Effectiveness of the cluster approach for sustainable development of small historical towns and settlements of the Republic of Tatarstan

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Abstract. One of the key issues of modern architecture and urban development is the decline of urban life in small towns and settlements, which are experiencing the negative consequences of the new socio-economic reality. The urbanization process, characterized by rising large cities and mega-cities, is provided by an increasing influx of migration from small historical cities and settlements. However, small urban settlements, preserving features of historical architecture, natural attraction and provincial coziness, are important factors in restraining the uncontrolled growth of mega-cities and as a condition for the preservation of local culture and traditions of sustainable ecological balance of the regional settlement system. Obviously, the issue of integrated development of small historical settlements is coming to the fore. To solve this problem, the authors propose a cluster approach that effectively develops the architectural environment of such cities and creates attractive living and tourism environments. The purpose of the research is to develop a method of the cluster approach for sustainable development of small historical towns and settlements, aimed at a comprehensive transformation of their architectural environment while preserving valuable historical, cultural, and architectural heritage. The limitation of the research is the Republic of Tatarstan.

Keywords. Small historical town, cultural heritage, criteria, classification, typology, systematic development, cluster approach.

1 Introduction

A small town is an urban settlement with a population of up to 50,000 with the status of «city». A small historical city is a small city in the context of historical, cultural, and architectural heritage, having a material, intangible, natural, and sociocultural historical context. Such cities exhibit different patterns of citizens’ behavior that differ from residents in major cities. The citizen’s consciousness is transmitted by cultural and historical memory, traditions, and customs. At the same time, the architectural environment of such cities has a «cosy, home» view and allows to show monuments of history and culture together with low activity in such cities.
The diversity of small urban settlements in our country is due to their different historical origins: urban planning framework that has shaped the city, natural landscapes, local traditions and culture and transport logistics. Nowadays, there is a tendency to destroy of small urban settlements with their established structure and way of life in the Republic of Tatarstan.

Many small towns and settlements in the Republic of Tatarstan, in modern socio-economic conditions, lost their former development potential and now they are experiencing an outflow of socially active population; a lack of urban infrastructure development; loss of historical, cultural and architectural heritage. Many of these cities were created on the basis of historical settlements and, while continuing to develop, preserved the valuable building and planning structure of past centuries. There are sixteen cities in the Republic of Tatarstan which are characterized by historical features, natural potential, historical, cultural and architectural heritage and a preserved planning structure.

The problem of the growing needs of the modern population with the poor condition of small towns and settlements (streets, squares, service infrastructure) has a negative impact on the architectural environment where the requirements for the updating of the existing urban environment cross with the requirements for the preservation of valuable architectural and cultural heritage. Because of the issues outlined above in our research we offer to create special entities – clusters that have specific architectural-functional and spatial-planning characteristics that represent integrated models consisting of structural subsystems.

The cluster approach consists of effective interaction between the main structural subsystems. The application of modern approaches is reflected in the formation of each of the elements of the system. They create and transform the existing subsystems of the new territorial entity. It defines and requires the close interaction of the subsystems and ensures the functioning of the cluster as a new type of territorial entity capable of ensuring the sustainable development of the system as a whole and improving the quality of life of the population, while preserving historical background cultural and architectural heritage. This specificity is a hallmark of the cluster approach.

This research is based on scientific literature sources and domestic and foreign experience of urban transformations of small historical towns and settlements. There was reviewed modern methods and principles of organizing the development of small historical towns and settlements through integrated development [1-3].

A lot of researches are aimed at solving the problems of preservation of historical, cultural and architectural heritage [4-6] and adaptation of the historical environment in modern conditions [7-10]. Among the relevant tasks, the authors note the problem of transforming the centers of small towns and settlements that have preserved historically valuable buildings, the renovation of which should be aimed not only at improving the quality of the urban environment but also at preserving it.

Formation and developing transport and communication base is identified by researchers as an essential aspect of sustainable urban development [11]. The transport and communications base determines the efficient use of the territory’s resources. Today, the creation and development of transport infrastructure at the spatial planning level is relevant topic for many researches [11-13]. The study focuses on addressing issues of accessibility to public transport. At present, the passengers of small towns and settlements depend on the connectivity of the external transport and logistics framework, and in order to achieve high mobility it is necessary to focus on the development of this subsystem as an integral part of the cluster [14].

There is a study that explores the implementation of sustainable urban mobility and proposes a number of measures to improve the urban environment, with a view to reducing the influence of external transport factors. The nature of urban mobility causes significant
negative externalities, namely, emissions from individual transport to the atmosphere, thereby reducing the natural potential of cities [15].

Researchers are considering solutions to social and economic problems. Small towns and settlements are characterized by the development of functional zones with prospects for development in the economy while preserving the distinctive characteristics of local culture and the natural environment [16-19].

In study, the authors consider territorial (re)branding as a multidimensional design algorithm, including architectural and design solutions as a single strategic concept [20]. A significant number of studies are aimed at addressing the problems of housing development [21, 22] and the urban objectives of sustainable rural development [23-25].

An analysis of publications relating to the history of the formation and development of small towns and settlements in the Republic of Tatarstan revealed a lack of development of the topic. There are few materials on sectoral issues in the public domain [26].

The purpose of the research is to develop a method of the cluster approach for sustainable development of small historical towns and settlements of the republic of Tatarstan, aimed at a comprehensive transformation of their architectural environment while preserving of valuable historical, cultural and architectural heritage.

The objectives of the study are:
1. Identification of evaluative criteria the potential of small historical towns and settlements in the Republic of Tatarstan.
2. Establishment of a typology and classification of small historical towns and settlements on the basis of their territorial characteristics.
3. To establish the models for the sustainable development of small historical towns and settlements in the Republic of Tatarstan on the basis of the typology identified by the cluster approach based on the evaluation criteria.

2 Materials and methods

A comprehensive study was conducted to identify the predominant features of the structural organization of small historical towns and settlements in the Republic of Tatarstan and to assess the quality of their current condition and to determine the prerequisites for reorganizing sustainable development; including a multi-factor area analysis:

1. An analysis of the location of the historical zones of the municipalities of the Republic of Tatarstan, which was carried out in accordance with the criteria for the historical development of the settlement system and the concentration of cultural heritage objects, revealed five zones based on historical and cultural background: Kazan zone, Bulgar-Bilyarsk-Tetushy zone, Kamsk zone, Zone of «new» cities», South-east zone.

2. An analysis of concentration of cultural heritage objects in the municipalities of the Republic of Tatarstan, which was carried out on the basis of the quantity and quality of cultural heritage sites, showed that approximately 79 % of all State-protected cultural heritage (1.061 sites) are located in 11 municipalities. (Kazan, Arsky District, Buinsky District, Yelabuzsky District, Zainsky District, Zelenobolsky District, Laishevsky District, Mendeleevsky District, Spassky District, Tetyushsky District and Chistopolovsky District). In more than 50 % of the regions, the number of cultural heritage sites ranges from 1 to 15. There is no cultural heritage objects in the territory of 4 districts of the Republic (Aznakayevsky district, Bavlinsky district, Drozhzhaniyovsky and Yutazinsky districts).

3. Analysis of the transport framework of the Republic of Tatarstan, based on the location of main railway and waterways, roads and airways, ensuring the delivery of goods and passengers in all directions, has revealed that a strong economic growth band is forming in the area of major crossings (transport, water, air), the main centres of which are the cities of
Kazan, Zelenodolsk, Chistopol, Nizhnykamsk, Naberezhnye Chelny. Small historical cities and settlements, which are located near the growth belt, are more sustainable.

4. An analysis of the population of small historical towns and settlements in the Republic of Tatarstan, conducted between 1856 and 2021, showed that more than 56% of small historical towns and settlements had lost their population (Bilyarsk, Bulgar, Buinsk, Mendeleevsk, Menzelinsk, Sviyazhsk, Tetyushi, Aznakaevo, Zainsk, Kamsk Mouth). The smallest proportion of towns and settlements is characterized by small population growth (Laishevo, Mamadysh, Arsk, Bawly, Rainfa, Novoseshmynsk, Kamskoe Ustye).

5. An analysis of the dynamics of the tourist flow in the Republic of Tatarstan for 2014-2019 showed the increased by 30%. The annual rate of increase in the tourist flow in the Republic averaged 8 per cent. The number of foreign nationals who arrived in the Republic of Tatarstan in 2019 decreased by 3% compared to 2018 when the FIFA World Cup was held in the Republic.

6. An analysis of the existing recreational and tourist infrastructure showed that the Republic of Tatarstan has considerable potential for forming a tourist cluster, which has rich natural conditions and unique historical and cultural heritage, as well as a consistently high level of tourist visits, but the quality of recreational and tourist services is not sufficiently high.

3 Results

As a result of research conducted through analysis of maps and schemes (geographical, transport, historical, cultural and architectural, as well as tourist) The effectiveness of the cluster approach in the complex reconstruction of small historical towns and settlements of the Republic of Tatarstan has been revealed. The effectiveness of the cluster approach is reflected by the evaluation criteria given in fig. 1. The analysis identified the following criteria for the evaluation of small historical towns and settlements in the Republic of Tatarstan:

- Transport and logistical accessibility of the small historical settlement and the extent to which it is linked to the regional settlement system;
- Economic potential to attract tourism flows and promote investment in settlements;
- Geographical location in relation to specially protected and protected areas in order to maintain a sustainable natural and human balance;
- Historical and cultural potential and presence of architectural heritage, location of historical sites in the planning structure of the city;
- Population dynamics, growth, migration and outflow of the capable active population;
- Availability of employment as industrial and technological production and other employment.

Taking into account the peculiarities of the organization of small historical towns and settlements of the Republic of Tatarstan in the context of the historical and cultural heritage, the varying degree of involvement in the life of the spatial planning structure of the city, A typology and classification of small historical towns and settlements of the Republic of Tatarstan was developed.

Types of typology and classification (fig. 2):

1. Cities with historical and cultural heritage (cities with identified historical features, cultural heritage, historical and cultural potential);
2. Cities with identified natural potential (cities with protected sites, forests and lakes);
3. Cities with developed transport infrastructure (cities with identified centres of attraction, such as railway stations and stations, airports, shipping ports, etc.).
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On the basis of the identified typology and classification of small historical towns and settlements, the following models of the cluster approach for the organization of sustainable development of small historical towns and settlements of the Republic of Tatarstan are defined:

1. The historical and cultural heritage cluster model of the city given in fig. 3 provides:
   - restoration and reconstruction (cultural heritage, wooden architecture, street morphology);
   - archaeological research (exploration of the Territory, its historical, cultural and architectural potential);
   - territory branding (firm style of cities and settlements, marketing and promotion of cities and settlements, territory identity);
- cultural education (creation of tourist routes, promotion of folk art, arts-and-crafts);
- architectural and urban planning reorganization (development of social, transport, and tourist infrastructures);
- organizing informal urban communities of interest (holding festivals and holidays, creating volunteer movements).

![Fig. 3. Cities with historical and cultural heritage.](image)

2. The Urban Cluster Model with Identified Natural Potential, shown in fig. 4, provides:
   - Development of natural potential (identification and conservation of protected sites, habitats, geographical features such as lakes, rivers and forests);
   - Preservation of the previous ecological status of cultivation in a careful manner (restriction of water consumption, electricity consumption, use of biological materials);
   - Natural resource development (agriculture, livestock, farm organization and rural tourism);
   - Organization of communities of interest (organization of tourism and environmental festivals, creation of voluntary movements, involvement of charity);
   - Territory branding (the creation of the corporate style of cities and settlements, their navigation and introduction, marketing and promotion of cities and settlements, formation of territorial identity);
   - Architectural and urban restructuring (development of social, transport, and tourism infrastructures).

![Fig. 4. Cities with identified natural potential.](image)

3. The Urban Transport Infrastructure Cluster Model, shown in fig. 5 provides:
   - Development of industrial potential (organization of scientific, technical and human potential, production of products);
   - Development of transport potential (organization of transport corridors, development of the transport system and infrastructure and supply chain);
   - Development of the economic model (attraction of investment activities, innovative technologies and charity, development of the internal market, organization of economic incentives);
   - Territory branding (the creation of the corporate style of cities and settlements, their navigation and introduction, marketing and promotion of cities and settlements, formation of territorial identity);
   - Architectural and urban restructuring (development of social, transport, and tourism infrastructures).

![Fig. 5. Cities with developed transport infrastructure.](image)
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- Development of natural potential (identification and conservation of protected sites, habitats, geographical formations, such as lakes, rivers, and forests);
- Preservation of the previous ecological status of cultivation in a careful manner without excessive water consumption and restriction of electricity consumption and use of biological materials.
- Natural resource development (agriculture, livestock, farm organization and rural tourism);
- Organization of communities of interest (holding festivals and holidays, creation of volunteer movements, involvement of charitable organizations);
- Territory branding (the creation of the corporate style of cities and settlements, their navigation and introduction, marketing and promotion of cities and settlements, formation of territorial identity);
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The uniqueness of the cluster approach models as new territorial entities providing for the development of structural subsystems at a modern level lies in the close interrelationship of the four necessary elements of their structure – history, nature, economy, and infrastructure. A close relationship is achieved not only by the proximity of the elements, but also by their continuous structural functioning. The key to identifying the models of the cluster approach is the concentration of the functions of the elements and their interrelationships, their size and their somacity. Figures and tables, as originals of good quality and well contrasted, are to be in their final form, ready for reproduction, pasted in the appropriate place in the text. Try to ensure that the size of the text in your figures is approximately the same size as the main text (10 point). Try to ensure that lines are no thinner than 0.25 point.
4 Discussion

Small cities are intended to be one of the most important factors in curbing the uncontrolled growth of mega-cities and in building sustainable development at the territorial level. The relevance of integrated development of small towns and settlements is linked to the overall challenge of ensuring their sustainable development.

The results presented in the study are aimed at revealing the cluster approach in the complex formation of small historical towns and settlements of the Republic of Tatarstan. A comprehensive analysis of small historical towns and settlements, based on an assessment of the current state of the territory and its development, was carried out in order to develop scientifically sound recommendations for identifying key spatial and functional transformation techniques. From the analysis it was possible to identify a typology and classification of small historical towns and settlements, which determines the specificity of the architectural and urban situation. The presented models of the cluster approach illustrate ways of practical application of theoretical conclusions in small historical cities and settlements of the Republic of Tatarstan.

5 Conclusion

Therefore, in the territory of the Republic of Tatarstan small historical towns and settlements show a trend towards sustainability. A typology and classification of small historical towns and settlements, models of applying the cluster approach to each type of organization are presented. In all sustainable models, the concentration of functional elements and their interrelationships play a key role.

The research considered the cluster approach as a method combining instruments to ensure city-wide integrity, environmental sustainability and the preservation of valuable historical, cultural and architectural heritage of cities and settlements.

Therefore, the cluster approach is a highly relevant approach to the organization of sustainable development of small historical towns and settlements of the Republic of Tatarstan, with the presence of historical, cultural and architectural heritage in their environment, through the restoration and maintenance of their structural integrity, natural and historical value.

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