

STRUCTURAL FEATURES OF RESIDENTIAL BUILDINGS IN MODERN UKRAINIAN CITIES, BASED ON THE EXAMPLE OF ODESA CITY

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Abstract. The article is devoted to Ukrainian cities that are very different in their history, size, functions and architecture. In the period of crisis and almost complete halt of new housing construction and critical resource limitation, the most promising approaches for the development of residential areas are those that use existing housing structures and available resources. One of the most advanced areas is the use of existing housing structures. Instead of building a new housing stock with new networks and infrastructure, it is possible to develop and compact the existing housing stock (both historical and Soviet), thus reducing the amount of old housing stock and increasing the number of available square metres of housing for city residents. Each city has its own specific history and background, as well as housing structures that were formed at different times.

The history of the formation and structural features of the residential development of Odesa city have been studied, so it is important to understand it in the general typology of Ukrainian urban settlements. The main criteria for dividing urban settlements into the types are the following factors: city size, number of residents, historical background, planning structure and functional content.

The structural features of the residential development of modern Ukrainian cities are studied, the characteristic features and their impact on the development of residential development are identified. The development strategy for Odesa residential areas has been proposed to create a high-quality high-density living environment in historic cities.

The purpose of this paper is to study the structural features of the residential development in modern Ukrainian cities, to determine their characteristic features and influence on the development of the residential development on the example of Odesa. The materials for this study are the structural features of residential development in modern cities. In particular, the impact and consequences of the crisis period on the housing infrastructure and the city structure are considered in order to understand better the crisis contribution to the formation of the modern city. The combination of the research results of the available material base and theoretical foundations of the structural features of residential development in modern cities became the main methodological basis of this work.

Keywords: residential development structures, crisis periods, residential development of modern Ukrainian cities, formation of a modern city.

Introduction. Ukrainian cities are various in their history, size, function and architecture. Each city has its own specific history and background, as well as housing structures that have developed over time. The complex interaction between social, economic, technological and cultural factors in the formation of the urban environment reflects the crisis periods' effect on the development of residential buildings in modern cities. The main type of residential building is apartment houses with different number of storeys. Country houses, both traditional and cottages for the construction in the suburbs and towns, and multi-storey buildings for the construction in the heart of a large city – all of these are housing.

Analysis of recent researches and publications. Many foreign scientists have studied the structure of the residential development. The comprehensive approach to the design of multi-comfortable urban space in the conditions of high density of Milan was studied by O.S. Burukhina, V.S. Tsarkova and I.N. Maltceva [1]. The modernisation and renovation of a school building in the

Old Town with a high population density was demonstrated by Zhiyuan Chen et al [2]. The technical problems of residential construction were examined by Beata Nowogońska and Jerzy Cibis [3]. Irina Maltseva et al paid attention to mid-rise atrium residential buildings [4]. S. Rachmayanti et al developed the criteria for designing the architectural composition of residential areas [5]. Yunxi Bai et al studied the attractiveness of housing in the compact urban areas on the example of Hong Kong [6]. The innovative approaches in the period of mass industrial development on the example of the residential areas of Kharkiv were studied by O. Buriak et al [7]. I. V. Ladigina and A. O. Rudenko analysed the peculiarities of the formation of a systematic approach in the national urban planning [8]. The problems and potential of creating livable public spaces in the historical centres of small towns in Slovakia were shown in the research of Katarina Kristianova and Agnieszka Jaszczak [9]. Tomasz Bradecki et al developed the models for the experimental high-density housing [10]. The main trends in the architecture of modern residential complexes in the market conditions of Kyrgyzstan were studied by Kozhobaeva Saltanat Tolonbaevna [11].

Problem definition. To study the structural features of the residential development of modern Ukrainian cities, to determine the characteristics and impact on the development of residential development. To create a high-quality high-density living environment in historic cities, to develop a strategy for the development of Odesa residential areas.

Purpose and objectives. To study the structural features of the residential development in modern Ukrainian cities, to determine their characteristic features and impact on the development of residential development.

Materials and research methods. The materials for this study are based on the structural features of residential development in modern cities. In particular, the impact and consequences of the crisis period on the housing infrastructure and city structure were examined in order to understand better the crisis contribution to the formation of the modern city. The combination of the research results of the available material base and theoretical foundations of the structural features of the residential development in modern cities became the main methodological basis of this work.

The main part. The article investigates the history of the formation and typology of the housing structure of Odesa, so it is important to see it in the general typology of Ukrainian urban settlements, which is shown in Figure 1. The main criteria for dividing the urban settlements into the types are the following factors: the size of the city, the number of the residents, historical background, planning structure and functional content.

Odesa in the general typology of Ukrainian cities. According to the general typology (Fig. 1), which is shown in the diagram, Odesa is a one-million city with a history dating back to the Greek colonies (6th century BC), but the city itself (its modern part) was formed after Khadjibey (the old name of the city) came under the control of the Russian Empire. It was at this time that the combined planning structure of the city was formed, consisting of two block nets that intersect at the angle. Odesa is a multifunctional regional centre, Ukraine's largest commercial port, tourist and cultural centre.

The city has been formed for several historical periods. The history of Odesa begins in the 6th century BC with the Black Sea Greek colonies. The first mention of the city as Khadzhibey or Kotsyubey dates back to the 14th century. In the 15-18th centuries, Khadjibey was controlled by the Osman Empire. In 1791, Khadjibey joined the Russian Empire. In 1795, according to the order of Catherine II, Khadzhibey was renamed to Odesa.

Since 1991, the city has been the part of independent Ukraine. Nowadays, Odesa has a combined general layout, as it consists of two parts – the historical (1803-1875) and the new territory, which is being formed since the Soviet era to the present day.

Odesa during the full-scale invasion of 2022-2024. There are many types of crisis periods that affect city development [12]. Military operations are one of the most destructive types of crises. Most often, the consequences of military conflicts in the cities are the destruction of infrastructure and housing stock.

TYPOLOGY OF UKRAINIAN CITIES

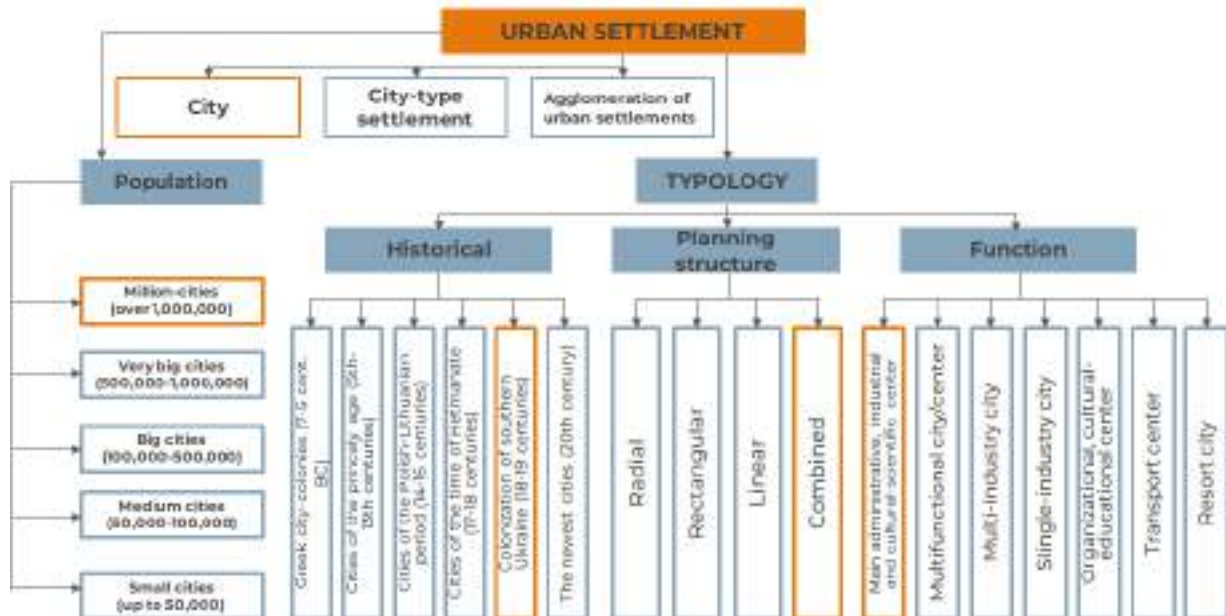


Fig. 1. Typology of modern Ukrainian cities. Odesa is marked in orange

In 2022 – 2024, Odesa (Fig. 2) faced the significant destruction and changes in the city development. The main and most significant consequences of the military operations were:

- mass migration – the departure of the local population to safer areas or abroad;
- refugees from the occupied or frontline cities;
- destruction of housing stock;
- destruction of infrastructure facilities;
- destruction of cultural heritage sites;
- full or partial halt of the construction of new residential and infrastructure facilities;
- partial "closing" of the city for the citizens with military purposes;
- halt of large-scale urban projects.



Fig. 2. Photography of the public space near the Opera House in Prymorskyi district, Odesa, March 2022

The location of the city close to the front line (Fig. 3) is the factor that directly affects the formation of the residential development in modern Ukrainian cities. The most important factor that impacts on the development of urban residential development is the number of the residents and their increase due to the urbanization. During the military conflicts, a large number of temporarily displaced people can have both positive and negative impact on the structure and development of the housing.

Modern Ukrainian cities can be divided into three main categories:

1. Frontline cities and towns, located directly on the contact line, are the most dangerous for the citizens and the most damaged communities.

2. Cities and towns close to the frontline, located up to 100 km away, are safer for the residents than the first category, but are also regularly destroyed.

3. Back cities and towns are the safest and most isolated cities, they are also damaged, but much less frequently than the first two categories, the main feature is the large number of new residents – temporarily displaced people.

According to the diagram (Fig. 3), Odesa belongs to the second category, which significantly affects the development of existing and new residential buildings.



Fig. 3. Typology of Ukrainian cities depending on their location near the contact line

Features and typology of the residential development structure in Odesa. In order to comprehensively analyze the structural features and characteristics of residential development in Odesa, it is necessary to examine the historical context first. Since this factor has had the greatest impact on the structure and condition of the modern housing stock. Figure 4 shows the urban planning analytical diagram "Main periods of housing stock formation in Odesa".

Depending on the period of formation, the examination of Odesa identifies four main types of the residential development structure (Fig. 4):

1. Historic block high-density residential development (historic city centre).
2. Low-rise block development (areas that were formed as the suburbs of Odesa in the XIX century).
3. Medium – and high-rise Soviet residential buildings.
4. Modern multi-storey residential development.

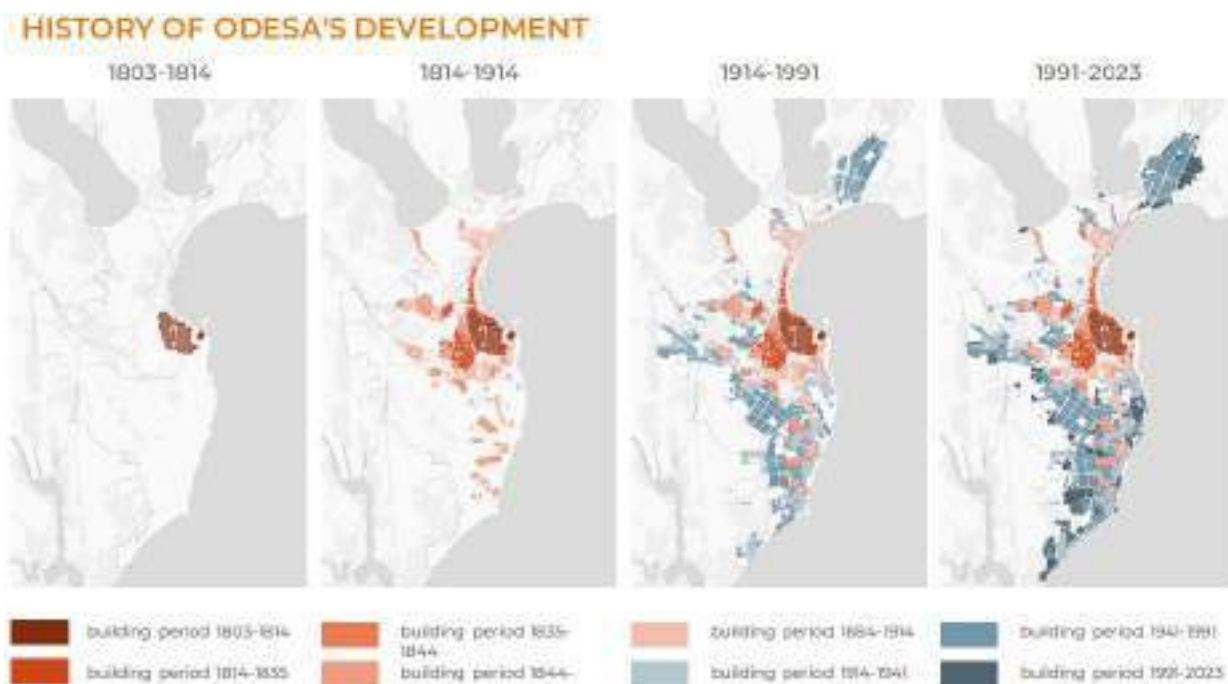


Fig. 4. Town-planning analytical scheme "Main periods of housing stock formation in Odesa"

The city's general plan shows that the residential structure of these periods has different densities, the number of storeys, the typology of the apartments, and the shape of the buildings in the plan (Fig. 5).

Thus, fundamentally different living environments were formed with the different scales in relation to the residents, comfort level, infrastructure and features.



Fig. 5. Diagram "Main structures of residential development in Odesa"

Specific features of different residential structures in Odesa. Depending on the time of its formation and location, each type of housing structure is special and unique. The characteristics of the main four types of residential structures are listed below and shown in Figure 6.

1. Historic high-density block housing development (historic city centre).

During the period of 1803-1905, Odesa experienced significant economic and cultural development, which was reflected in the town planning and architectural appearance of the city centre.

THE MAIN STRUCTURES OF RESIDENTIAL DEVELOPMENT



Fig. 6. Specific features of different residential structures on the example of Odesa

The residential buildings of this period are mostly made in such styles as Neoclassicism (the main features of which are traditional strict forms and colonnades) and Historicism (many buildings were made with the elements of Gothic, Renaissance, Baroque and other historical styles).

The first residential buildings had up to 2 floors, but later, with the development of the economy and population growth, the multi-storey buildings began to appear in Odesa. They had the balconies, large windows and ornaments on the facades.

A distinctive feature of the residential development of this period was the format of an apartment building, which provided for entire houses to be rented to different citizens.

This period is one of the most important for the formation of Odesa's urban structure, and its architectural solutions determined the city's appearance and cultural heritage over the years.

2. Low-rise block development (the areas that were formed as the suburbs of Odesa in the nineteenth century).

The suburbs were developed along with the residential development of the central part of the city in 1844-1905, and were formed by a regular rectangular low-rise block structure.

The blocks, which were originally formed as the summer cottages or country houses, are now an organized residential structure in the heart of the city. Such districts are for example Slobodka or Moldavanka.

The architecture of the residential buildings is stricter, there are less historicist façades with the details and ornaments.

The number of the storeys in the residential buildings of this period is usually 1-2 floors, and the buildings with the height of 3 floors are less common. Such buildings often have a small adjoining territory, and one house can be divided into several apartments.

3. Medium – and high-rise Soviet residential buildings.

During the Soviet period, most of the housing stock of modern Odesa was formed. This development has a special structure, characterized by a large-scale and integrated approach to the urban planning and ideology.

As a part of Soviet industrialization and the planned economy, massive construction of residential complexes was actively carried out. These were mostly multi-storey apartment buildings (9–16 floors, as well as 5-storey buildings) designed to accommodate a large number of the residents. The number of the storeys of the buildings depended on the period of the construction.

Many architectural solutions were standardized in the interest of saving resources and speeding up the construction process. This included the typical district layouts, building plans, apartment formations, façade elements, and general architectural forms. The residential structures of this period are easily recognizable on the city's general plan due to the large size of the buildings, the spacing between them, and the general appearance of the neighborhoods. In its ideology, Soviet society aimed at the social homogeneity, and this was reflected in the residential complexes, where the variety in housing standards and infrastructure was limited [13].

The residential areas were planned with a focus on the functional zoning, including the location of residential buildings close to schools, kindergartens, shops and other necessary infrastructure.

The development of city-wide plans and infrastructure was based on the needs of the city as a whole. The location of the main arteries and service facilities was determined by the need to provide the population with the necessary services. However, this comprehensive approach often ignored the human scale and the need for visual identification of buildings.

4. Modern multi-storey residential development.

The formation of the residential development in modern Ukraine is a complex and comprehensive process. During this period, the different types of residential development were formed, such as multi-storey apartment buildings and complexes, cottage complexes, mid-rise residential development, multifunctional complexes and apartments [14, 15].

Nowadays, Odesa has a new residential real estate market, but due to the war, a very small number of new projects are still being built.

The main characteristics of modern residential development in Odesa are the following:

- multi-storey buildings;
- infill development;
- change of the apartment typology and reduction of the gross floor area;
- mixed architectural style;
- lack of a comprehensive housing strategy when implementing new projects.

New housing projects often overload the existing infrastructure of the city and break the current state building codes. In Odesa, one of the most difficult problems in housing implementation is the connection between the authorities, developers, and city residents.

The composition of the housing stock.

Thus, the modern housing stock of Odesa (Fig. 7) in percentage ratio consists of:

- 23% – historical buildings of the Russian Empire period;
- 12% – early Soviet residential development until the 1950s (Stalinist period);
- 47% – Soviet panel housing development;
- 16% – modern residential development ("new" housing stock).

It should be noted that one of the important characteristics of the building is the condition of its structures and networks. At present, 1.5% of housing in Odesa is in a state of disrepair, and 0.8% is in a state of emergency.

The most important factor is that the largest share of the gross housing stock is made up of Soviet panel buildings constructed in the period 1960-1990 – 30%.

Conclusions and prospects for further research. Consequently, Odesa, as a modern city with a historical background, has a mixed housing structure formed during different historical periods, with different characteristics and specific features.

At present, considering the current social and economic prerequisites, the housing structure of Odesa is developing very slowly, in comparison with more secure large cities (Lviv, Ivano-Frankivsk, etc.), it is almost in a state of stagnation due to the destruction during the wartime and the outflow of city residents.

In the period of crisis and almost complete halt of new housing construction and critical resource limitation, the most profitable approaches for the development of residential areas are those that use existing housing structures and available resources. One of the most profitable areas is the use of existing housing structures. Instead of building a new housing stock with new networks and infrastructure, it is possible to develop and compact the existing housing stock (both historical

and Soviet), thus reducing the amount of dilapidated housing stock and increasing the number of available square meters of housing for city residents.

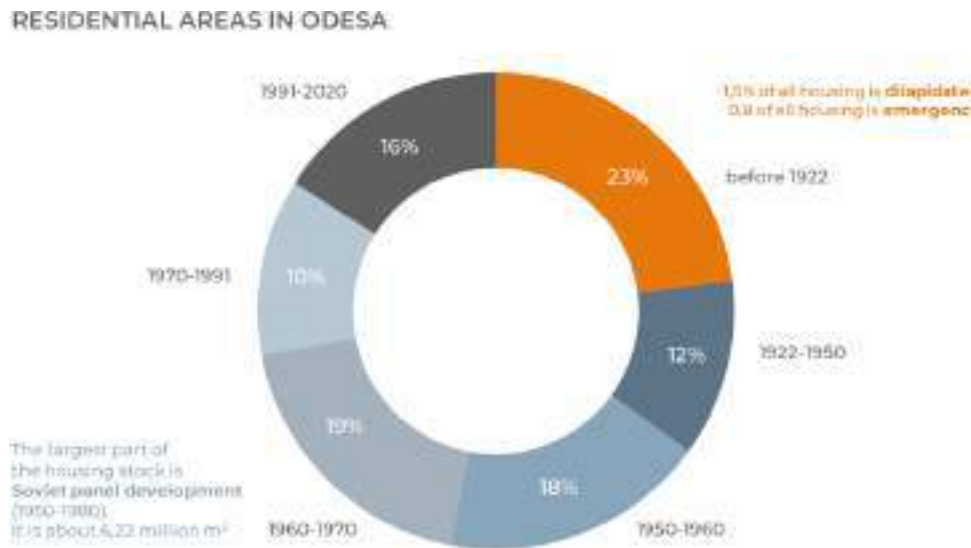


Fig. 7. Composition of Odesa housing stock in 2024

The development of cities and housing structures is an endless process, as the residents need the accommodations today, especially during powerful crises. That is why new approaches to formulating a city's housing strategy are an important part of the work for both the authorities and developers.

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ОСОБЛИВОСТІ СТРУКТУРИ ЖИТЛОВОЇ ЗАБУДОВИ В СУЧАСНИХ УКРАЇНСЬКИХ МІСТАХ, НА ПРИКЛАДІ М. ОДЕСА

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Анотація. В статті розглянуті українські міста, які різноманітні за своєю історією, розмірами, функціями та архітектурою. В період кризи та майже повної зупинки нового житлового будівництва та критичної обмеженості ресурсів найбільш перспективними для розвитку житлових територій є підходи з використанням вже існуючих житлових структур та доступних ресурсів. Одним з перспективних напрямків є робота зі сформованими житловими структурами. Замість будівництва нового житлового фонду з новими мережами та інфраструктурою, можна розвивати та ущільнювати існуючий житловий фонд (як історичний так і радянській), таким чином можливо зменшити кількість ветхого житлового фонду та збільшити кількість доступних квадратних метрів житла для мешканців міста. Кожне місто має свою особливу історію формування та бекграунд, а також житлові структури, сформовані в різні часи.

Досліджена історія формування та особливості структури житлової забудови саме міста Одеса, тому для загальної картини важливо побачити його в загальній типології українських міських поселень. Основними критеріями для розподілення міських поселень на типи є такі чинники, як: розмір міста, кількість мешканців, історичний бекграунд, планувальна структура та функціональне наповнення.

Досліджено особливості структури житлової забудови сучасних українських міст, визначені характерні особливості та їх вплив на розвиток житлової забудови. Для створення якісного житлового середовища високої щільності в історичних містах, розроблено стратегію розвитку житлових районів Одеси.

Метою даної роботи є дослідження особливостей структури житлової забудови в сучасних українських містах, визначення їх характерних особливостей та вплив на розвиток житлової забудови на прикладі м. Одеса. Матеріалами для проведення даного дослідження є особливість структури житлової забудови у сучасних містах. Зокрема розглянуто вплив та наслідки кризового періоду для житлової інфраструктури та структури міст, щоб краще зрозуміти внесок, який роблять кризи у формуванні сучасного міста. Поєднання результатів досліджень наявної матеріальної бази та теоретичних основ особливостей структури житлової забудови у сучасних містах стало головною методичною основою даної роботи.

Ключові слова: структури житлової забудови, кризові періоди, житлова забудова сучасних українських міст, формування сучасного міста.

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