions is industrial production and research centers located in historically established and new cities. In the largest polycentric settlement system of the Volga region – the Samara-Tolyatti conurbation, the megacities of Samara and Tolyatti are located. This is the only example in Russia where the transport accessibility of a neighboring metropolis does not exceed 90 km. It is important that the two main cities of the Samara region have different development histories: Samara retains traces of a historical settlement, and Tolyatti considered as an example of a new city over the world. The market era has left its mark on the specifics of the planning structure of cities: the profiling functions and development of industrial territories, the dynamics of the number and socio-demographic structure of the population have changed. In 2018, 1163 thousand people lived in Samara, and 707 thousand people lived in Tolyatti. The area of Samara is 541.4 km², Tolyatti – 314.8 km² [1]. These cities have similar population densities: 2146.8 people/km² and 2488.0 people/km², respectively. In addition, the Samara–Tolyatti urban planning system includes four towns, as well as a significant number of rural settlements.

In the second half of the 20th century, the Rapid growth of Samara and Tolyatti observed. It conditioned by the development of industry and the construction of a huge number of standard housing. Many of the problems that prevent the improvement of the quality of life in these megacities
were the result of a peculiar economic and urban planning policy characteristic of the last period of the Soviet era.

2. Materials and methods

Materials of the author's long-term work related to the study of problems and methods of sustainable development of urbanized territories used in the article. Extensive material from dissertations, monographs and articles published in the late 20th and early 21st centuries in publications included in the authoritative international and Russian databases of scientific citation systematized. This allowed us to acquainted with the approaches to indicating sustainable urban development and identify the specifics typical for Russian and non-Russian systems. The assessment of urban instability in Samara and Tolyatti carried out in the course of full-scale familiarization with the current situation. Materials of master plans, drawings and reports posted on the websites of municipal administrations studied. Additional information obtained from collections published on the website of the Russian Federal state statistics service. Special attention paid to the processing of the results of sociological research conducted by the Samara Institute of TerrNIIgrazhdanproekt and Moscow teams – the Internet portal Domodond, the analytical Levada-center, the DGM Agency and the Strelka design Bureau.

3. Results

3.1. Information about the features of Samara urban development

Samara founded as a fortress on the Eastern borders of the Russian state in 1586. In 1688, it became a city. The decisive factor in the initial economic development was trade, because the city was conveniently located near the confluence of the Volga and Samara rivers. After leaving the fortress, the urban planning structure developed as an irregular one. The disastrous fire of 1765 was the reason for the development of a regular planning grid and the first actual plan 1782 with rectangular quarters. Soon after receiving the status of the County center (1796) – in 1804, the city received a new plan. Minor changes recorded in the 1840 measurement drawing. In 1851, the city became the capital of the province. Since 1853, the construction carried out according to a "highly approved" geometric plan. Suburban territories developed spontaneously. Later the paved streets, the city water supply and gas for lighting public buildings appeared. In 1895, the horse-drawn railway opened. In 1900, the power plant started working. At second half of the 19th century, the first factories built, but even in the early 20th century, trade was much more important. At the turn of the 19th and 20th centuries, the main longitudinal axes began to form-the outbound highways and the railroad. In 1904, a new railway bridge built across the Samara-river. In 1909, construction of the city's sewer system began. During the 1920s and 30s, the area adjacent to the railway developed, but the city center remained within the borders of the 19th century [2].

In Soviet times, the city known as Kuibyshev. Its significance as the center of the agricultural province remained until the 1930s. In this period, several large enterprises of heavy industry and the defense complex built. This has stimulated the development of science and education. In 1936, the city General plan was prepared. Its implementation began in 1940 under the control of the established office of the chief architect. The territory grew towards the Northeast direction on a linear basis with parallel placement of industrial and residential areas. The main streets in the historical core reconstructed and the number of facilities floors increased.

The great Patriotic war played a particular role in the history of the city. Large factories evacuated from the western territories of the USSR. The settlement of Bezymyanka is beginning to develop. In 1942, the trolleybus line laid, the first traffic lights installed, and in 1944, electric trains launched on the railway to connect with the city center. Immediately after the war, centralized heat and gas supply began introduced in the city [2]. The rapid development of industrial areas and working quarters caused the gradual merging of disparate sections of the city by the end of the 1950s and 60s. Further growth of the territory is associated with the construction of huge "sleeping" areas to the West of the railway line. The extended planning axes that linked the periphery to the historical core finally formed.
By the 1960s, several new loci outside the historical core had emerged, including in several autonomous worker settlements serving the space industry. Soon, new industrial construction was limited. In 1965, the decision to build multistory buildings invented.

The approval of the 1967 city's General plan led to mass housing construction on the crest of watershed of rivers Volga and Samara. In the same year, the population of the city exceeded 1 million people. In 1978 thanks to this, the decision to build a metro made and it was included in the new General plan (Giprogort Institute, Moscow) in 1984. The first line opened in 1979. The 1967 and 1984 documents the focus was on optimizing industrial zones in existing areas, but new production and utility facilities built in the immediate vicinity of residential areas. The city returned to its historical name Samara in 1991. Gradually it became clear that the growth of the territory does not lead to improvement in the quality of the urban environment. In 1994-95, the General plan adjusted, and three development options calculated until 2006 considered. However, the dramatic transition to market relations and the loss of a significant number of city-forming facilities (jobs) did not allow the planned implementation. A new 2008 document developed by the Moscow Giprogort Institute was approved, but soon an update was required [3]. It has amended several times since 2012. In 2019, they caused by the lack of relevance of previous schemes for the development of the street and road network and the borders of the territories of cultural heritage sites, as well as insufficient development of the infrastructure of social facilities.

3.2. Information about the features of Togliatti urban development

Fortress Stavropol (previous name of Tolyatti) appeared in 1737. Little changed over the course of three centuries, and in 1924 Stavropol even ceased to be a city. The status of the city returned only in 1946. However, in 1950, due to the construction of the Volga hydroelectric power station and the filling of the reservoir, it decided to move the city to a new location. According to the new master plan, in 1951-1953, residents moved to a purpose-built residential area located on an elevated north site of the dam. In accordance with current regulations, all standard types of equipment used here - heat, water, electricity and gas supply, water disposal. The emergence of a new district is the starting point of the history of the modern city. Soon the nearest workers' settlements became part of it. The presence of a construction base, Railways and roads has stimulated the development of industrial facilities. Implementation of the second master plan, which prepared by the Central research Institute of urban development (CNIIPgradostroitel' stva, Moscow), began in 1961. On the Western site, agricultural land was subject to seizure.

In 1964, Stavropol was renamed Tolyatti in memory of the leader of the Italian Communists. Perhaps this event changed the fate of the city, and in 1967-1971, the construction of the Volga automobile plant together with the Italian concern FIAT began here. The new Avtozavodsky district built especially for factory workers. Housing and infrastructure facilities built using factory methods based on serial projects. Engineering features of the coastal zone of the reservoir have become an obstacle to the use of areas near the water area for development. In the same years, other industrial city-forming objects appeared. Some businesses have come close to residential areas. Thanks to the developed industrial potential, the city gradually took a leading position in the production structure of the Samara region. In 1976, the third General plan of Togliatti, also developed by the CNIIPgradostroitel' stva, approved. A modern three-part planning structure laid in it. The need to preserve valuable woodlands and the presence of artificial borders-railway lines and junctions, taken into account. Since 1981, construction of new, reconstruction and expansion of existing enterprises have prohibited in Tolyatti. Residential areas both in the city and in suburban areas began to build.

Since 1993, Togliatti has developed according to the fourth master plan (CNIIPgradostroitel' stva). The requirements for taking into account peculiar natural and complex anthropogenic factors, the need for environmental protection and improving the living conditions of the population met. Each of the three major districts of the city retained its planning structure, but there were no plans to improve transport links between them. The draft adjustment of this master plan approved in 2004 due to changes in the Federal urban planning legislation [4].

3
Currently, approximately 120 medium-sized and large industrial companies form the basis of Togliatti’s economic potential. Industrial territories tend to belong to each of the administrative regions. A characteristic feature of the city is the alternation of functional zones and a high degree of territories development. The city’s latest master plan, which runs until 2037, approved in 2018. Developers – TerrNIIgrazhdanproekt (Samara) and Lengiprogor (St.-Petersburg). Current ideas of the previous General plan, Federal and regional documents, and municipal programs formed the basis. Agglomeration projects – construction of a bridge over the river. The river Volga to the West of the city, the creation of a special economic zone, and the organization of high-speed rail services taken into account. The development of the city planned in the South-West direction. The specifics of each of the three existing districts taken into account. The new settlements should be part of the city district. Reserve territories and priorities for infrastructure development – roads, engineering structures, public spaces and social facilities have identified.

4. Discussion

Analysis of the evolution of urban development in Samara and Tolyatti shows that for a long time approaches to improving the state of the urban environment have changed in accordance with the specific historical period of theoretical concepts and schemes. However, the transition to the post-industrial phase of development did not lead to a change in the paradigm typical of the Soviet period [5]. This is probably the main reason for the lack of viability of city master plans. Innovations of the era of sustainable development not sufficiently reflected in the updated documents. One of the most sensitive tools for assessing the consumer properties of the urban environment is sociological surveys.

For several years, Samara and Togliatti have been in the field of view of the Russian Internet portal Domofond. The rating of Russian cities, which reflects the satisfaction of local residents with living conditions, takes into account such private characteristics as environmental conditions, cleanliness of territories, the work of public services, conditions for good neighborliness and raising children, sports and recreation, convenience of public transport and shopping infrastructure, personal safety and the cost of living. Eventually the integral result is determined. In 2019, Togliatti took 95th place among 200 participating cities, and Samara was on the 112 row. Responses from residents of both cities generally correlated with the overall results: the worst estimates are the cost of living, the state of road transport infrastructure, the work of the housing and utilities sector, and cleanliness [6].

In 2014, as part of the preparation of a comprehensive development strategy for Samara, the local Foundation of social research identified the main problems that concern residents. They are the health infrastructure and security. People identified the following key characteristics of the city’s image correction in the near future: clean, modern, dynamic, rich, beautiful, leisure-developed, open and safe [7]. A survey conducted by the Institute of TerrNIIgrazhdanproekt in Samara revealed that many local centers do not meet the needs of residents and need to be updated [8]. In Tolyatti, a mass sociological survey conducted by TerrNIIgrazhdanproekt also in 2016. The top concern of residents was the improvement, landscaping of public areas and courtyards, as well as the need to improve the housing stock [9]. These data show that there is a contradiction between the potential advantages that residents of modern megacities can have, and the real situation that caused by an insufficiently thought-out city development strategy and management policy.

An effective way to overcome the problems of unsustainable urban development is planning that ensures the achievement of the UN sustainable development goals. It should have noted that the issues of sustainable development indicating became relevant in Russia at the end of the 20th century. In 2014, a group of scientists from Moscow state University, based on extensive international experience, proposed using a system of indicators of sustainable development adapted to Russian realities for megacities. The authors recorded more than one hundred private parameters. Therefore, indicators were included into the following root groups: economic indicators, energy efficiency, transport, social and institutional indicators, air and climate, water resources, waste, protected areas and noise impact. Thus, not only the priorities of consumers (residents), but also issues related to the economy, spatial development, management and current functioning of cities as open systems came into view [10].
Since 2018, the Russian Federal state statistics service has been monitoring actions to achieve the sustainable development goals. All priority national projects synchronized with them. They cover three key areas – "Human capital", "Comfortable living environment" and "Economic growth". Real changes in individual cities are tracking by the scientific community. Since 2012, the SGM Agency has been rating sustainable development of Russian cities. It allows you to identify leaders and outsiders of sustainable development among 185 contestants. Samara in this rating never rose above 48th places and Tolyatti – above 59th. In 2018, Samara was on the 55th position and Tolyatti was on 85th place. The same problems for Samara and Tolyatti are associated with low indicators of demographic stability and social infrastructure (medicine, education, security). In addition, there is a tense environmental situation in Samara (transport, insufficient landscaping), while economic instability persists in Tolyatti (unemployment and the associated income level of the population) [11].

Research conducted by the Strelka DB (Moscow) commissioned by the Russian Ministry of construction is also of interest. The methodology for determining the urban environment quality index applies to more than 1000 cities in the country. The quality of housing, road network, landscaping, public-business and social-leisure infrastructure, and citywide spaces rate. Safety, comfort, environmental friendliness, identity, modernity and management efficiency are the criteria. In the group of the 15 megacities in 2019, Samara’s rank is 11–12. Housing, recreational spaces, public-business and social-leisure infrastructure are factors of the decline. Togliatti is on the 23rd position in its group, which includes 63 cities. The main problems are the properties of green spaces, public and business infrastructure [12].

The analysis of unstable development factors of Samara and Tolyatti shows that the use of the stereotype of city development, which is customary for industrial society, according to master plans that do not take into account the changes that are taking place, is a thing of the past. They continue to be a strategic reference point for development. However, priorities changed, since the main goal is to improve the quality of life [13]. Certain principles may be used. The most significant of them is the consistency. It means that a city that is part of a higher-ranking system (an agglomeration and others), may be considered as a complex of lower-ranking subsystems (administrative parcels, functional zones, individual sections, etc.). The next important principle is the development, which conditioned by taking into account the constant changes in the quality of life in the territories. The most effective forms of implementation of this principle are the formation of a data Bank and the implementation of GIS monitoring (socio-demographic indicators, land use, real estate, environmental indicators, etc.), as well as the processing of information and its interpretation using digital technologies [14]. The principle of multiplicity is important when urban models developing: alternative options that allow flexible responses to changes may considered. For this purpose, such forms as tenders, scientific and creative competitions exist. Various restrictions (requirements) may stipulated in the terms of competitions, for example, the task of improving environmental potential. Compliance with the principle of feasibility of models is a necessary condition for improving the quality of life. Its guarantee is long-term management algorithms and applied methods for users at all levels of implementation – legal (justification of the territory's status), administrative and managerial (management, regulation of the resource market), economic and financial (development of investment projects, business plans), as well as architectural and urban planning (master planning, design of facilities).

5. Conclusions
The study of historical background and modern factors that prevent the improvement of consumer properties of the cities of Samara and Tolyatti, allows us to conclude that it is necessary to develop comprehensive strategies based on the principles of sustainable development. It is necessary to take into account the position of cities in national and regional settlement systems, trends in strengthening mutual economic and social ties, high scientific and industrial potential, the presence of a unique natural environment, urban architectural features, etc.
The experience of regional planning in countries that have passed the stage of industrial development before Russia serves as an example for planning the main ways to change urban policy, stabilize and improve the quality of the urban environment of these megacities. Primary measures are the systematic reorientation of the city-forming base of preferential development of high technology sector and service, public transport system optimization, improvement of social infrastructure, quality and conditions of maintenance of residential and non-residential property, taking into account environmental factors, physical condition and cultural values, the formation of a high-tech utility infrastructure, development of green spaces. The concept of such a program involves the use of a full range of implementation methods. These include legal (international, state, local); administrative (stimulating, preventive, radical); urban planning (planning, architectural); organizational and technological (organizational, technological, sanitary and hygienic, methodological); economic (regulatory, innovative, discriminatory), as well as informational and psychological (educational and informational).

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