Structural transformation of small cities

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Abstract. One of the key problems in urban planning is the present-day development of small cities experiencing negative consequences of new socio-economic reality. The need for searching the ways to raise the investment attractiveness of small cities becomes obvious as also the need to revise the goals of their planning structure development. On the example of Chistopol city possible ways of structural transformation, aimed at both preservation of small city natural attractiveness and opening up new opportunities for its urban development, are considered. One of the crucial goals of the research is to reveal the effective methods of small cities’ central part spatial transformation directed on satisfying new social needs of residents while maintaining the valuable historical heritage. As a result of comprehensive assessment of the current state of city’s central part spatial organization, its characteristic features are revealed and new city center formation model is proposed, which structural and functional organization is more complex and emphasizing the idea of creating high quality urban environment.

Keywords: Architectural Heritage, Living Environment, Structural Transformation, Small City, Urban Reorganization, Waterfront Area.

1 Introduction

The process of urbanization, marked by the growth of large agglomerations and the formation of megacities, is provided by the growing flow of migrations from villages and small urban settlements. However, this process is not so uniquely centripetal. Small urban settlements, preserving the features of traditional everyday culture and natural attractiveness, perform an important factor restraining the uncontrolled growth of megacities, a condition for maintaining the ecological balance of resettlement systems at the regional level [1, 2, 3].

The variety of small urban settlements that has set in our country is due to differences in their historical origin, the basis of city formation, natural and cultural development conditions. Despite the diversity of small cities’ types, all of them have a single characteristic feature of the functional planning structure, which is the presence of an agro-industrial landscape. This feature indicates not so much the transitional status of a small urban formation from the “village” to the “city”, but the specifics of everyday culture and social relations and the nature of contacts with the environment. It should be emphasized, that the small city has always provided a wide range of opportunities for the non-conflict coexistence of the city and nature due to the absence of environmental pollution major sources, the walking availability of work places and service facilities, the proximity of the nature, and, generally, the occupancy of the large area by individual dwellings with personal lots [4].

The need for constant renewal and transformation of the urban environment, caused by changes in the living conditions of society and the increasing demands for urban environment quality improvement, is an integral part of any modern city sustainable development [5, 6, 7]. This trend towards urban environment transformation leads to the systematic implementation of different urban planning reconstructive measures starting from adjustment of city’s planning structure and ending with the reconstruction and replacement of separate buildings and structures [8, 9]. Among the urban reconstruction urgent tasks we should note the problem of transforming the centers of small cities that have preserved historically valuable buildings, the renewal of which should focus not only on
improving the urban environment quality, but also on preserving and adapting the historical environment to new requirements [10, 11, 12]. Many small cities of the country, in the conditions of modern socio-economic changes, have lost their former development potential and are experiencing an outflow of socially active population, lack of funds for the urban infrastructure development. However, at the same time, small urban settlements preserve the features of traditional culture, natural attractiveness, and serve as a condition for maintaining ecological balance at the regional level. Many small towns were established on the base of historical settlements and, while continuing to develop, preserve valuable buildings and planning structure of the past centuries [13, 14, 15].

In the Republic of Tatarstan an example of such a city is Chistopol with a population of 60,000 inhabitants, which is characterized by distinctive historical development features – remarkable landscape conditions, historical and architectural monuments and the preserved planning structure of the city’s central part. At the same time, it is a city developing in socio-economic terms, experiencing the need to update the existing urban environment. The problem of the inconsistency of the existing urban environment with the growing needs of the population is most clearly expressed in Chistopol’s central historical part, where the requirements for renovation of the existing urban environment intersect with the demands for valuable architectural and cultural heritage preservation [16, 17].

The main goal of the study is to reveal the key ways of Chistopol’s central part architectural and spatial environment transformation and renovation aimed at meeting the new social needs of residents, while maintaining the valuable historical, cultural and architectural heritage of the city [18, 19].

For the mentioned goal achievement the following tasks were formulated: transformation of the ordinary “linear” public center of the city into a more spatially developed system by attaching to it objects and complexes that reflect the emergence of new points of city development; organizing the “connectedness” of the proposed spatially developed scheme of new center by implementing intercity public transport and differentiating city communications with selecting the pedestrian traffic prevailing directions; emphasizing new and existing public spaces – squares, pedestrian connections, parks, gardens, micro-gardens and other landscaping that meet modern trends in landscape design while maintaining the distinctive features of local culture, the scale of a small town and natural environment [20, 21, 22].

2 Materials and Methods
2.1 Urban development of the Chistopol’s center
The historically formed village Chistoe Pole acquired the status of a county town at the end of the 18th century. The choice of the village as the center of a large county was the evidence of the settlement’s favorable geographical location on Kama river. During the 19th century, the city was intentionally developed in accordance with a regular planning system. This period was the time when Chistopol’s central zone was being formed, which was a characteristic example of prosperous merchant urban environment represented as households with stone residential buildings linearly located along the streets with courtyards and outhouses. The remarkable economic and cultural status of the city during this period is confirmed by extensive public construction, which was attended by famous architects P.G. Pyatnitsky, I.P. Bessonov, F.I. Petondi.

In the 20th century radical changes in the social and economic structure of the state, typical for the Soviet period, transformed the course of city’s historical center exploitation. While maintaining the existing architectural and spatial structure of the center, the functional and social basis of the considering space has significantly changed.

At present, the central part of the city is located within the historical borders with the tendency of its further territorial development towards the Kama River. The area of the central historical zone, excluding the adjacent coastal territory, amounts 88.7 hectares. The modern stage of city’s historical center development is characterized by a more intensive use of the territory due to the concentration of administrative, commercial and service functions and the complexity of spatial solutions. At the same time, there is also a trend of the territorial and spatial development of Chistopol’s center, namely, alongside with its intracity historical core, local sub-centers along the streets of Engels and 40 years of
Victory are being formed, where daily and periodic service facilities are concentrated. The territorial differentiation of the center determined by necessity of increasing the number of citywide functions and the trend of the territorial growth of the city. The tendency to form a polycentric system of Chistopol’s center will bring the central functions closer to the peripheral residential areas and reduce a significant part of the transport load on the historical center territory. According to the general plan of the city, the central historical core should be developed by further intensifying the existing functioning of the territory by low-value dilapidated buildings liquidation, maximizing residential buildings ground floors exploitation, compacting blocks of existing development [23].

Along with the above-mentioned directions of center development, indicated in the general plan, also the need for recreational and tourist infrastructure development in Chistopol has been identified. The significance of this city development direction is justified by the “Program of tourism development in Chistopol municipal district”, which was developed in accordance with the State program of culture and tourism development in Russia. Setting up this task will undoubtedly cause the implementation of city center reconstruction measures for improving the appropriate service infrastructure [24].

In order to identify the prevailing features of the functional and planning organization of Chistopol’s central part with assessment of its current state’s quality, and to define the prerequisites for reconstruction, a comprehensive study was carried out including the factor analysis of the territory and consisting of the following stages:

1) analysis of the city center’s development physical condition, performed according to the criteria of physical and moral depreciation, which showed a significant proportion of buildings belonging to the category of dilapidated, the preservation of which is impractical. On average, the share of dilapidated buildings in the territory under consideration amounts to 35%. Moreover, the largest part of buildings requiring demolition is concentrated in the centrally located quarters of the historical zone and the largest number of buildings requiring reconstruction and repair are also located there;

2) analysis of the city’s central part housing stock, made according to the criteria that determine the ownership of land lots, which demonstrated that the largest percentage of territories that are owned by the municipality also belongs to centrally located blocks of the historical zone and amounts to 45 %;

3) historical and architectural analysis, which showed the wide range of historical, cultural and architectural heritage objects, concentrated in the central part of Chistopol, having various value characteristics – from monuments of history and architecture and historical objects that do not have the status of monuments that support the scale-stylistic characteristics of the urban environment to neutral structures of no historical and cultural interest;

4) analysis of the nature of Chistopol’s center territory use, which revealed the prevailing groups of functions and their distribution in space. So, the residential area is unevenly distributed and concentrated in the peripheral parts of the center, occupying up to 80 % of its territory. In centrally located neighborhoods, the share of residential development comes to 35 %, and the main part of public and business development is also concentrated here;

5) analysis of the complex system of cultural and public services, made on the basis of comparing existing set of service facilities with normative indicators, which revealed the lack of primary facilities – kindergartens and schools, as well as the lack of citywide level facilities, such as hotels, libraries, leisure centers, museums;

6) analysis of the city’s central part landscaping system, that showed a sufficient balance of open green and built-up spaces, however, the level and the quality of landscaping need to be improved;

7) analysis of the existing recreational and tourist infrastructure, which demonstrated that Chistopol has significant potential for the tourist cluster formation possessing rich natural conditions and unique historical and cultural heritage, as well as a consistently high level of tourist visits, however, the level of recreational and tourist services quality is not high enough;
8) analysis of Chistopol’s center transport and pedestrian connections, which revealed that the historically formed rectangular street grid dividing the center territory into large-scale blocks with the 2-4 hectares area provides convenient pedestrian and transport links, both within the considered zone and with the peripheral districts of the city.

As a result of Chistopol’s central historical zone comprehensive study, its following functional and planning distinctive features were identified, which should be taken into account when reconstruction project proposals developing:

1. Accessibility of urban service facilities – objects of trade, culture, education, city administration, which are compactly concentrated within the historical zone. In addition, there is a need of further territory’s centrality quality strengthening by implementing new public facilities, places of work, integrating various typologies of public and residential buildings.

2. The stylistic integrity of the urban environment, preserving the image of 19-20 centuries merchant development of a small city, which finds expression in buildings’ silhouettes and its scale. However, a significant part of the existing historical, cultural and architectural heritage fund requires a comprehensive reconstruction and restoration problems solution [25].

3. A sufficient amount of open green spaces within the central zone, the orientation of the main street spaces in the Kama River direction. However, the existing landscaping system of the center requires a strong reorganization by creating attractive and diverse public spaces, architectural and landscape improvement, integrating elements of urban design and identifying the semantic qualities of the city.

4. Polyfunctionality of the historical center, which locates not only public facilities of the city, but also housing and primary service facilities. Preserving the historically formed principle of mixed functional use of the center's territory, its further development is required, both through the integration of new city-wide service facilities, and through the new housing, schools and kindergartens construction.

5. Preserved historical architectural and planning structure of the center in the form of a system of blocks, which scale corresponds to the status of a small city. At the same time, the internal functional and spatial organization of the historical center blocks requires renovation, taking into account the need of empty territories elimination, housing stock and landscaping compaction.

6. Organization of a full-fledged tourist services infrastructure by means of new hotel fund construction and reconstruction of the existing ones, the formation and spatial arrangement of tourist routes and reconstruction of sightseeing objects within the historical zone.

The identified features of the Chistopol’s central historical zone functional and spatial organization were taken into account while developing the project proposal for its architectural and urban reconstruction (figure 1). The project proposal includes the renovation of the central historical core of 101 hectares area within the boundaries of Butlerov, Marx, Vakhitov, Lenin, Oktyabrskaya and Narimanov streets, and taking into account the adjacent waterfront zone. The main idea of the center planning structure reorganization is based on the principle of preserving the historically formed buildings’ perimeter, that forms the front facade of the blocks, and including new residential development in intra-block spaces by forming small courtyard territories similar in scale to historical households. An additional means of historical blocks development structuring was the creation of an intra-block system of green communications and micro-gardens intended both for pedestrian transit paths, connecting neighboring streets of the center, and for intra-block recreation zones. The project proposal also provides the development of waterfront zone fragment that connects the central blocks with the main landscape dominant of the city – the Kama River, where it is proposed to locate a recreation and hotel complex and a waterfront city park.
2.2 Methods of Chistopol’s central part planning reorganization
On the basis of project proposal results generalization, the following key methods of city center’s architectural and spatial structure transformation and development are defined:

1. Modernization of preserved historical buildings, which are placed along the streets and form the perimeter of the central zone blocks, including their major renovation and new engineering infrastructure installation, reconstruction in accordance with buildings’ new function, preservation and restoration of the buildings’ historical appearance, decorative elements of facades and small architectural forms.

2. Insertion of new residential buildings in the structure of historical blocks by using deep spaces that are being freed from dilapidated buildings. Large-scale residential groups with landscaped courtyards are being built into the existing grid of historical blocks, planning structure of which is similar to historical households.

3. The expansion of central functions’ variety due to the displacement of non-central functions to the peripheral areas of the city. The change of the center’s territory functional use should be carried out without a significant transformation of development spatial parameters – by using the ground floors of the historical perimeter and modernizing existing public buildings.

4. The inclusion in the development of new public facilities of citywide and local level, not violating the historical integrity of the urban environment, by regulating the high-rise characteristics and stylistic decisions.

5. The disaggregation of some blocks in order to ensure pedestrian permeability and connectivity of the center by creating intra-block pedestrian communications, recreational and storage spaces – sites and squares combined with a system of pedestrian connections.

6. Creating a sustainable and multi-level landscaping system of the city center by reconstructing existing green objects, reclaiming empty spaces – wastelands, coastal territories, introducing into blocks’ structure small landscaped areas intended for neighborhoods’ residents, creating linear landscaping for pedestrian transit paths [26].

3 Results and discussion
Small cities are called upon to become one of the most important factors in deterring the uncontrolled growth of megacities and a condition for the formation of a stable equilibrium at the level of territorial
settlement systems. The relevance of small cities’ and their centers’ reconstruction is associated with the general problem of providing of their sustainable development, specifically, when social, economic and physical development is guaranteed for a long period by the presence of the entire spectrum of resources, including environmental ones.

The results presented in the research are aimed at identifying methodological approaches to urban planning reorganization of small city’s central historical zone using the example of Chistopol. In order to develop scientifically sound recommendations to identify key functional and spatial methods for the city’s central part reconstruction, a comprehensive analysis of the historical center was carried out, based on a multivariate territory’s current planning structure and development assessment, the results of which made it possible to reveal historical center characteristic features that determine the specifics of its architectural and urban planning situation. The presented design approbation illustrates the ways of applying theoretical conclusions in architectural and planning renovation of the small historical city central part using the example of Chistopol [27].

4 Conclusions

The developed comprehensive proposal for Chistopol’s central part functional and planning reorganization is based both on taking into account the necessary infrastructure changes and on preserving and developing natural and aesthetic attractiveness of the place, complemented by historical, cultural, national, sacred and other landmarks [28, 29]. One of the key methods of the reorganization is the transformation of the ordinary “linear” public city center into a spatially more developed “mesh” system by connecting objects and complexes that reflect the emergence of new city development points. The proposed center planning structure is formed by highlighting an enlarged grid of blocks, emerged against the background of an undifferentiated existing development system. Peripherally located tourist, recreational and pilgrimage objects, included in the structure of the new center, will not only expand city’s central zone territorial boundaries, but will also contribute to the development of related services – trade, catering, culture, transport and other facilities. Another applied reorganization method is providing the “connectivity” of the proposed new center spatially developed scheme by inserting intricacy public transport and differentiating city communications with highlighting the prevailing pedestrian traffic directions. It is proposed to define pedestrian directions as the main type of mobility corresponding to the type of “garden city” and organize the shortest and most comfortable pedestrian connections between the significant objects of the city center. The next method is the emphasizing new and existing public spaces – squares, pedestrian links, parks, gardens, micro-gardens and other landscaping that meet modern trends in landscape design, while maintaining the characteristic features of local culture and the small city scale. The green infrastructure of the center includes the creation of a developed linear landscaping system – boulevards and streets with comfortable areas for pedestrians, as well as the improvement of the “entrance nodes” in the surrounding the city water-green belt and forest tracts. By taking into account the interconnectedness of the combined into a single system various factors listed above, a new model of the city center formation is obtained. The model is more complex in aspect of functional and planning organization structure and emphasizing the idea of creating a full-fledged high-quality environment in a small city.

The presented Chistopol’s central part planning structure reorganization proposal, focusing on the sustainable development principle, suggests an approach to its implementation both in social and landscape-planning aspects. In terms of social sustainability, the goal is to reduce socio-spatial isolation at the urban level, to prevent residential environment degradation and segregation and to create conditions for the formation of community and cultural development of residents living in this area. The landscape-planning aspect, along with the preservation and restoration of natural systems and compensation for the consequences of anthropogenic activities, also implies a change in the mobility structure, namely, the environmentally friendly means of transport introduction and improvement of the communication spaces quality. In world practice, the direction of so-called “tactical urbanism” is becoming more and more relevant. Tactics implies small-scale actions necessary to achieve larger goals. Translating into the language of urban planning, tactical urbanism is an
approach to the urban settlements reorganization and development, using short-term, low-budget and relevant-scale strategies and policies, involving a wide range of socially active segments of citizens and managers of different levels. This approach creates conditions for more flexible urban spaces’ transformations, both new and existing, where the objects of tactical urbanism are “huge reservoirs of spaces not yet touched by the imagination” [30].

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