

CONTEMPORARY EXPERIENCE OF CARRYING OUT OF TECHNOLOGICAL PROCESS
OF BUILDING'S RECONSTRUCTION

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Abstract

In the paper is considered the domestic and foreign experience of implementing the technological process in reconstruction and function change of buildings. By considering many examples, it was determined that the non-compliance of industrial enterprises with modern requirements and the non-competitiveness of their products, as well as economic reform and the transition to market principles of enterprise efficiency assessment, introduction of land cadastral value, shortage of labor resources, etc. It leads to the necessity of liquidation of a number of industrial objects or their urgent transformation for other, most often, social objects.

Key words: reconstruction, residential complexes, buildings, efficiency.

Introduction

The complex reconstruction of existing territories, individual populated areas of cities and buildings represents a process of reorganization of the urban environment, the content and duration of that are determined by interrelated actions, such as designing, planning and implementation of reconstruction measures. In this regard, the complexity lies both in the design of reconstruction objects and in the selection of methods of project decisions implementation.

The aim of the paper is to establish the theoretical foundations of the reconstruction of residential complexes, literary review and analysis.

The main objectives of the research are:

1) The essence of the concept "Evaluation of the efficiency of residential development reconstruction";

2) Analysis of Georgian and foreign experience in the reconstruction of residential development,

current state of the problems of the housing fund during reconstruction.

The definition of reconstruction in the Code of "Georgian Spatial Planning, Architectural and Construction Activities" is given as follows: reconstruction is the essential change of an existing building and/or part of it for the purpose of their physical, qualitative and qualitative renewal.

In other scientific literature, reconstruction is a combination of construction works and organizational and technical measures related to the change of basic technical and economic indicators (load, planning of buildings, volume and total area of building structure, engineering equipment) to change operating conditions. Compensation of maximum loss from physical and moral wear and deterioration, reaching of new goals of building operation.

Basic part

When the train is running on the uneven track, considering the influence factors of the train vibration load, the vertical vibration load of the train can be simulated by a exciting force function^[6]:

$$F(t) = k_1 k_2 (P_0 + P_1 \sin \omega_1 t + P_2 \sin \omega_2 t + P_3 \sin \omega_3 t) \quad (1)$$

The calculation of specific parameters in the formula refers to the reference [6].

In this paper, the train axle load is 20t, and unsprung weight is 750kg. According to the code for design of high speed railway in China, Table 1 shows the irregularity of the vibration wave length and the height of versine when the train vibration load is simulated. Fig. 1 shows the time history of the vertical vibration of the train when the vehicle speed is , which is simulated by the excitation force function of the first two seconds.

Table 1
All reconstruction methods of residential buildings

Reconstruction regulations	Typical for reconstruction methods
Reconstruction	By keeping functions By changing function
Restoration	Restoration of architectural monuments Renovation of monuments lost volumes
Preservation	Monuments preservation Renovation of monuments lost volumes
Sanitation	Transfer of industrial and dangerous enterprises to suburban area Reshaping Cleaning
Reconstruction of development	Demolition of whole building Demolition of some parts of building Rearrangement of building
Compaction of development	New construction after demolition of old building Add a superstructure on building Extension of building Inclusions and extensions
Improvement of buildings exterior	Without changing building exterior (face-lift) With partial change of building facade fragments Change of building exterior Improvement of area in front of house Complete rearrangement
Repair	Operating Sample

Common methods that are now widely applied are reducing and increasing the density of development.

Recently, a lot of attention has been paid to improving the appearance and amenities of buildings in Tbilisi. Tbilisi City Hall has issued a number of resolutions with the program of improvement of courtyard areas and building entrances. Much has been done to improve the

appearance of the buildings, especially in the central part of the city.

Before selecting a reconstruction method, it is necessary to study the factors affecting decision-making.

The relevance of the complex reconstruction of the old districts of existing cities is stipulated due to a number of social, urban planning and economic factors. Social factors are related to the low quality of housing and potential breakdown rate, high operating costs of its maintenance, accumulated insufficient repairs.

The transformation of residential development would be an integral part of the reconstruction project of the multifunctional central planning district, its parts (public complexes and junctions, streets, zones). In this case, the following issues should be interrelated in the project:

- 1) Ratio of residential and public spaces and organization of planning;
- 2) Construction of new residential and public buildings, demolition of old (depreciated) ones;
- 3) Rearrangement, overhaul (modernization) and reconstruction of preserved residential and public buildings;
- 4) Engineering equipment and neighbourhood improvement.

Currently, a number of targeted programs are aimed at solving reconstruction problems, such as "housing", "preservation and development of the architecture of historical districts", "program of complex reconstruction, modernization and improvement of residential areas of Tbilisi", etc.

In general, the complex reconstruction, modernization and improvement of residential areas is aimed at the transition from the territorial growth of cities to the qualitative transformation of the existing development, which requires a balanced solution of urban planning and housing problems.

Foreign experience in residential complexes reconstruction

In connection with the rapid integration of modern trends and technologies, special attention should be paid to studying the experience of other countries in scientific activities.

At the First International Workshop on Urban Reconstruction and Modernization, held in The Hague in August 1958, it was declared that the

main goal of urban renewal is to consciously change the environment and create modern living areas and working conditions for citizens by changing the existing spaces. Initially, the main principles were developed to extend the life cycle of existing city areas, aimed at strengthening the activity of all structures that, as a result of moral and physical wear and tear, ceased to fulfill the functions of providing a comfortable life and work for the population. Initially, the renewal of the territories affected the historical centers of the cities first of all. This circumstance was due to the fact that the main economic, social, political activity was concentrated in their central parts, and the need to introduce new technologies and improve public comfort was especially acute. The first large-scale urban renewal project is the renewal of Paris, carried out by Baron Haussmann in the middle of the XIX century (Fig. 1)



Fig. 1. Paris reconstruction scheme implemented by Baron Housman in the middle of the XIX century

However, the United States of America is the first state that develop complex national urban reconstruction programs. This circumstance was caused by the need to renew a large number of cities due to their active urbanization.

The first step of the US government in the field of urban revitalization was the adoption of the Housing Act in 1949, which became the main instrument for the modernization of urban areas, aimed at the active demolition of old housing and the active construction of new ones.

The program was based on three main elements: prevention, restoration of structure and surroundings and their reconstruction. However, private investors were reluctant to participate due to restrictions that made the projects focused on residential construction that was not the most

profitable investment in the long term. As a result, the cities were reconstructed mainly by demolishing old houses. The implementation of the programs was going on with many problems and was accompanied by the relocation of industries and enterprises and the active demolition of residential buildings. In addition, the implementation of this policy led to a huge imbalance between the amount of investment in the development of business districts located in the central parts of cities and the limitation of attention to the social problems of residential areas. This policy ultimately led to the active growth of luxury housing and the reduction of the volume of low-cost housing with low rents.

When looking at the politics of mainstreaming approaches to urban regeneration in Europe, trends similar to those in the United States can be observed.

Active modernization of the old central areas of European cities began during the industrial revolution, which occurred a little later in Europe than in the United States. Thus, the experience of the United States of America and their basic principles were used as a model by European countries. However, unlike the United States, European countries have implemented the reconstruction of urban areas without developing specific national programs. As an example of the active participation of the state in the reconstruction of urban areas, we can cite the experience of Great Britain in the middle of the 19th century, when it pursued an active policy to eliminate outdated residential areas. In the 1920s, Europe actively began to implement works in the direction of reconstruction and modernization of cities, which was connected with the results of the First World War. As a result, for this period, the most reconstruction works were carried out in one generation. After the Second World War, in the 1950s, there was an increased interest in the restoration of historic buildings, the reconstruction of urban ensembles of the previous era, and much attention was paid to the preservation and restoration of historic cities and urban areas.

Hong Kong and Singapore are the clearest examples of active policies of modernization and renewal of Asian city areas. Hong Kong and Singapore are examples of active implementation of Initially, the reconstruction of Hong Kong was

dominated by the private sector. Government intervention in urban regeneration in Hong Kong first began in 1954 with the adoption of a large-scale demolition scheme for old housing. In 1972, an extensive program was implemented to renovate estates built in the 1950s, turning them into autonomous institutions. Schools were created in such buildings, or conditions were created for their administrative or social use.

In 1987, the state's approach to the reconstruction of Hong Kong changed. The government decided to create conditions for the development of public-private partnerships, for that a special body, the Land Development Corporation, was created, which was responsible for raising private funds for the implementation of reconstruction projects.

The main objective was to accelerate the pace of private sector reconstruction in certain areas of Hong Kong, as well as to improve the quality of projects and their economic benefits by reducing government subsidies. A visible result of the implementation of these concepts is the example of the reconstruction of Hong Kong's western cultural district.

Singapore's experience in the field of reconstruction of existing buildings

Considering the period of the 1960s special attention deserves. This period was characterized by outdated buildings.



90-ies of previous century prior re construction



After reconstruction

Active demolition and modernization and active reconstruction of the area were performed in many quarters. In 1964, with the help of foreign consultants, an urban reconstruction program was developed and started in the central part of the Chinese city of Singapore.

The result of the implementation of this program was the reconstruction of all the colonial districts in the central part of the city, which were mainly built with two-three-story buildings. Special attention was paid to the creation of the resettlement fund, before the reconstruction or demolition of the existing buildings, new modern buildings were built in the surrounding areas, which reduced the level of social tension.

Currently, the central part of the city is completely reconstructed and updated. Shopping complexes, office and residential buildings are located on its territory, high-rise Singapore replaced the colonial city. In the territory of the city, only a few luxurious colonial residential areas have preserved their original appearance.

In Western European countries, the 21st century is characterized by a complex approach to the reconstruction and modernization of existing territories.

Consider the reconstruction process in Georgia on the example of the old districts of the city of Tbilisi.

By the end of 2023, according to the data of Mtatsminda District Administration, the number of dangerous buildings amounted up to 707;

According to the data of 2016-23, the number of objects restored by the Tbilisi Development Fund is 160 units;

56 residential houses are planned to be reconstructed and restored in 2024;

The number of resettled families during the reconstruction is 402 families;

Reconstruction of the recreation area was carried out in 5 objects.

Below are fragments of the reconstruction in the old district of Tbilisi.

Within the framework of the "New Tbilisi" project, Tbilisi Development Fund carried out rehabilitation works of residential houses located in Orbeliani Street N31 and N33 in Mtatsminda district.

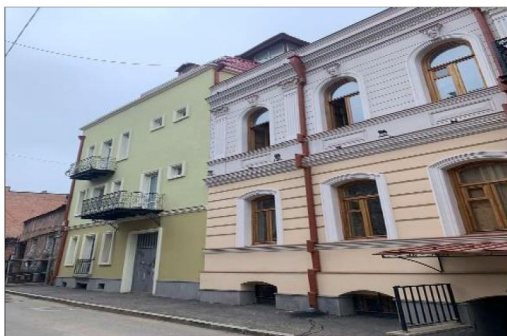
The building located in the historical part of Tbilisi has the status of a cultural heritage

monument.

After the completion of the rehabilitation, the living conditions of the apartment owners living at 31 and 33 Orbeliani Street will be improved, and two more restored and renovated buildings will be added to the tourist route of Tbilisi.

Let's consider several examples of restoration in Tbilisi, David Agmashenebeli avenue.

David Agmashenebeli avenue N 106



The Tbilisi Development Fund, within the framework of the "New Tbilisi" project, completed the rehabilitation works of the Darejan Dedofli Palace monastery complex.

In the territory of the monastery complex of the Darejani Palace, in a deep trench prepared for strengthening the foundation and making a drainage system, archaeological remains were discovered, including fragments of the wall, which were cleaned and preserved by

archaeologists in accordance with the relevant rules.

Within the framework of the project, the conservation works of the wall painting of the 18th century church of the Mother of Transfiguration Monastery were carried out.



Factors affecting the choice of housing reconstruction option and performance evaluation indicators

The mass character and social orientation of the measures implemented during the reconstruction of the housing fund increases the role of the economic efficiency of the invested funds.

The measures of modernization of the housing fund provide for the elimination of the moral wear and tear of the building along with the elimination of its operational deficiencies. During modernization, the indicators of apartment planning are improved, engineering equipment systems are improved, the quality of amenities and the sanitary and hygienic properties of buildings, etc., are increased.

Increasing the living area is one of the most important results of the reconstruction in the case when it is necessary to increase its density in the existing part of the building from the point of view of city planning. Another, no less important goal of building reconstruction is the qualitative renewal of the foundation, which does not meet modern requirements.

This leads to the consideration and evaluation of the option of demolishing the buildings and building a new building in their place that gives the possibility to solve the task of receiving modern housing. This task can be ensured by the option of new constructions in peripheral areas,

the costs of which have their own accounting characteristics.

Conditional (evaluative) economic effect - $e(p)$ is defined as the difference in income that can be obtained from the sale of apartments in the housing market at their market value, minus the costs of reconstructed or newly built residential buildings. In addition, the market price of 1 sq. M. The total area of apartments $f(m.b)$ for new construction and reconstruction is assumed to be the same, since, according to the condition of comparison, the category of compared houses should be the same and the economic and social effect should be equal.

Conditionally, it is assumed that all costs are incurred during the year and coincide with the results obtained in time. The time of construction and reconstruction of a new house coincides with each other. Then as a result of reconstruction $m(r)$ is received conditional (evaluative) economic effect or for new construction of a residential building $m(a)$ is calculated as a profit from the invested capital received as a result of the sale of apartments in a reconstructed or new house at a single market price per square meter of common living space.

At the reconstruction, the consumer properties of the housing should be brought up to the level of the new construction.

$$e(p) = m(r) - m(a), \quad (1)$$

a) Calculation of profit at reconstruction.

In the case of reconstruction carried out without resettlement of residents, the profit calculation formula will be as:

$$m(r) = f(m.b) \times \Delta N - k(r), \quad (2)$$

where $f(m.b)$ is the market price of 1 square meter of the apartments total area;

ΔN is the area increase as a result of reconstruction;

$k(r)$ - capital investment in reconstruction.

In the reconstruction of the house that is related to the accommodation of residents, re-planning of apartments and their subsequent sale, formula (2) takes the form:

$$m(r) = f(m.b)(N(r) + \Delta N) - k(r) - X(\text{research, resset}), \quad (3)$$

where $N(r)$ is the total area of the apartments before the reconstruction of the house;

$X(\text{research, resset})$ - are expenses for accommodation of old house residents.

A positive value of the conditional (evaluative) economic effect $e(p) > 0$ indicates the efficiency of the investment costs of the object's reconstruction.

Conclusions

A review and analysis of the experience of the reconstruction of residential complexes in Georgia and abroad was carried out, the theoretical foundations of the reconstruction were elaborated, which means that the concept of the reconstruction of the development should be differentiated for different periods and for different buildings. Factors affecting the choice of housing development reconstruction option and performance evaluation indicators were identified.

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