

Modern Classification of Mixed-use Residential Complexes

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Abstract The relevance of the research topic is that the placement of mixed-use residential complexes in large cities plays a vital role in spatial planning from a combination of a large number of functions, which are the basis for the improvement of the settlement, taking into account the needs of the population. The purpose of this study is to form a classification of mixed-use residential complexes and their architectural and planning structure on the basis of Astana, the capital of the Republic of Kazakhstan. The authors used a set of general scientific research methods, in particular: factual analysis, synthesis, generalization, induction, abstraction. The article analyses the role of mixed-use residential complexes in modern conditions of active urbanization. The necessity of modernization of complex plans of existing residential areas is grounded. A number of problems in the field of normative regulation of urban planning norms and standards is characterized. Modern trends affecting the formation and classification of mixed-use residential complexes of cities in the Republic of Kazakhstan were substantiated. A number of factors justifying the essence of the concept of "mixed-useity" were determined. A group of basic urban planning principles, which are taken into account the formation of residential complexes, was analysed. The modern classification of mixed-use residential complexes was defined by the example of the city of Astana. The general classification of mixed-use residential complexes takes into account all the external and internal factors of a large city, not only the norms of architectural and planning structure. This research provides a valuable foundation for future research in urban planning and architecture, with the potential to

inform policy and practice in cities both in Kazakhstan and globally.

Keywords Urban Development, Planning and Architectural Solutions, Astana, Typological Composition, Classifier of Residential Developments

1. Introduction

Efficient and rational spatial organisation of a mixed-use housing complex is a tool for smart urban management. Thanks to this, it is possible to make prompt decisions to ensure the life of the complex population in any sphere: education, medicine, engineering and transport, sanitary and epidemiological well-being, fire safety. It is important to note that strategic spatial planning of the territory allows to create and more effectively attract investment programmes and projects. The modern urban planning features of the capital city of the Republic of Kazakhstan, Astana, are characterised by processes of improvement of the territory and adaptation to the needs of modern human settlements, which consist of an active growth of entrepreneurial potential combined with comfortable living conditions for the population. Such positive shifts are due to an increase in gross regional product figures because of the successful implementation of various business projects valued at around 2.5 trillion tenge, and as a result of the financial reserve to address urgent issues of innovative urbanisation. In the report of the Mayor of Astana, Altai Kulginov, the need for a defining economic sector of

construction was emphasised. In particular, it spoke about objects of social needs and mixed-use housing complexes [1].

Regulatory and standardisation issues of modern classification of mixed-use residential complexes, which are designed for specifically defined purposes and the needs of all categories of the city's population, remain important. The legal and organisational problems of incomplete construction remain unresolved, which precludes their further exploitation. However, the authorities are developing and implementing forward-looking plans to address the problem of owner-occupied housing, stating that it is a priority. S.M. Otepbergen [2] analyses the underlying principle of modernising the integrated plans of established and designed mixed-use complexes. The author points out that the modern construction of complexes is characterised by fragmentation due to an unformulated system of architectural and planning structure. A.S. Galimzhanova and B.B. Berikbosynov [3] consider the experience of European countries in the formation and implementation of construction projects of mixed-use residential complexes. The authors substantiate the functioning of all elements of the complex, in particular the advantages and disadvantages, which confirms the need for research and implementation of international experience of safe, comfortable residential complexes in major cities of the Republic of Kazakhstan.

A. Mutaliev and K.I. Samoilov [4] investigate Kazakh and international experience in implementing effective methods of resource and energy efficiency in the operation of mixed-use complexes. At the same time, energy efficiency improvement processes must be harmoniously connected with the environment. It is talking about the introduction of the so-called "green infrastructure". A.O. Ospanova [5] considers the influence of socio-economic factors on the formation of mixed-use housing complexes. The author considers the needs of different categories and strata of the population, which should be organically combined through service and recreational functions of a

particular residential complex. T.V. Karakova and G.A. Karabaev [6] investigate approaches to the formation of comfortable centres of social activity of the population by creating an indoor architectural environment integrated into the urban structure and ensuring a favourable microclimate. And yet, in the scientific literature the issues of normative regulation of classification of mixed-use housing complexes in the settlements of the Republic of Kazakhstan remain insufficiently investigated in the context of formation of industrial competitive specialization of the region, economic growth, infrastructure development, availability of education, healthcare, conservation of natural resources and improvement of the environment, as well as effective use of land resources.

The purpose of the article is to justify the general classification of residential complexes, taking into account all the external and internal factors of a large city, not only the norms of architectural and planning structure.

2. Materials and Methods

The scientific research was based on the strategic approaches to rational spatial planning, their concepts and categories, as well as the basic principles of modern theory of architectural composition. As a methodological basis applied theoretical scientific methods of knowledge, based on a systematic approach to the solution of the problem. In particular, scientific works of authors from Spain, USA, Germany, Poland, Malaysia, Bangladesh, Jordan related to research in the field of formation, classification of the main elements and objects of mixed-use residential complexes within large cities to ensure comfortable living standards and accessibility to all important infrastructure facilities. Work has also focused on improving the classification of complexes, taking into account the shortcomings and defects in the functioning of already implemented complexes. A set of general scientific research methods was used to achieve the research objective (Table 1).

Table 1. Research methods for achieving the goal of the study

Method	Description
Synthesis	Development of scientific works on the problems of formation and classification of mixed-use residential complexes in the context of not only urban planning norms and standards, but also taking into account the development of infrastructure facilities and extensive transport system, management of the processes of formation of landscaping and effective spatial planning.
Factual analysis	The role of mixed-use housing complexes in the current context of big-city development and the particularities of the modernisation of integrated housing schemes implemented within the city structure.
Generalisation	The main problems in the field of normative regulation of urban planning norms and standards; current trends affecting the formation and classification of functional residential complexes in large cities; a number of factors substantiating the essence of the concept of 'mixed-useity'.
Induction	A group of basic urban planning principles considered in the formation of housing complexes; modern classification of mixed-use residential complexes using the example of the city of Astana.
Abstraction	A general classification of mixed-use residential complexes that takes into account all the external and internal factors of a large city, not just the norms of the architectural and planning structure.

Source: compiled by the authors.

The research and further writing consisted of several stages. The first stage considered the essence of the concept of mixed-use housing complexes in the structure of the integrated spatial organisation of the city. It also substantiated the necessity of modernization of existing residential areas and increasing the level of improvement of the region through the improvement of social, transport, medical, educational, business, tourism and recreational infrastructure.

The next step was to analyse the specific components that are determinative in forming the classification of mixed-use residential complexes. In particular, the main problematic issues concerning the regulation of all architectural and planning solutions and the landscaping of settlements were highlighted. The third step was to identify and characterise the current trends affecting the formation and classification of mixed-use residential complexes. Factors reproducing the notion of 'mixed-use' residential complexes were then identified.

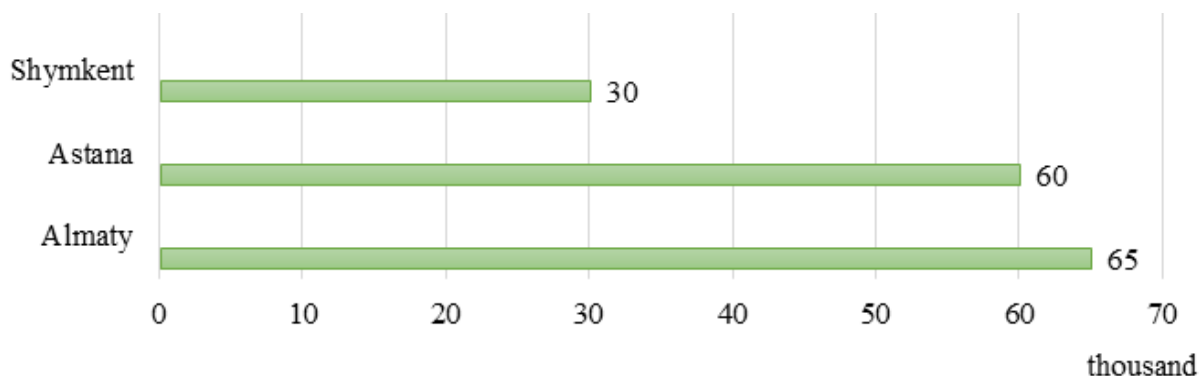
The penultimate step was to define and justify in detail a group of basic urban planning principles. In particular, the basic elements within a holistic system of human settlement functioning were identified, according to which the classification of mixed-use residential complexes should be updated. The last step was to define a modern classification of mixed-use residential complexes using the example of the city of Astana. A general classification of mixed-use residential complexes, which takes into account all external and internal factors of a large city, and not only the norms of architectural and planning structure, was justified.

3. Results

The role of mixed-use residential complexes is decisive in the current context of active urbanisation. After all,

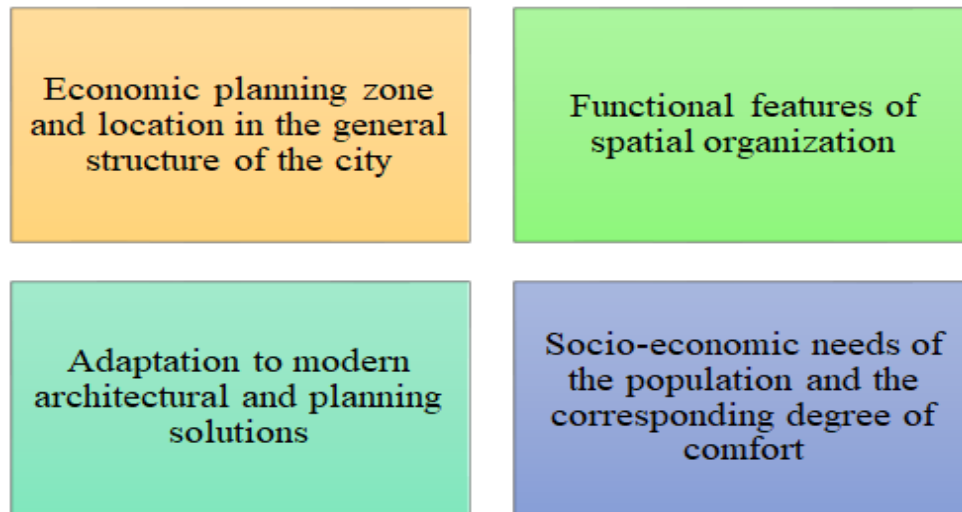
according to recent studies, the annual population growth in large cities of the Republic of Kazakhstan, starting in 2019, is 4.7% (Figure 1). In particular, such complexes are an indispensable element in the implementation of effective spatial organisation solutions that provide all the needs of citizens from the working zone to recreation.

Along with the development of new projects of large-scale construction of mixed-use residential complexes, the issue of improving the areas of improvement of existing residential areas remains. The Astana Urban Planning and Architecture Department aims to upgrade the integrated development plans of residential areas through the improvement of social, transport, medical, educational, and entertainment infrastructure, thereby equating them to modern projects of mixed-use residential complexes. In other words, effective spatial organisation and good spatial planning remain important factors. Although in an already built-up area it is much more difficult to provide all the conditions for improvement. That is why the master plan of development of the city should initially take into account all future plans for the modernization of the city, as well as the reservation of land for the future needs of the population and the formation of mixed-use housing complexes. In Astana, as in other large cities of the Republic of Kazakhstan, there is a problem of unregulated classification of mixed-use residential complexes. This issue is extremely important because it is the classes of residential development that determine the main parameters, location, appropriate level of comfort, configuration and area of development, transport accessibility, facilities of various sectors of infrastructure, which are the key to the same mixed-use of the complex [1]. The classification of functional residential complexes is formed on the basis of a number of components (Figure 2).



Source: compiled by the authors on the basis of [1].

Figure 1. Weighted average annual population growth rates for the major cities of Kazakhstan



Source: compiled by the authors on the basis of [7].

Figure 2. The components that are integral to the formation of a mixed-use residential complex classification

According to the housing development programme of the city of Astana, which started in 2019, a number of problems have been identified regarding the regulation of basic building rules and standards [1], namely:

- unreasonable allocation of the legal and regulatory framework governing building features through specific standards;
- the basic differences and essence of the concepts of "apartment complexes" and "mixed-use housing complexes" are not settled, in particular there are indicators of identity in the formation of these complexes, including the placement of the same functional facilities;
- insufficient specifically defined architectural and planning approaches and a lack of harmonisation with modern building regulations.

The existing classification refers exclusively to the residential area without taking into account all functional objects, forming a so-called isolation. An analysis of the classification of mixed-use residential complexes, based on conceptual designs, shows design deviations from the current norms. These deviations are mainly in the form of an overestimation of the floor area and an increase in the height of residential floors, which results in the blurring of clear boundaries between neighbouring classes and the emergence of a public classification. This series of disadvantages create several types of classification:

1. Classification, which is formed according to the current urban planning legislation.
2. Classification is defined solely on the basis of societal principles, the basis of which is the class of the housing estate.

It should be noted that the classification and formation of modern mixed-use residential complexes in the Republic of Kazakhstan, including Astana, should take into account

urban planning, scientific, technical, socio-economic and environmental trends:

1. Urban planning-planning, design of residential complexes in built-up areas or on reserve land free from development; allocation; mixed-use factor through development of supporting planning structures; modernisation purposes by increasing the comfort level of the residential area of existing infrastructure facilities and design of new ones; increase of facilities of different functions.
2. Scientific and technical-modernisation of modern technological support and creation of innovative construction methods and approaches to the formation of mixed-use residential complexes; use of modern construction materials. Socio-economic - expansion of residential areas and adapted to the natural and climatic conditions of the settlement.
3. exploitation of the maximum number of elements for various functional needs, in particular the use of rooftops; creation of interconnections between flat offices and residential elements; maximum combination of residential area with recreational area; establishment of public relations within the complex through socially active space; living in the complex of different strata and categories of the city population.
4. Environmental – the use of environmentally friendly building materials; maximum energy and resource efficiency in the construction and operation of complexes; certain trends and their characteristics indicate that there is a prominent level of urbanisation of cities, which positively affects the economic development of the region, but in some cases the social needs of the population remain in the background [8].

In particular, the social needs of residential areas in mixed-use complexes should be provided with important facilities such as:

- recreational – green areas, green spaces, parks, squares, playgrounds; sports – physical education and sports facilities for children and adults. Factors reflecting the mixed-use of residential complexes:
- improving the living standards of the population – increasing the level of development of the residential area, business, and public area, improving the main directions of policies supporting different types of economic activity;
- employment – stimulating employment of the population in different areas of economic and entrepreneurial activity;
- development of social infrastructure – priority development of the social sphere and infrastructure, in particular public utilities, education and health care facilities, transport and engineering and telecommunications, as well as other means of information provision; formation of an attractive image of the complex area; increasing the level of attractiveness of living in the territory;
- raising income levels – creating a level playing field to support enterprises and infrastructure regardless of their type, type, size, ownership and economic form [9].

In forming the classification of mixed-use residential complexes and their architectural and planning structure, a group of urban planning principles are taken into account, such as: the suitability of the structure to the urban context; spatial conformity of the form of the structure; visual perception of the housing development; planning security of the residential area; rational territorial organisation of the residential area. The principle of structure compliance with urban planning requirements defines mixed-use housing complexes as the main infrastructure elements of a particular area. With this principle, all crucial elements of the complex provide infrastructural occupancy of the region with the necessary social and public facilities, and their accessibility is not unimportant. The analysis of the natural environment, land and resource potential, the presence of business sectors, and the classes of existing residential developments are important (Table 2).

The principle of spatial conformity of the architectural form of the building reflects the specifics of the planning organisation of the development in the context of the historical and sustainable ways of developing the region. It is important to note that the design of a mixed-use housing complex should not be monotonous. The relationship of the complex with other functional areas should also be taken into consideration. The principle of visual perception of residential development reflects the aesthetic component of architectural and planning solutions in the context of the individual field of art. This highlights the main aspects of individuality in the appearance of the building, originality, and diversity of architectural and artistic solutions. Mixed-use complexes are the object of a highly organised and high quality architecturally-artistic, where people

reproduce their everyday life and are the driving force for intellectual social development. The principle of planning security of a residential area is ensured by several methods:

- Organisation – use of human capacity (security service).
- Technology – the use of modern technological solutions (security and video surveillance system).
- Planning – a system of navigation and beautification.

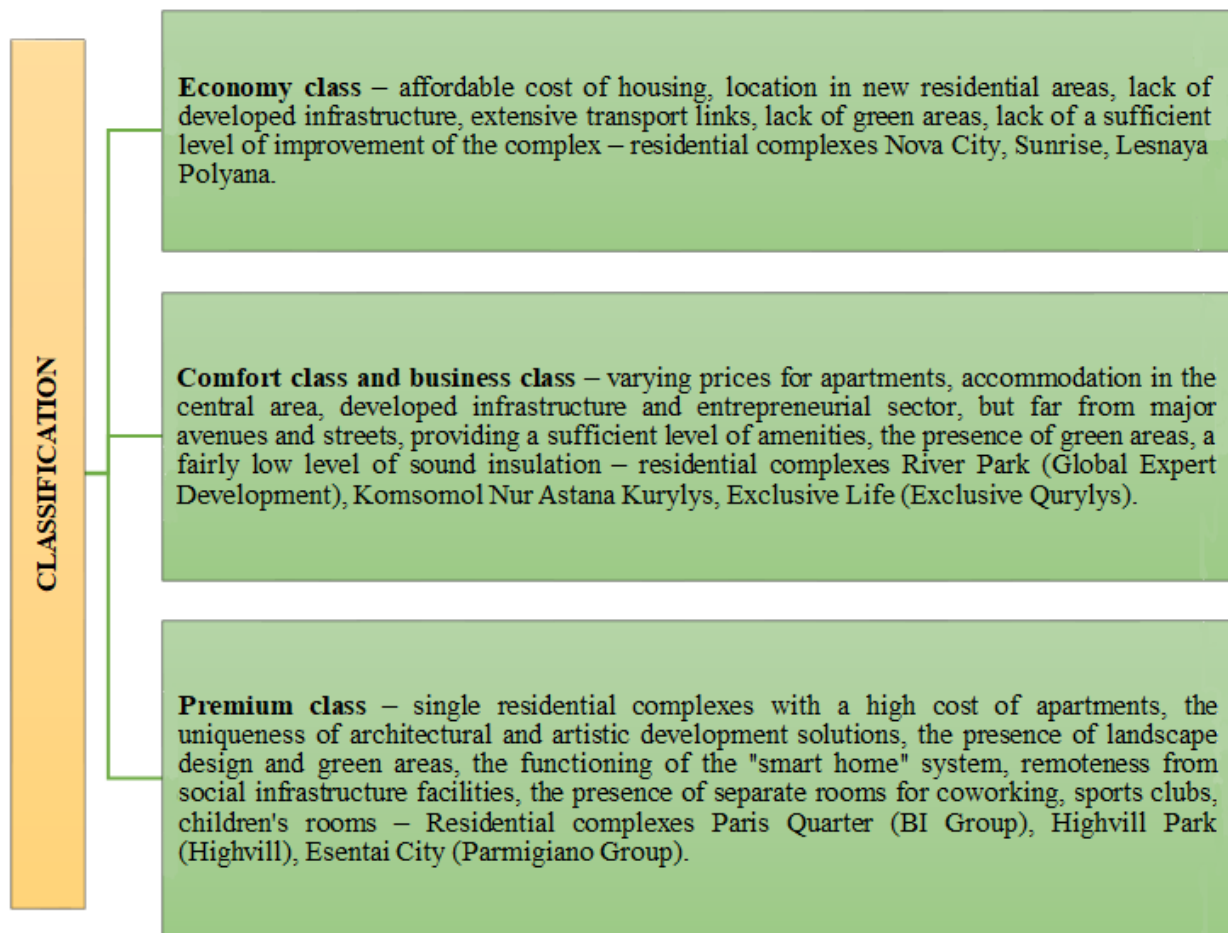
All the above-mentioned principles should take into account that at the present stage of formation of modern residential complexes it is necessary to take into account the global energy trends, which carry out the transition from the outdated model of energy industry functioning. After all, it was characterized by large enterprises, inefficient electricity networks, imperfect competition in the natural gas, electricity and coal markets to a new model in which a more competitive environment is created. In doing so, development opportunities are levelled and the dominance of one type of energy production, source or fuel supply route is minimised. At the same time, increased energy efficiency and the use of energy from renewable and alternative sources are favoured. Thus, security in mixed-use developments is about constantly monitoring the existing situation, comparing the functioning of security measures in different residential areas, and taking measures to avoid problems caused by incompatible adjacent infrastructure.

The efficient layout of the complex allows the control of traffic speeds, while highlighting a variety of functional facilities and controlling social interrelationships. The classification of mixed-use residential complexes developed on the basis of the 2012 regulatory framework, namely the State norms in the field of architecture, urban planning and construction. Code of rules of the Republic of Kazakhstan SP RK 3.02-109-2012 "Mixed-use buildings and structures" [10] is currently outdated and not adapted to modern urban planning trends. That is why the notion of mixed-use housing complex should be seen as a qualitatively and quantitatively improved structure with a functional organisation that is adapted to modern socio-economic, scientific, technical, environmental, natural-climatic and urban planning conditions. The classification developed and operated in the Republic of Kazakhstan, in particular in Astana and other cities, should take into account not only construction requirements, but also all infrastructure facilities, in particular public and recreational spaces (Figure 3). For each of the models presented a characteristic type of functioning, it identified and developed a specific set of service institutions that meet the needs and opportunities of each social group and are relevant to the urban situation. The principles of placement of welfare institutions in the structure of the residential complex for each of the models are also presented, since the placement of welfare institutions in the structure of the complex has a direct dependence on the level of income of people living in it.

Table 2. Detailed characterisation of the physical socio-economic components of the area while respecting the principle of conformity of the structure to urban planning requirements

Physical components	Socio-economic components
<ul style="list-style-type: none"> - physiographical and topographical characteristics of the area; - peculiarities of the area's ground cover, groundwater; - landscape features; - surface waters, catchment areas; - air quality; - the characteristics of the atmosphere and weather conditions; - level of ploughed land and agricultural activity; - types of flora and fauna; - features of the ecological system. 	<ul style="list-style-type: none"> - land potential; - the comfort level of the living area; - residential class; - the economic development sector of the area; - types of recreational, conservation and environmental facilities; - the aesthetic component of neighbourhood development; - local employment; - municipal services; - the archaeological features of the area, the presence of historical and cultural monuments; - the basics of spatial planning.

Source: compiled by the authors.



Source: compiled by the authors on the basis of [11].

Figure 3. Classification of mixed-use residential complexes using the city of Astana as an example

Given recent studies, publications and analysis of the system by which the classification of mixed-use complexes is determined, three separate classes – Class A, Class B and Class C – should be distinguished. Classification of mixed-use residential complexes and their characteristics:

1. Class A:

- located in an economic and planning area of the city with a well-developed infrastructure, but removed from major avenues and streets;
- functional independence of the flat;
- availability of internal and external communication;
- availability of individual office-workspace as well as office space for routine use;
- retail and domestic facilities within the complex, but operating in the public domain;
- sports fields operating in an enclosed type of facility;
- the maximum number of floors in a complex is 7.

2. Class B:

- located in a central part of the city with a well-developed infrastructure, but removed from major avenues and streets;
- the functional independence of the living area;
- the external and internal methods of communication between all elements of the complex are clearly visible;
- availability of individual office and workspace as well as office space for routine use – co-working space;
- availability of educational, commercial and consumer facilities that are easily accessible;
- planning recreational area in the form of parks, squares, recreation areas for children and adults;
- the maximum number of floors in a complex is 12.

3. Class C:

- located in a central part of the city with a well-developed infrastructure, but removed from major avenues and streets;
- the functional independence of the living area;
- the external and internal methods of communication between all elements of the complex are clearly visible;
- the availability of individual office and workspace as well as shared office space concentrated in separate blocks of the complex;
- availability of educational, health care, food, trade, and consumer services facilities that are easily accessible and have separate, isolated entrances within the complex;
- the presence of a recreational area inside the complex;
- the maximum number of floors in a complex is 18.

4. Discussion

The classification of mixed-use residential complexes is based on the rational spatial organization of the development, taking into account the development strategy

of the region, as well as the prospects and shortcomings that currently exist [12-14]. The very first measures are the definition of the types of predominant functional use of territories (agricultural, engineering-industrial, landscape-recreational, etc.), respectively transport infrastructure, communications, communications, and engineering highways, in particular the establishment of restrictions on the use of natural resources and land use. Improving the structure and form of the complex, as well as its elements, allows a variety of architectural and planning solutions [15, 16]. And the connection with the environment, in particular, the street and road network, the ecosystem, the historical areas as a result creates a unique planning structure. That is why the algorithm of openness and dynamism in the compositional model of the building is used in the formation of modern mixed-use complexes.

Spanish researchers S. Sánchez-Moral et al. [17] investigate the features of active work activities combined with comfortable living conditions in mixed-use residential complexes in Madrid. In particular, it is talking about the improvement and comfort of workers in the field of information technology and programming. After all, this industry is the key to the socio-economic development of the region. The authors examine the spatial planning features of mixed-use residential complexes in the context of the formation of a post-Fordist working model, the realisation of which aims to maximise the harmonisation of everyday and working space. To achieve this, various sociological studies are carried out, unique databases of workers are created, spatial regression, socio-demographic and occupational characteristics of a particular region are assessed, and mixed-use complexes are classified according to a group of factors that affect accessibility to work centres. The authors of their own academic study also look at the needs of the business sector through the spatial planning of mixed-use developments with separate office buildings, or "co-working spaces". The need for transport accessibility to the various social facilities and business networks of a settlement is also justified [18]. It should be noted that the article classifies such mixed-use developments as comfort class and business class.

A team of German and Polish researchers I. Zwierzchowska et al. [19] substantiate the features of formation of mixed-use residential complexes of premium class and elite class in large settlements with the provision of a high level of quality of life and landscaping. For this purpose, the authors considered the peculiarities of formation of residential areas designed and built in 1960-1990 in comparison with new buildings. The study was based on a systematic analysis of the socio-environmental potential of the region, architectural and planning decisions, and the environmental policy of the region and the state of the environment. A total of 225 mixed-use developments in Berlin, Germany and 92 in Poznan, Poland were inspected. Based on the geo-information analysis, the area was assessed and the plan-map information was updated. The study showed that

the ecological conditions in areas of social-modernist development are more favourable than in new buildings. It is the social-modern estates that include large areas of green space, which is almost 50% of the total area of the housing estate, which play an important role in the modern urban environment, namely ensuring the development of green infrastructure [20, 21].

Own research results also reflect the need to include recreational areas as part of the system of mixed-use residential complexes, which are classified as premium and elite class. This element is seen as the basis for providing amenities and improving the quality of life of the population. These areas at the local level of the complex provide active recreation in landscape and recreational areas. It should be noted that the presence of green areas and recreational components in the structure of the housing complex performs a number of functions of economic, socio-cultural, political, educational and environmental nature, the sphere of implementation of market mechanisms, stimulates regional development, and increases the welfare of the population [22, 23].

R. Islam Tasnia et al. [24] study the current aspects of the design of mixed-use residential complexes using innovative technologies and unique architectural and artistic solutions. The researchers point out that although the design projects are characterised by originality and aesthetics, they are quite difficult to implement and create very unexpected design flaws. The results of the study include the identification and study of the most prominent architectural and artistic solutions affecting the cost of maintenance. In particular, the aim of the study is to reduce and eliminate impacts with the least environmental and economic losses. Through factual analysis, the researchers have been able to classify mixed-use developments by the group of factors that influence the occurrence of deficiencies in the implementation of different design solutions: group 1 – poor design quality; group 2 – no maintenance work; group 3 – inappropriate choice of materials; group 4 – lack of designer responsibility; group 5 – lack of experience as a designer; group 6 – incorrect design scheme.

The authors also characterize the peculiarities of visual perception of the mixed-use residential complex in the context of the region's architectural and planning solutions. In this case, the main aspects are the aspects of individuality in the appearance of the building, originality and diversity of architectural and artistic solutions. Residential complexes are defined as an object of highly organized and high-quality architectural and artistic design, which reproduces the daily life of people and is a driving force for intellectual social development [25-27]. Various articles classify such mixed-use housing complexes as premium complexes. Researchers from Jordan M. Al-Fadlat and W. Al-Azhari [28] investigate the theory of contextualism, which consists of the study of harmonious interaction of elements of spatial organization of new mixed-use residential complexes with historical

architectural objects. The authors consider the integration problems of congruence and continuity. In particular, it is noted that the use of contextual design method with the basis of analysis of traditional architectural style will affect the process of implementation of all artistic and design solutions. Scientists also propose to use the classification of mixed-use residential complexes, structuring elements of procedural modelling based on the specificity of building forms and augmented reality technology. The effectiveness and efficiency of the classification has been tested on the city of Amman to solve the problem of Western architectural movements incompatible with the peculiarity of the ancient architecture of the city.

The authors have not identified the historical features of the city as a separate class of mixed-use residential complexes of the Republic of Kazakhstan in their scientific research. However, authors absolutely agree with the opinion of Jordanian scientists about the importance of forming the classification of complexes in the context of the historical architectural development of the city. After all, such a structural element in the classification of residential complexes is important for the Republic of Kazakhstan, which on its territories contains a large number of objects of historical and cultural purpose and national patrimony.

Thus, mixed-use housing complexes combine a large number of functions, taking into account all the functional and geographical features of the region. In particular, climatic conditions, features of the natural environment, directions of business activities, the general level of socio-economic development of the region, national traditions, culture and life, as well as the presence of recreational complexes and "green" zones [29, 30]. At the same time, all architectural solutions, in particular, the volume-planning structure of the future complex and the structural scheme should be adapted to the urban planning features, engineering and communication infrastructure, modern technical and technological methods of development [31, 32]. The classification of the mixed-use housing complex should be updated according to such elements as part of a holistic system of human settlement functioning: the new social, economic and demographic needs of the population; changes in the legal framework for urban development and the inadequate characterisation of the housing complex in specifically defined regulations; the need to control all facilities that are part of a mixed-use complex and their defining role in the urban structure of the region.

5. Conclusions

The presented study emphasizes the importance of mixed-use residential complexes in the conditions of active urbanization of the Republic of Kazakhstan, where there is a significant increase in population in large cities. These complexes are necessary to meet the needs of the

population, ranging from workplaces to recreational facilities. In order to provide the population with acceptable living conditions, the study emphasizes the need for effective spatial organization and rational spatial planning. The study proposes to classify mixed-use residential complexes according to changes in urban planning, science, technology, socio-economics and the environment. The proposed classification takes into account, in particular, the growth of ancillary planning infrastructure, the modernization of existing infrastructure, the expansion of facilities serving different functional purposes, and the development of a pleasant perception of the complex area.

The study considers such concepts as the correspondence of the structure to the urban context, the spatial correspondence of the form of the structure, the visual perception of the residential development, the planning security of the residential area and the logical spatial organization of the residential area. The authors propose a new system of classification for residential complexes of mixed use and distinguish the characteristics of classes A, B and C. The location of the complex, functional independence, the presence of private offices and workplaces, retail and consumer services, sports facilities, planning recreation areas, as well as the maximum number of floors of the complex are all classification factors.

Further research in the field of improving the directions of formation and creation of an optimised classification of mixed-use residential complexes in the large cities of the Republic of Kazakhstan are: the features of the training and research centres that accumulate and transfer global practical experience in the field of urbanism; use of science-based approaches to improve the level of training of highly qualified public administration professionals in the field of territorial organisation and spatial planning of human settlements; improving the control levers for competent architectural planning and artistic decisions by the relevant authorised bodies; establishment of new methods to establish a clear communication link between the population and the city authorities to address urban planning issues; adapting the regulatory framework and design and development standards to the current development conditions, the needs of the population and global trends; improvement of urban planning policies not only at the level of big cities, but also of small towns and rural settlements.

In implementing the aforementioned directions, a comprehensive, harmonious classification of mixed-use residential complexes will be developed, which will ensure: mutually coordinated development of public and business elements as part of mixed-use residential complexes that play an important role in the overall structure of the settlement; assist in the creation of effective architectural and planning conditions for linking with the different urban elements, including optimising the layout of zones for different functional purposes; strengthening the strategic

directions of the socio-economic development of the area and the city as a whole; creating a mixed-use structure that meets the necessary social needs in a small area of the city; harmonious combination of compositional and three-dimensional solutions of mixed-use residential complexes with natural ecosystems.

Acknowledgments

None.

Conflict of Interests

The authors declare that there is no conflict of interests.

Data Availability Statement

The data that support the findings of this study are available on request from the corresponding author.

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