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## METHODOLOGY OF ANALYSIS OF RENOVABLE INDUSTRIAL FACILITIES UNDER THE MULTIFUNCTIONAL COMPLEXES

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### ABSTRACT

The article presents the methodology for the analysis of industrial renovation facilities for multifunctional complexes. This methodology provides for the consistent conduct of multilateral comprehensive research, the total assessment of which is crucial for choosing the type of multifunctional complex and the optimal direction of renovation. The presented analysis technique is suitable both for renovation of typical and neutral industrial enterprises, and for the rehabilitation of historical buildings and structures. The basis of the method is an integrated approach, which involves the examination of the object of study as an element of a single urban structure, which excludes the possibility of making limited and not complex decisions.

Key words: renovation of industrial facilities, multifunctional complex, architectural and urban planning analysis.

## 1. INTRODUCTION

Functional migration in an urban environment is not a new phenomenon. These processes, as a rule, are accompanied by a shift in the socio-political structure of society. The entry of our civilization into the post-industrial period caused, in different countries, to a greater or lesser extent, the process of de-industrialization, which led to the shutdown of a large number of industrial enterprises. In Ukraine this process has taken on a gigantic scale. The stopped industrial enterprises formed depressed territories at different urban levels. Back in the middle of the last century, the first examples of renovation of industrial facilities under new functions appeared in the USA and England. Gradually, this process has become common practice in Western countries. In Ukraine, the first examples of the adaptation of industrial facilities to public functions occurred in the late 90s of the last century.

Nowadays, around the world, there is a desire to use multifunctionality, both in new construction and in reconstruction. In particular, the adaptation of industrial facilities to multifunctional complexes has become very relevant and has a promising future for Ukraine.

As a result of the analysis of scientific research in the field of renovation of stopped industrial enterprises for multifunctional complexes, the study of relevant legislative acts of Ukraine, such as the resolution of the Verkhovna Rada of Ukraine "On the Concept of Sustainable Development of Ukrainian Communities" (Postanjva, 1999), the Strategy for Economic and Social Development cities of Odessa until 2022 (Stratehiya, 2016) governing the revision of the use of urban areas; the study of world and domestic experience, revealed a methodology for analyzing an industrial facility undergoing renovation, according to various criteria.

It was established that this methodology should include: urban environmental analysis, historical and sociocultural analysis, technical analysis, architectural and planning analysis and analysis of monitoring public opinion (in the context of participatory design, when project development takes place with the direct participation of city residents at all stages of design).

## 2 LITERATURE REVIEW

The theoretical basis for this study is the fundamental work, articles, essays in the field of renovation of industrial architecture at different urban levels of Ukrainian, Russian, Polish and German specialists. Scientific and methodological studies in the field of rehabilitation of the architectural environment using depressed economic territories are presented in the works of I.M. Lobova (Lobov I.M., 2000, s. 68-78), S.S. Storozhuk (Storozhuk S.S., 2018, s. 7-11), Ya.T. Senkovskaya (Senkovskaya Ya.T., 2017, s.188-190).

Bartosz M. Walczak examines in his works the industrial heritage on the example of Lodz, as one of the components of territorial capital included in the concept of economic geography and having both tangible and non-tangible assets (Bartosz M. Walczak, 2016, s. 45-56).

I.G. Lobov proposed a methodology for the rehabilitation of the architectural urban environment using the example of the Donetsk-Makeevka agglomeration (Ukraine). S.S. Storozhuk examined in detail the methodological aspects of assessing the factors of influence on the reorganization of depressed economic territories using the example of Odessa. I.T. Senkovskaya developed the directions of pre-project analysis for the territories of industrial facilities.

The problems of a soft approach when working with monuments of industrial heritage and the methodology for adapting them to new conditions are disclosed in the writings of Alex Föhl [Alex Föhl, 1996, s.129-135], M. S. Stiglitz (Stiglitz M. S., 2003, s.147-153), Oscar Spital-Frenking (Spital-Frenking, 2000, s.166-169) and S.E. Ivanov-Kostetsky (Ivanov-Kostetsky, 2011, s.178-181).

Alex Fell outlined the problem of using industrial monuments in Germany and finding ways to socialize such objects, and Oscar Hospital-Frenking revealed 10 principles for working with architectural monuments of any functional purpose.

M.S. Stieglitz developed criteria by which an industrial facility can be designated as a monument of architecture, and S.E. Ivanov-Kostetsky gave a methodology for identifying valuable characteristics of a monument of industrial architecture to select the optimal principle of rehabilitation.

The concept of organizing a loft in industrial buildings is considered in the work of O.A. Popova (Popova, 2013, s.143-150). Yu. A. Suprunovich proposed a methodology for designing shopping malls in conditions of adaptation of industrial facilities.

The analysis of special literature and scientific works showed that issues of the methodology for the formation of multifunctional complexes based on the renovation of industrial buildings were not comprehensively considered in these works.

### **3 ALGORITHM OF ANALYSIS OF THE INDUSTRIAL PROPERTY FOR RENOVATION UNDER A MULTIFUNCTIONAL COMPLEX**

#### **3.1. Urban analysis of the renovated enterprise**

It is necessary to conduct a detailed the urban planning analysis. The study of foreign and domestic experience in this area reveals three main types of industrial facilities:

Type 1 - Industrial facility located in a residential development system.

Type 2 - Industrial facility on the border with residential development.

Type 3 - Industrial facility away from residential buildings.

As a rule, objects of *the first type* had a low hazard class, had a small cargo turnover, automobile transport was used as movements; their sites are characterized, starting from the smallest areas of about 0.5 ha to 60 ha. These are enterprises of light and food industries, instrument making, and electronics.

*The second type* is characterized by the presence of a middle class of harmful production and cargo turnover, the use of road and rail transport; the area of the site ranges from 70 ha to 500 ha. Usually these are engineering enterprises, textile enterprises, and the production of building materials.

*The third type* of enterprises had a high hazard class, large cargo turnover, road and rail transport. The plots had an area of 800 hectares and more. These are enterprises of the chemical, metallurgical, oil refining, mining industries, as well as energy industries.

When developing the urban planning analysis, it is important to study the functional planning structure of both the site itself and the surrounding buildings. Identify historically significant objects, service radii, visual and territorial relationships, give an analysis of existing traffic and pedestrian flows, identify the advantages and disadvantages of the site in the context of adapting to a new function.

It is important to give an urban development assessment using the provisions of the city development strategy and the general plan as a whole.

#### **3.2. Historical and sociocultural analysis**

Historical and sociocultural analysis plays an important role in identifying a territory in the process of finding ways to transform it. The building does not exist outside the place. Each architectural object is unique. In the process of analysis, it is important to fix a special "industrial spirit" (genius loci) of an object and territory, taking into account tangible and intangible values.

An industrial object is always a concrete, definite place that possesses not only objective, fixed parameters, the presence of a common history, but also an individual character, a spirit that can be felt, caught on an irrational level. A building changes and transforms the place. This transformation can "kill" or depersonalize it, and can emphasize features, manifest and express its essence. The

competent transformation of stopped industrial facilities will help preserve the industrial history for future generations.

According to the results of the analysis revealed that industrial facilities undergoing renovation, in particular, for multifunctional complexes, can be divided into three main types:

Type 1 – they are historically valuable objects with a high level of architectural and artistic qualities.

Type 2 – they are historically valuable objects with an acceptable level of architectural and artistic qualities.

Type 3 – they are objects with a low level of architectural and artistic qualities.

The first and second types include monuments of history, architecture, unique objects. The second type includes objects that are not of aesthetic value, but have good architectural, planning and design indicators.

Depending on what type the building or complex belongs to, the soil is created for the adoption of the optimal direction of renovation.

### **3.3. Analysis of the technical condition of the object**

The composition of this analysis includes the implementation of technical, environmental and technogenic assessment of the facility and is an important component of the overall analysis. It is necessary to conduct a number of studies: analysis on the capital of a building and the percentage of its physical and moral depreciation; analysis of the spatial structure (including dimensions, grid columns, floor heights, etc.) and design solutions for industrial buildings; analysis of the degree of harmfulness of enterprises; analysis of facilities according to the degree of explosion hazard and fire hazard.

### **3.4. Architectural planning analysis**

To carry out architectural and planning analysis is also necessary in the context of adaptation of the object to new functions. The quality of the architectural and planning structure allows us to assess the degree of adaptability of the renovated object to functional migrations, the ability to perceive a new architectural and artistic language in combination with old elements. At this stage, using the results of urban planning and other analyzes, it seems possible to identify the concept of the functional content of the object and its artistic expressiveness, give a preliminary analysis of the resulting areas of the multifunctional complex for subsequent economic miscalculations, and suggest a socio-cultural effect as a result of integrating the studied object into the urban environment in a new quality.

### **3.5. Monitoring public opinion**

Designing with the involvement of residents, representatives of administrative structures, business, public organizations and others interested in the project will reduce possible misunderstanding of people about the upcoming changes. An analysis of public opinion at an early stage will allow you to receive offers from residents, clarifying the formed requests, to identify problems that are not noticeable to the specialist

## **4. CRITERIA FOR EVALUATING OF THE INDUSTRIAL FACILITIES**

**Criterion I.** Type of industrial renovation facility:

- I.- Separate production facility;
- II.- Complex industrial facilities;
- III.- Industrial area.

A separate object is usually located directly in the structure of residential buildings or between residential areas, which creates the prerequisites for creating a multifunctional integrated structure.

The complex of production facilities is located on the border of the residential territory. The industrial area is located at a considerable distance from the residential territory.

**Criterion II.** The architectural, artistic and historical value of the object.

Depending on what period the object was built (the stage of production of goods, the stage of formation of industrial architecture, the stage of industrialization) and what its historical value is, the following types can be distinguished:

I.- Historically significant object;

II.- Typical or neutral object.

**Criterion III.** The degree of preservation of the industrial facility.

It is characterized by the degree of integrity of the original image and constructive solutions.

1. 100%.

2. 99 - 80%.

3. 80 - 40%.

4. 40 - 0%.

**Criterion IV.** The degree of adaptability of the object to new functions.

I.- Optimal degree;

II.- Permissible degree;

III.- Low degree.

This criterion is formed on the basis of the analysis. The more positive indicators for the formation of a multifunctional complex on the basis of the studied object, the higher the degree of adaptability.

**Criterion V.** The feasibility of functional reprofiling:

D. - appropriate.

N. - impractical.

This criterion is final and is final when making a decision.

## 5. CONCLUSIONS

The proposed methodology for analyzing a renovated industrial facility allows us to identify the type of multifunctional complex that is optimal for a particular building or complex, as well as the correct choice of the renovation method. As a result of multilateral analysis, three main types of multifunctional complexes were identified that are formed on the basis of an industrial enterprise: small (three to five functions), medium (more than five functions) and large (complex multidisciplinary systems). Small complexes are usually formed on the basis of a separate industrial facility, medium ones – on the basis of a separate facility or production complex, large - on the basis of a production complex or industrial area. After choosing the type of multifunctional complex, you can proceed to the development of a conceptual project, on the basis of which the economic component of renovation will be calculated.

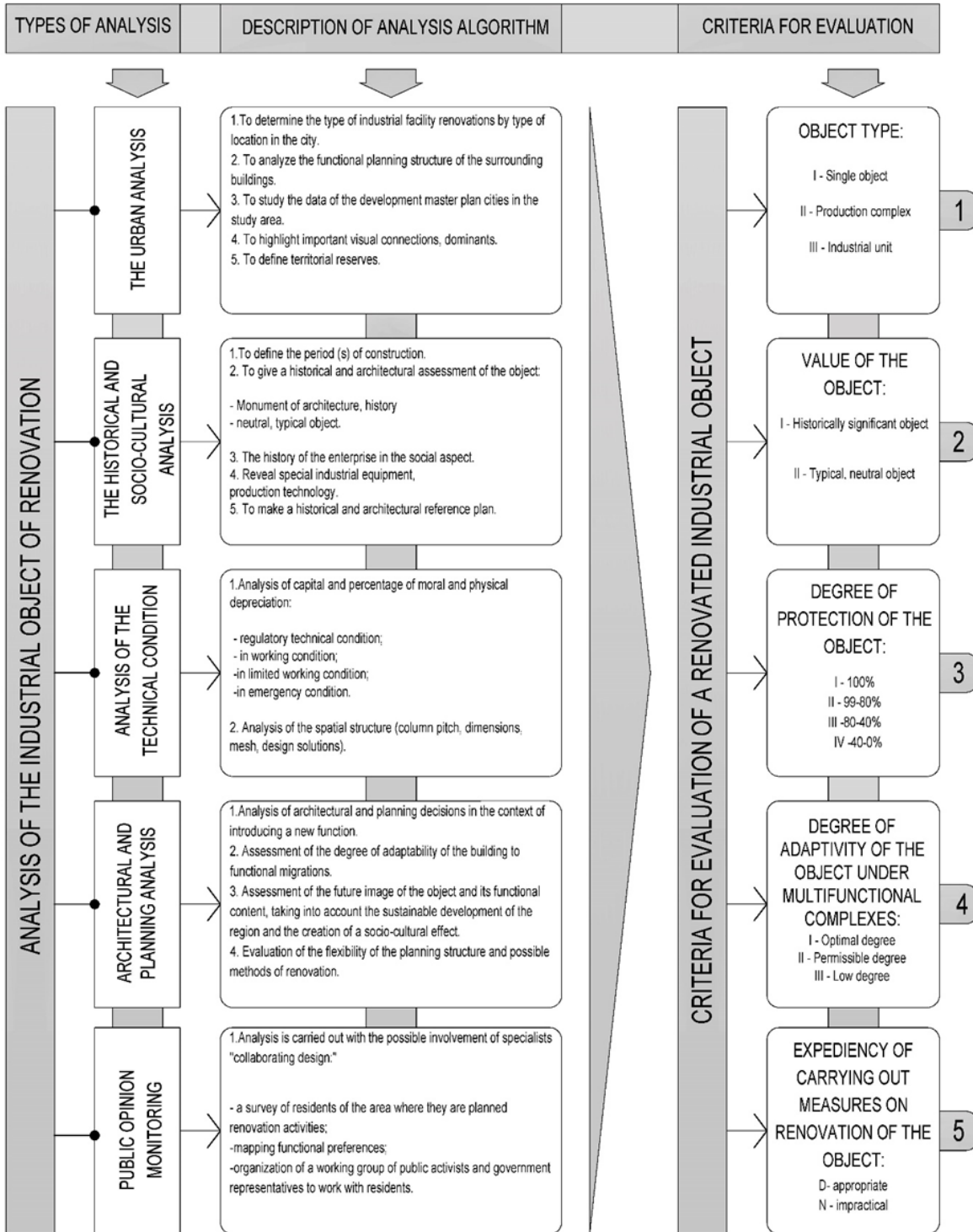


Fig. 1 Methodology for the analysis of a renovated industrial facility for a multifunctional complex (compiled by Dmytryk N.O.).

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