Potential of Buildings Creating High-Quality Urban Environment

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Abstract. The study deals with the problem of creating high-quality comfortable residential urban environment with the inclusion of residential buildings that have different space-planning structure. The analysis of objects built both in the middle of the last century and in the last 20-30 years is carried out. The research provides comparative assessment of these buildings and complexes that have a developed network of service functions in their structure. As a result, these buildings and complexes have a more significant impact on the creation of high-quality comfortable living environment. Due to the different impact of a building on the living environment, the authors propose to introduce such a concept as «typological potential of a building». Depending upon the impact on comfort and quality of the environment there are residential buildings with «negative», «zero», «small», «medium», «above-average» and «high potential».

1. Introduction
The problems of creating comfortable high-quality residential environment pose a rather difficult task for all specialists involved in making decisions on territory development of cities and various localities in order to create and include architectural and typological elements affecting its creation favourably. What are the main architectural objects that can be used to create modern environment and should it be homogeneous or different in terms of comfort and quality? What is the dependence of the urban residential environment being created on the socio-economic condition of the population, the inclusion and location of certain service functions in the residential environment, location of residence area, mutual influence of natural and climatic conditions on the quality and comfort of the living environment and a lot more? All over the world, both theoretical studies of this problem and practical developments of various buildings and complexes in architecture are being conducted actively. The assessment of the living environment comfort is carried out. Categories of living comfort for people of different age, lifestyle and national characteristics are defined. In addition, the problems of improving the comfort and quality of urban living environment in the existing built-up areas, as well as the environment in the newly created urban areas are considered. The study is devoted to defining the quality potential of residential buildings of different structure that should form and create comfortable modern high-quality residential urban environment. It is important to determine what potential the building being constructed or being designed may have.
2. Materials and methods
When solving this problem, a systematic approach is crucial in studying the architectural and typological potential of buildings that are different in function, space-planning structure and height. At this stage of the research, the task is to reveal the very understanding of the phenomenon of architectural and typological potential, determine its characteristics and values for the conditions of creating high-quality comfortable and, most importantly, modern residential urban environment.

To look at the problem means to highlight the main component of the living environment – residential buildings. Other types of service buildings that are usually free-standing architectural objects are not considered in this study. Due to their functional features they can be defined further at the level of residential areas. In addition, various districts of Samara were selected for studying and analyzing various types of residential buildings and residential urban environment. Special attention is paid to the areas the construction of which started in the middle of XX century. Since the 1990s, these areas have undergone and are still undergoing changes that modify the architecture of the buildings, the surrounding courtyard spaces and the living urban environment taken as a whole. Also, the study analyzes residential buildings in the city districts where active construction has been carried out in the last 25-30 years.

3. Results
Studying the problem of defining the qualitative and quantitative potential of buildings, a careful account is given to foreign and domestic experience in the construction, operation and design of residential buildings and complexes, including multifunctional ones that have a set of different service functions in their structure. Besides, the following documents related to the creation of high-quality and comfortable urban living environment in Russian cities in the period from 2019 to 2030 are analyzed: in particular, such a fundamental document as the program «Creation of comfortable urban environment» developed within the framework of the global national project «Housing and urban environment»; the methodology for forming and defining the urban environment quality index, approved on March 23d, 2019, No. 510-p; «Guidelines for determining priority areas for the development of urban environment using Urban Environment Quality Index completed by the Ministry of Construction, Housing and Utilities of the Russian Federation, DOM.RF and the design bureau «Strelka» in October 2020 [1].

Having analyzed the documents, the paper points out that the indicators of urban environment quality are grouped by six elements or spaces: «Street and road network», «Housing and adjacent spaces», «Public and business structure and adjacent spaces», «Social and leisure facilities and adjacent spaces», «Green spaces» and «Citywide space». When analyzing the space-planning structure of residential buildings or complexes abroad and in Samara, all six elements were considered, but special attention was paid to «Housing and adjacent spaces» as well as «Social and leisure facilities and adjacent spaces». According to previous surveys of city residents’ opinion these factors are considered to be the most attractive and have the greatest impact on the comfortable living in a particular residential building, complex or district.

From the previously made analysis on a number of high-rise buildings the authors point out some examples that show clearly the presence of service functions intended for residents that work and live in a particular high-rise building and complex and for transit visitors and guests. The others propose to have a look at some examples of high-rise residential complexes in Singapore and in Shenzhen (Chine) where problems related to the comfort and quality of urban living environment are taken care of successfully.

One Shenton is a residential complex in Singapore consisting of two residential towers (50 and 42 floors). The complex stands on the 8-storey stylobate housing a car parking (from the 2nd to the 7th floor) and having various service functions (on the 1st and the 8th floors) such as cafes, shops, swimming pools, gyms, recreation areas for adults and children, a library, a solarium, a laundry and a lot more. The complex residents can use all the service elements located both in the stylobate part and
in the structure of high-rise buildings. Only a small part of the complex is open for the so-called transit visit.

**Scotts Square** residential complex built in Singapore in 2010 consists of two residential buildings (of 35 and 43 floors) and a multi-storey stylobate. On several floors of the stylobate there is a shopping center with hundreds of shops and boutiques selling clothing, accessories, cosmetics, furniture, various interior items, food, several restaurants, cafes and so on. A multi-level car parking is designed for residents and visitors of the shopping center.

A new approach to creating high-quality modern comfortable living environment is observed in the multifunctional complex **Shum Yip Upperhills** built in Shenzhen (figure 1). The complex includes offices, a hotel, apartments, residential and public spaces located on a podium, which is a kind of a platform. The complex has all service elements necessary for convenient and comfortable life of people. The podium structure houses a variety of retail premises, a trade and exhibition center, a theater, restaurants, cafes, sport facilities, social areas, a huge car parking, etc.

![Figure 1. Multifunctional complex Shum Yip Upperhills, Shenzhen.](image)

Having analyzed the foreign experience in the construction of residential buildings and complexes with service functions, it should be noted that the density, intensity as well as the composition of functional elements depend on the number of people living in them. The higher the density of people living on 1ha, the greater and wider the range of functional elements located in the structure of buildings and complexes. Naturally, the number of residents depends directly on the number of floors [2-10].

If low-rise residential buildings in Russia and abroad are considered, it can be noted that there are no cultural and consumer services built into residential buildings. Small intersperses of service functions on the first floors of medium-rise and multi-storey residential buildings can be found but as a rule they do not solve everyday problems of residents living in these houses. But the desire to introduce service elements into previously built residential medium-rise and multi-storey buildings can be observed in various cities of the world, including Russia. Here are some typical examples of the conversion of the first floors of residential buildings for service functions on the example of Samara (Russia).

After 1990s, the changes in the political course of Russia affected all aspects of society life, including the socio-economic one. The global privatization of the housing stock was carried out. The ways for the development of small businesses were opened. Service elements began to appear on the first floors of residential buildings. All this led to the fact that the business began to buy apartments on the first floors from those who wanted to sell them, and instead of apartments made shops, pharmacies, office space, etc. (figure 2). In this regard, as noted above, the construction of 50-70s of XX century was analyzed. It is claimed that the districts located along the main streets of the city began to change their look, the structure of residential buildings and the quality characteristics of urban environment.
Having analyzed deeply the functional composition of mainly medium-rise residential buildings deeply, a number of positive and negative aspects of this phenomenon should be noted. Residents living next to the residential buildings where grocery stores and pharmacies are housed note that it is very convenient. But the set of service facilities necessary for life, which are built into the first floors of 5- and 9-storey residential buildings, does not quite meet the requirements of residents living both in these houses and nearby. As a rule, the range of services does not correspond to what is needed by the residents of a particular area. Regulatory requirements for loading goods are violated. There are no loading platforms. Sanitary and sometimes fire regulations are not observed. There are no ramps for low-mobility groups of people.

Unfortunately, the same disadvantages are found in residential multi-storey buildings built in the last 25-30 years. They either have no social and cultural facilities or, if they are provided on the first floors, they have a limited composition and small areas. At that their nomenclature does not correspond to the needs of the house and the area residents (figure 3). Touching upon the problem of indoor parking, including underground parking, it is necessary to note their complete absence. A number of residential complexes, in which several hundred apartments are located, have in their structure covered parking garages designed for 10-15 cars only. There are no organized parking lots. People living in residential buildings are forced to leave their cars along the roads and inside residential areas that does not create high-quality living environment.

4. Discussion
As a result of a comprehensive analysis of residential and multifunctional buildings and complexes, a number of typological features were identified. They have different impact on the creation of
residential urban environment depending upon their space-planning structure. Therefore, it is possible to identify residential buildings and complexes that influence much and increase the comfort and quality of urban living environment as well as to identify houses that do not have any influence and the houses affecting the creation of this environment negatively. In this regard, the authors propose to introduce the concept of «typological potential of a building». The potential of a residential building or complex should be considered as a created charge, reserve, opportunity to impact on the creation of high-quality comfortable living urban environment.

Depending on the significance of the influence of certain residential buildings and complexes on the creation of comfortable high-quality living environment, the authors propose to introduce several categories of assessing the potential of certain buildings. In this research the authors rank residential buildings by the potential volume from the lowest value to the highest: «residential buildings with negative potential», «residential buildings and complexes with zero potential», «residential buildings and complexes with low potential», «residential buildings and complexes with medium potential», «residential buildings and complexes with above-average potential» and «residential buildings and complexes with high potential». Naturally, the potential assessment of buildings and complexes is conducted in points, then the rating is determined by the summation system. The potential of a residential building or complex is taken into account not only by the presence of service functions, but also by other indicators that should have a favorable impact on a person living in the artificially created urban environment.

For example, when assessing a residential building according to the category «availability of functional service elements», there may be no such objects in its space-planning structure. If there are no such objects or when operating the objects violate the current regulatory requirements the building will have the status of «a residential building with zero potential» in this category. Violations of regulatory requirements can be observed, as noted above, in residential buildings in which the first floors are adapted to various service functions. There can be seen the lack of ramps for the low-mobility category of people and violation of sanitary standards.

5. Conclusion
Based on foreign and partly on domestic experience, it should be noted that to create residential environment with full range of service functions is possible only by including a sufficiently powerful platform called a stylobate part in the building structure, often with the inclusion of underground space. But the construction of a stylobate is possible only when the number of people living in residential buildings or complexes increases. This leads to the development of high-rise construction in cities. Here it should be claimed that it refers not to multi-storey buildings or high-rise buildings but to the buildings of over 75m that are considered to be high-rise according to the classification adopted in Russia.

The existing negative attitude towards high-rise buildings in Russia leads to underestimation and misunderstanding of their impact on the creation of comfortable high-quality urban living environment. All over the world, there is a search for new typological structures of residential buildings, where they try to take into account the impact of adverse factors on a person and create a certain protection for his comfortable life. Natural and climatic factors, their global changes, environmental problems, diseases, including COVID-19, pose serious challenges to modern society, including architects in finding new approaches to the creation of modern residential urban environment. It is necessary to abandon the construction of multi-storey buildings in cities that do not create and will not create comfortable high-quality living environment in the future.

By using the methodology of defining comfort and quality characteristics of the living environment by «typological potential of buildings» will allow to assess the impact of a particular object on the living environment and on its quality. This will make it possible to assess the architectural significance and most importantly the impact of any building on the urban environment development.
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