

## ABSTRACT

of the dissertation for the degree of Doctor of Philosophy (PhD) in the specialty: 6D042000 – “Architecture”

by **Amangeldikyzy Raushan**

on the topic: **“Architectural renovation of industrial buildings using the example of large cities in Kazakhstan”**

**Relevance of the Topic.** Relevance of the Topic. The creation of a comfortable environment and quality infrastructure is outlined in Kazakhstan’s strategic development plans through 2025. A priority is to ensure a favorable living and working environment through the regulation of architectural, urban planning, and construction activities [1]. “The rights of citizens to a favorable environment in settlements” are described in the Law of the Republic of Kazakhstan dated October 28, 2015, No. 366-V, “On Architectural, Urban Planning, and Construction Activities in the Republic of Kazakhstan” [2].

This dissertation research is conducted within the framework of supporting the development of a new cultural policy and the national idea “Mangilik El,” aimed at consolidating the people of Kazakhstan with their rich cultural heritage and creative potential to successfully achieve the goal of Kazakhstan’s entry into the top 30 developed countries in the world.

In the context of rapid urbanization and changing economic realities, the relevance of industrial building renovation is becoming increasingly evident. Kazakhstan, with its rich heritage of industrial construction, faces challenges related to optimizing the use of old industrial facilities. Many of these structures, which once served as the foundation of economic prosperity, are now subject to degradation and require renewal, adaptation, or complete transformation. The process of architectural renovation provides unique opportunities to create new urban spaces that not only preserve historical identity but also meet the modern needs of society.

The renovation of industrial buildings in major cities of Kazakhstan can become a key element of sustainable development, contributing to the restoration of the socio-economic context and the creation of new jobs. This research also explores the environmental and economic benefits associated with the transformation of outdated industrial facilities, as well as opportunities for integrating new functions and services. Thus, this work is aimed at developing an architectural concept for the effective renovation of industrial buildings, which will help improve the quality of the urban environment and raise the standard of living for city residents.

This research examines examples of successful international industrial renovation projects, drawing on methods and strategies from organizations such as

TICCIH (The International Committee for the Conservation of the Industrial Heritage) and ICOMOS (International Council on Monuments and Sites).

The study of international experience allowed for a comparative analysis of the renovation of domestic industrial buildings and revealed key issues, which include the lack of developed concepts and programs, as well as a lack of practical partnerships with international organizations working in the field of industrial building renovation and preservation as part of industrial heritage.

The results of this research will be valuable not only for architects and urban planners but also for government authorities, investors, and the general public interested in the sustainable development of urban areas.

**Research Object:** The architecture of industrial buildings after renovation in an urbanized city.

**Research Subject:** Organizational-typological and architectural-aesthetic aspects of the renovation of industrial buildings in large cities and the principles of their interaction with the concept of modern urban environment development.

**The aim of the research** is to develop a concept for the architectural renovation of industrial facilities in Kazakhstan, taking into account modern trends in urban environment development.

**Research objectives:**

- To study the features of architectural and compositional solutions of industrial buildings and their role in shaping the aesthetic qualities of the urban environment;

- To analyze the efficiency of the renovation process for industrial buildings and its feasibility in an urbanized city;

- To review international and domestic experience in the renovation of industrial buildings and methods of their integration into the modern urban environment;

- To examine modern strategies and creative approaches in the renovation of industrial buildings;

- To assess the organizational-typological and architectural-aesthetic qualities of industrial buildings in Kazakhstan after renovation;

- To study trends in the development of urban spaces;

- To develop a concept for the architectural renovation of industrial facilities in Kazakhstan, considering modern urban environment development trends.

**Degree of Research on the Topic:**

**Theoretical aspects, social foundations of industrial building development, their classification,** architectural and artistic issues in the design of industrial buildings and structures, as well as the prospects for further development of industrial buildings and structures, have been studied in the works of: S.G. Zmeul, B.A. Makhanko [3], S.V. Dyatkov, A.P. Mikheev [4], B.Ya. Orlovsky, Ya.B. Orlovsky [5], V.F. Vavilin, V.V. Vavilin, N.M. Kuznetsov, N.M. Korotaev [6], S.V. Demidov, A.A. Khrustalev [7], D.S. Rybakova, A.S. Fedotov [8], S.G. Kosmeridi [9].

**The renovation and repurposing of industrial buildings have been explored by:** S.G. Kosmeridi [10], S.A. Turtygina [11], O.I. Sysoeva [12], V.V.

Fedorov, N.N. Fedorova, Yu.V. Sukharev [13], A.L. Shagin [14], N.S. Shepelev, M.S. Shumilov [15].

**Effective methods for a comprehensive approach to industrial area renovation and urban development have been studied in the works of:** A.A. Kornilova [16], N.V. Starkova, I.Yu. Green [17], V.V. Fedorov [18], N.P. Shepelev, M.S. Shumilov [19], G.A. Potaev [20], G.K. Sadvakasova [21].

**Renovation programs for industrial buildings are presented in the scientific works of** international organizations TICCIH-ICOMOS, the Nizhny Tagil Charter, and the Dublin Principles [22, 23].

**Aesthetic factors in shaping the urban environment have been researched by:** K. Sitte [24], S. Giedion [25], K. Lynch [26], Le Corbusier [27], A.E. Gutnov [28], V.L. Glazychev [29], A.V. Ikonnikov [30], A.G. Rappaport [31], A.R. Sabitov [32], A.V. Stepanov, G.I. Ivanova, N.N. Nechaev [33], V.L. Glazychev, G.A. Golts, et al. [34], G.B. Zabelshansky, G.B. Minervin [35], J. Jacobs [36], C.R. Jeffery [37], J. Harfst, A. Wust, R. Nadler [38], M.S. Stiglitz et al. [39].

**Various architectural and urban planning aspects of Kazakhstan in the late 20th and early 21st centuries have been studied in the works of:** B.A. Glaudinov [40], A.Zh. Abilov [41], B.U. Kuspangaliyev [42], K.I. Samoylov [43], N.Zh. Kozbagarova [44], G.S. Abdrasilova [45], D.E. Sarsembayeva [46], Zh.Zh. Tolegen [47], A.I. Turekulova [48], E.T. Danibekova [49].

**The scientific novelty** of the research lies in the study of the process of functional renewal and the experience of preserving industrial buildings in Kazakhstan, as well as in the development of a theoretical concept for renovation. This concept views industrial structures as significant historical phenomena in each region, contributing to the enhancement of the aesthetic and comfort qualities of the environment, which are crucial aspects of the strategic development of modern cities.

**The reliability of the dissertation's scientific results** is ensured by a multifaceted research method, an extensive empirical base, and thorough analysis, which make the conclusions robust and relevant for practical application.

– A comparison of renovation examples from various cities in Kazakhstan was conducted to identify common trends and differences;

– A sociological survey and questionnaires were carried out among residents to gather opinions and evaluate the comfort qualities of buildings after renovation.

The results were presented at scientific conferences, allowing for feedback and comments from professionals in the field of architecture.

**The methodological foundation of the research is a comprehensive approach that includes:**

Studying scientific and theoretical material related to the design of industrial buildings and familiarizing with regulatory documents from international organizations regarding the renovation of industrial facilities;

– graphical systematization of the theoretical materials studied;

– scientific and theoretical analysis of the principles of architectural and aesthetic organization, and the prerequisites for the renovation of industrial

buildings;

- analysis of the architecture of industrial buildings after renovation in accordance with the concept of preserving industrial heritage;
- comparative method—comparing two or more objects (phenomena, ideas, research results), identifying commonalities and differences to classify and typologize them;
- graph-analytical method of experimental modeling and conceptual forecasting in the development of principles for the theoretical concept;
- post Occupancy Evaluation (POE)—assessing the comfort qualities of buildings after occupancy or commissioning.

**The scientific hypothesis** asserts that the architectural renovation of industrial facilities in major cities of Kazakhstan, using the concepts of international organizations (TICCIH, ICOMOS UNESCO), contributes to the preservation of industrial heritage, the formation of identity, and the development of urban spaces in line with sustainable urban development strategies (SDG No. 11).

**Research Boundaries:**

1. The study is limited to the renovation process of industrial buildings, which are part of urban development and meet sanitary standards, such as buildings from the textile industry, food industry, construction industry, and service buildings.

2. The chronological boundaries are defined by the period of the 20th–21st centuries.

3. The architectural boundaries include functional and architectural-compositional transformations of industrial buildings after renovation.

4. The geographical boundaries cover major cities in Kazakhstan: Almaty, Astana, Shymkent, and cities actively implementing the practice of restoring and preserving industrial facilities, including service buildings, such as Turkestan, Aktau, Kostanay, Atyrau, Semey, Ekibastuz, and Zhezkazgan.

**The following are submitted for defense:**

- Theoretical justification that architectural-compositional solutions of industrial buildings significantly influence the formation of the aesthetic qualities of the urban environment, contributing to the creation of a harmonious visual space and improving the quality of life for city residents.

- Methods of adaptive integration used in international practice, ensuring the development of unique architectural solutions tailored to regional conditions

- A comparative analysis of Kazakhstani and international experiences in the renovation of industrial buildings in modern urban contexts.

- An analysis of the renovation of industrial buildings based on modern strategies and creative approaches.

- An evaluation of the organizational-typological and architectural-aesthetic qualities of industrial buildings in Almaty after renovation.

- Justification of the necessity to develop strategic plans, programs, and conceptual approaches to the renovation of industrial buildings, allowing the preservation of Kazakhstan's industrial buildings as architectural heritage and

historical value, forming the identity of Kazakhstan's cities.

– A graphical model of the concept for the architectural renovation of industrial facilities in Kazakhstan, taking into account modern urban development trends.

**Scientific Significance:** The research expands scientific knowledge about the adaptive capabilities of architecture and reflects a creative approach to transforming industrial facilities in line with the concept of urban development and construction in industrial cities. The results stimulate the involvement and collaboration of Kazakhstani scientists, academic institutions, and public organizations with international organizations addressing the challenges of renovation and preservation of industrial facilities. It also contributes to the formation of regulatory documents and scientifically-based criteria for the renovation of industrial buildings in Kazakhstan., научно-обоснованных критериев реновации промышленных зданий Казахстана.

**Practical Significance:**

1. Preservation of Cultural Heritage: The dissertation contributes to identifying new approaches to the renovation of industrial buildings, enabling the preservation of architectural heritage and the historical identity of Kazakhstani cities.

2. Improvement of Urban Environment: The developed recommendations for architectural renovation will help enhance the aesthetic qualities of urban environments, improving citizens' quality of life and attracting tourists.

3. Integration of Modern Technologies: The study of modern renovation strategies and technologies will enable the implementation of innovative solutions in design, thereby modernizing outdated infrastructure and increasing its functionality.

4. Economic Efficiency: The analysis of the economic feasibility of renovating industrial facilities will help local authorities and investors plan budgets more efficiently and optimize resources.

5. Adaptation to New Functions: The developed theoretical concept will provide optimal solutions for adapting old industrial facilities to modern requirements, contributing to the creation of new public and cultural spaces.

6. Improvement of Legislative Framework: The research results can be used to develop proposals for improving legislation and standards in the field of renovation and utilization of industrial buildings.

7. Educational Foundation: The work can serve as a basis for educational courses and seminars on architectural renovation, contributing to the professional development of specialists in this field.

8. Stimulation of Interdisciplinary Cooperation: The research can serve as a foundation for cooperation between various fields, including architecture, urban planning, sociology, and economics, leading to a more holistic and effective approach to urban environment design.

Thus, the practical significance of the dissertation lies in the formation of scientific-practical recommendations for improving urban infrastructure in Kazakhstan.

### **Testing of Research Results:\***

The main provisions of the dissertation were presented at the international conference: "Modern Trends in Architecture and Construction: Energy Efficiency, Energy Saving, BIM Technologies, and Urban Environment Issues" (Almaty, 2020).

Publications (7):

- In scientific-practical publications included in the list recommended by the Committee for Control in the Field of Education and Science of Kazakhstan – 1;
- In journals indexed in the Scopus database – 2 (Civil Engineering and Architecture, "Architecture," R 67%, CiteScore 1.2, 2022; Future Cities and Environment, R 85%, CiteScore 3.2, 2023).

### **List of Published Scientific Articles on the Dissertation Topic:**

1. Atagulova R.A. Reconstruction of Industrial Buildings and Structures on the Example of the City of Almaty (Kazakhstan) // Proceedings Collection / Nizhny Novgorod State University of Architecture and Civil Engineering; Nizhny Novgorod: NNGASU, 2019 – 412 p. – pp. 32-36.
2. Atagulova R.A., Tokayuk A., Amandykova D.A. Revitalization of Industrial Buildings as an Aspect of Sustainable Development on the Example of Bialystok City // Collection of Scientific Conference "Modern Trends in Architecture and Construction: Energy Efficiency, Energy Saving, BIM Technologies, Urban Environment Issues": International Scientific-Practical Conference. – Almaty: MOC, 2020. – 601 p. – pp. 69-73.
3. Atagulova R.A., Moldabekov M.B., Isakhov N.Z., Myrzakhmetova S.T., Amandykova D.A. Typology of Architectural Space // Journal of Emerging Trends in Engineering Research – 2020. – Vol. 14. Issue 2 – ISSN 1307-9867.
4. Amangeldikyzy R., Nauryzbayeva A.S., Suleyeva K., Sadvokasova G.K., Imanbayeva Z.A., Tolegen Z.Z., Sagybekova A. Folk Art Crafts of Kazakhstan: The Concept of Renovation of Industrial Buildings // Turkish Journal of Computer and Mathematics Education – Vol. 12 No. 12 (2021) – pp. 1169-1175.
5. Amangeldikyzy R., Assylbekova A., Jumagaliyev T., Derbissova M., Nigmatova A., Myrzahmetova S., Imanbayeva Z. Evaluation of the Aesthetic Quality of an Industrial Building after Renovation // Civil Engineering and Architecture 10(6): 2022.
6. Amangeldikyzy R., Amandykova D.A., Tokayuk A. Folk Art Crafts of Kazakhstan: The Concept of Renovation of Industrial Buildings // (87) 2023 – pp. 7-15.
7. Amangeldikyzy R., Amandykova D., Tokayuk A. Architectural Renovation of Industrial Buildings on the Example of Large Cities of Kazakhstan // Future Cities and Environment, 9(1): 6, 2023 – pp. 1-15.

### **Implementation of Research Results:**

Act of implementation (Appendix A) in the development of architectural design activities in Turkestan Region.

Act of implementation (Appendix B) in the development of architectural design activities in Turkestan Region.

Amangeldikyzy R. was recommended for membership in the Union of Architects of the Republic of Kazakhstan (Appendix C) by the Chief Architect of the city of Turkestan for her professional achievements and positive research results.

**Volume and Structure of the Research:** The dissertation consists of 98 pages, including an introduction, three chapters, a conclusion, a list of references (159 sources), and appendices (49 pages).

## MAIN CONTENT OF THE WORK

The **introduction** outlines the relevance of the problem and the theoretical foundation of the research, defines the goal, objectives, object, subject, and hypothesis of the study, as well as the boundaries and methodology of the research, its scientific novelty, and the theoretical and practical significance of the work.

In the first section, titled "**Renovation as a Method for Integrating Industrial Facilities into the Structure of the Modern City**," the experience of designing architectural-compositional solutions for industrial buildings is studied. An analysis of the effectiveness of the renovation process for industrial buildings in an urbanized city environment is conducted. International and domestic experiences in renovating industrial buildings and principles of adapting them to the modern city are examined.

### **Conclusions of the first section:**

Architectural-compositional solutions for industrial buildings play a key role in shaping the aesthetic appearance of the urban environment. The aesthetic qualities of such buildings can significantly enhance a city's attractiveness, contributing to its cultural and social development.

Renovation of industrial buildings in urbanized settings proves to be a highly effective strategy, helping to reduce the shortage of comfortable public spaces while preserving historical and cultural heritage. This process requires a comprehensive approach, including the study of international experiences, modern strategies, and methods of industrial building renovation. The success of renovation can be achieved through well-thought-out planning and the involvement of local communities, which enhances social sustainability and the appeal of cities.

International experience demonstrates various approaches to renovating industrial buildings, including flexible use of space, the introduction of sustainable technologies, and active community involvement. Principles of adapting such buildings to modern conditions include ecological sustainability, integration with urban infrastructure, and the creation of multifunctional spaces, all of which contribute to improving the quality of life in cities.

A comparative analysis of industrial building renovations in Kazakhstan and internationally has highlighted the need for comprehensive measures and the

development of renovation strategies that account for both architectural and social aspects.

The second section, **"Strategic Methods and Creative Concepts for the Renovation of Industrial Buildings as Factors Stimulating the Qualitative Development of Urban Spaces,"** analyzes modern strategies for adapting industrial buildings, creative concepts for the spatial and visual realization of new functional programs, and evaluates the aesthetic qualities of industrial buildings post-renovation using the examples of the "Armada" and "Grand Park" shopping centers in Almaty.

#### **Conclusions of the second section:**

Modern strategies for renovating industrial buildings include innovative architectural solutions and creative approaches. These include multifunctionality, the use of sustainable materials, and active community involvement in the transformation process. This approach promotes not only economic revitalization but also cultural enrichment of cities, creating new public spaces.

Creative approaches to industrial building renovation reflect the growing interest in transforming these structures, which have become not only part of historical heritage but also sources of inspiration for new architectural solutions. These approaches include transforming industrial buildings into cultural and public spaces, galleries, co-working areas, and cultural centers. This allows for the preservation of historical architecture while meeting the modern demands of society. The use of sustainable construction principles—such as eco-friendly materials, energy optimization, and the integration of "green" technologies—contributes to this effort. The desire to restore historical elements and features of buildings helps preserve cultural heritage, giving the renovated space uniqueness and character.

The evaluation of the organizational-typological and architectural-aesthetic qualities of industrial buildings in Kazakhstan (using the "Armada" and "Grand Park" shopping centers as examples) post-renovation revealed satisfactory interior comfort conditions. The perception of urban space is enhanced, improving the quality of life for urban residents by eliminating previously degraded areas. However, the renovation of industrial facilities was carried out without public involvement, interdisciplinary specialists, or consideration of international methods for renovating industrial heritage.

In the third section, **"The Concept of Architectural Renovation of Industrial Facilities in Kazakhstan under Modern Urban Development Conditions,"** a theoretical model for the architectural adaptation of Kazakhstan's industrial facilities is developed. This model involves the full or partial preservation of these structures for new functions, taking into account the modern development of Kazakhstani cities.

#### **Conclusions of the third section:**

Trends in urban space development show a growing interest in creating integrated, multifunctional zones that provide comfort and accessibility for different population groups. These trends suggest the active use of industrial areas

as platforms for business development, cultural initiatives, and recreation, which requires flexibility in architectural planning.

The development of a theoretical concept for the architectural adaptation of Kazakhstan's industrial facilities to new functions is based on principles of sustainable development and urban aesthetics. The concept considers not only functional aspects but also cultural, historical, and social contexts, ensuring a harmonious integration of these objects into modern urban spaces.

The proposed renovation concept for industrial facilities has an educational foundation, combining museum functions with a center for public life where people can meet, communicate, spend leisure time, and participate in various events. This approach promotes social integration and urban cultural development. This principle of functional renovation stimulates interdisciplinary collaboration, serving as a platform for cooperation between architecture, urban planning, sociology, and economics, leading to a more holistic and effective approach to urban environment design.

## CONCLUSION

Thus, the hypothesis that architectural renovation of industrial facilities in major cities of Kazakhstan, applying the concepts of international organizations (TICCIH, ICOMOS UNESCO), contributes to the preservation of industrial heritage, the formation of identity, and the development of urban spaces in line with sustainable urban development strategies is confirmed.

During the research on the architectural renovation of industrial buildings in major cities of Kazakhstan, a comprehensive assessment of the current state of industrial facilities and their potential for further use within the urban context was conducted.

The analysis showed that a significant portion of industrial buildings constructed during the Soviet era not only retained their structural integrity but also have high potential for adaptation to modern requirements. The application of renovation principles leads to the enhancement of architectural aesthetics as well as solving social issues, such as creating new public spaces, offices, and cultural centers, which in turn improves the quality of life for city residents.

This dissertation highlights the importance of the renovation concept as a tool for transforming urban planning practices and integrating abandoned industrial spaces into the broader urban context. The results of the research can serve as a foundation for further studies and practical recommendations aimed at creating a more harmonious and viable urban environment.

The analysis of successful renovation examples of industrial buildings in major cities worldwide revealed that key success factors include adapting architectural solutions to new public needs, involving local communities in the design and implementation process, and using an interdisciplinary approach to planning, combining elements of architecture, ecology, and social policy.

Industrial building renovation is possible only with a comprehensive approach that considers historical and cultural context, economic feasibility, and environmental sustainability. It is also essential to consider the needs of local residents and adapt new public spaces to their demands and interests, aligning with the principles of sustainable development and social equity.

The study also identified the importance of local authorities, architects, and society's involvement in the renovation process. Effective collaboration between these stakeholders allows for the consideration of historical and cultural aspects and ensures the sustainable development of urban infrastructure.

Based on the collected data and developed concept, it can be concluded that the architectural renovation of industrial buildings holds strategic importance for the development of Kazakhstan's urban policies. These initiatives not only contribute to the preservation of historical heritage but also open new opportunities for economic growth and attracting investment to the region.

In conclusion, architectural renovation is a necessary step toward creating a more harmonious and functional urban environment that addresses the challenges of the present and the needs of future generations. The concept developed through this research can be used as a foundation for further studies and practical work in this field.

As a result of this research, the goal was achieved, and a concept for the architectural renovation of industrial facilities in Kazakhstan was developed. It takes into account the needs and preferences of residents, requirements for creating a comfortable and safe environment, and methods for forming creative urban spaces based on renovation and the preservation of industrial heritage.

Thus, the proposed concept is integrated, encompassing cultural, social, and economic aspects of the use of industrial buildings, meeting the modern requirements of sustainable development in major cities of Kazakhstan.

The fulfillment of the set tasks allowed for the formulation of principles applicable to Kazakhstani realities, enabling the implementation of creative solutions aimed at the effective renovation of existing industrial facilities, and opened new horizons for architects and urban planners in creating comfortable and aesthetically appealing urban environments.

### **Publications related to the dissertation research:**

1. Atagulova R.A. Reconstruction of Industrial Buildings and Structures on the Example of the City of Almaty (Kazakhstan) // Collection of works / Nizhny Novgorod State University of Architecture and Civil Engineering; Nizhny Novgorod: NNGASU, 2019 - 412 p. - pp. 32-36.

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