

## CONSTRUCTION AND OPERATION OF RESIDENTIAL AND NON-RESIDENTIAL COMPLEXES BROWNFIELD IN THE CIRCULAR ECONOMY



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**Abstract.** The article examines the problem of transformation of mining complexes of the BROWNFIELD type, territories that were previously exploited for industrial purposes. The author analyzed the management of brownfield-type facilities in Ukraine and world practice. The statistics indicate that Brownfields have significant potential for development. They can be used for the creation of new manufacturing enterprises, logistics centers, warehouse complexes, shopping centers, residential complexes and other objects.

Specific approaches have been identified for the effective development of mining complexes of the brownfield type, as well as a system of incentives for investors and government officials who are engaged in the redevelopment of brownfields. Successful redevelopment and renovation of brownfields have been established in various parts of the world.

**Keywords:** *brownfields, industrial parks, circular economy, green renovation, residential complexes, management, redevelopment, private investors, environmental aspects.*

### **Introduction**

A large number of industrial territories are concentrated in Ukraine, a significant part of which has gradually passed into private ownership since 1991. In 2020, there were already about 3,643 that remain in state ownership. Today, most of them are not used for their intended purpose and are in an illiquid state. The creation of industrial parks on the basis of these territories is one of the possible ways of their effective use and development.

The study of initiatives to create industrial parks on the basis of property complexes in various regions, the assessment of concepts and opportunities for socio-economic development are aimed at determining whether there is a threat of repeating the negative experience of free economic zones in projects for the creation and operation of industrial parks. Initiators of creation, state and local executive authorities and local self-government bodies should act in such a way as to prevent the negative consequences of park activity or to avoid their creation only at the conceptual level.

In Europe, IPs has a long history and operate successfully in many countries. They are an important tool for industrial development, contribute to the diversification of the economy and create new jobs.

However, in the process of creation and functioning of industrial parks in Ukraine, a number of challenges arise that must be overcome. One of these challenges is the threat of repeating the negative experience of free economic zones.

The purpose of the article is to analyze the challenges and prospects of creating industrial parks according to the principles of the circular economy.

To achieve this goal, it is necessary to solve the following tasks:

- To determine the challenges that arise in the process of creation and operation of industrial parks of the brownfield type in combination with the conditions of green restoration;
- Analyze the experience of creating and operating brownfields in different European countries;
- To determine the challenges that arise in the process of creation and functioning of industrial parks of the brownfield type in modern Ukraine;
- Develop recommendations to address these challenges.

**Literature review.** In the scientific literature, there is a significant amount of research devoted to industrial parks. In particular, works consider the theoretical foundations of the creation and functioning of industrial parks based on brownfield property complexes, their role in the development of the economy and the social sphere (Ernest, Lowe, 1997; Lentes, Hertwig 2019; Lambert, Boons, 2002).

Stimulation of sustainable development of mixed industrial parks was studied by A.J.D. Lambert and F.A. Boons (Lambert & Boons, 2002).

The impact of industrial parks on the overall energy efficiency of regions was studied by B. Zhang, Yu. L.Lan, and Chuanwang Sun, Ch. (2023).

The optimal design of the infrastructure of industrial parks was studied D. Aussel, Cao Van, K., Zhang, B., Lan Yu, L., & Chuanwang Sun, Ch. Aussel, et. al (2023).

A typological assessment of the concept of brownfield industrial parks was made P. D. Preston, R. M. Dunk, G. R. Smith and G. Cavan (Preston, Dunk, Smith, Cavan (2023).

The specifics of industrial complexes in the conditions of the transition from Industry 4.0 + to Industry 5.0 were studied M. Golovianko et al. (Golovianko, Terziyan, Branytskyi, & Malyk (2023), Anastasovski, (2023).

Local industrial systems to eco-industrial parks and models of ecologically equipped industrial territories were studied R. Taddeo (2016).

The ecological approach to the planning and design of industrial parks was revealed in his works by A.J.P. Carr (1998).

The studies [13-15] analyze the experience of the creation and functioning of industrial parks in different countries of the world.

In domestic studies (Golovianko, Terziyan, Branytskyi, & Malyk, 2023; Anastasovski, 2023), the peculiarities of the creation and operation of industrial parks in Ukraine are considered.

The United Nations Industrial Development Organization (UNIDO) is carrying out activities under the "Overview strategic foresight of the circular economy in Ukraine" within the framework of the EU4Environment program, which is financed by the European Union. Her task is to define the framework, develop scenarios, vision and roadmap. The methodology is based on the use of a synergistic approach to the creation of industrial parks and a set of tools, including interactive online tools.

**Research methodology.** The scientific and research methodology of statistics with the economical essence of the main complexes of the BROWNFIELD type can include the following stages:

1. Analysis of theoretical foundations. At this stage, the theoretical foundations for the maintenance of residential and non-living infrastructure facilities, as well as the concept of brownfield mine complexes, were analyzed.
2. Analysis of statistical data. Statistical data on residential and commercial complexes of the brownfield type, their number, growth, and the type of hair weeds have been analyzed.
3. Follow-up of specific cases. Scientific research of organizational and economic mechanisms for managing mining

complexes of the brownfield type in order to analyze the possibility of their transformation in the minds of a cyclical economy.

**Research results.** Industrial parks are specially organized territories intended for the location of industrial enterprises, which are provided with the necessary infrastructure and stimulated for investment activities. They have significant potential for increasing the competitiveness of Ukraine's economy and creating new jobs.

In some countries where industry is developed, ideas have arisen to create eco-industrial parks. Initially, such parks were focused on the exchange of resources between heavy industry enterprises located on the same site. These initiatives are also called the concepts of industrial symbiosis and eco-industrial parks. Later, the concept of eco-industrial parks was expanded to another type of park called mixed industrial parks. They consist of a variety of small and medium-sized enterprises (SMEs), sometimes with a small number of large enterprises (Lambert, & Boons, (2002).

Analysis of the experience of creating and operating industrial parks based on brownfield complexes in various European countries shows that they have a significant potential to increase the competitiveness of the economy and create new jobs.

In Europe, industrial parks are created both at the state and private level. It can specialize in certain industries or be multifunctional.

A brownfield is an area that has previously been used for manufacturing purposes, such as the area of a pre-existing plant, factory, workshop or port. Such sites, as a rule, are already equipped with buildings, structures and infrastructure of industrial or commercial purpose, which have the potential for redevelopment.

The main causes of brownfields are:

Deindustrialization is the process of reducing the share of industry in the structure of the country's economy. As a result of deindustrialization, there is an excess of production capacity, which leads to the closure of enterprises and the release of industrial territories.

- Processes of property transformation – privatization, restructuring or bankruptcy of industrial enterprises. As a result of

these processes, enterprises can lose control over their production assets, which can lead to environmental pollution and destruction of infrastructure.

- Technical progress – the development of new technologies can lead to the closure of outdated industrial enterprises.

According to the research conducted in Ukraine, the largest number of brownfields was formed at the site of industrial enterprises belonging to the following industries:

- Mechanical engineering (13%)
- Production of food products (28%)
- Textile production (21%)
- Mining industry (10%)
- Metallurgical production (10%)
- Chemical industry (5%)
- Production of construction materials (5%)
- Electronic industry (2%)

Brownfields have significant potential for development. They can be used to create new production enterprises, logistics centers, warehouse complexes, shopping centers, residential quarters and other objects.

For the effective development of brownfields, it is necessary to take the following measures:

- Ensure proper control over the state of the environment in these territories.
- Create a system of incentives for investors engaged in the redevelopment of brownfields.
- Develop effective brownfield management mechanisms.

The development of brownfields can make a significant contribution to the economic development of the country. They can become a source of new jobs, investments and tax revenues.

**Discussion of research results.** In order to identify approaches for the functional transformation of brownfields, the global organization CABERNET (Concerted Action on Brownfield and Economic Regeneration Network, EU) has developed an A-B-C classification that focuses on how brownfields can be effectively used (World Bank, 2010).

In world practice, there are three forms of organizing the reuse of obsolete industrial zones, which differ in the degree of contamination of the territory and the level of state involvement in the redevelopment process:

- Form A – applies to minimally polluted objects located in a commercially attractive

location. These areas can be revitalized by private investors for high profits. The role of the state in these projects is reduced to the necessary coordination and issuance of permits within the framework of city development planning.

- Form B – applies to objects with moderate pollution. Projects are implemented on the basis of private or public-private partnership. Sometimes, direct financial assistance from the public sector is allocated for the restructuring of industries, subject to the fulfillment of planned socio-economic tasks.
- Form C – socially oriented projects – are carried out mainly in situations of significant pollution of the industrial zone, uncertainty of brownfield specialization and prospects for commercial use of the land plot. In these cases, the state assumes a more active role in financing and implementing projects.

According to the research conducted in Ukraine, the vast majority of brownfields (54%) belong to category B. The second place was occupied by objects of category A (49%), the third (21%) – category C.

Thus, all categories of brownfields exist in Ukraine with varying degrees of prevalence:

from those that are slightly ecologically polluted and are located in an attractive commercial location to those that show signs of severe pollution and are located in a commercially unattractive location with an inactive real estate market (for example, in depressed cities and districts).

King's Cross, London, Great Britain – an example of successful brownfield redevelopment.

King's Cross is one of the largest renovation projects of a former industrial zone in Europe. The project was implemented within the framework of the development plan of the city of London and was aimed at creating a new city center that would attract both residents and tourists.

The project began in the 1990s and was completed in 2012. As part of the project, the railway station was reconstructed, new houses, shops, offices, bars, restaurants, schools and even a university were built.

The redevelopment of King's Cross had a significant positive impact on the development of the City of London. He contributed to the growth of the city's economy, the creation of new jobs and the improvement of the quality of life of residents.

## Conclusions

Property complexes of the BROWNFIELD type have significant potential for the development of new business processes. They can be used to create new production enterprises, logistics centers, warehouse complexes, shopping centers, residential quarters and other objects.

For the effective development of brownfields, it is necessary to take the following measures:

- To ensure proper control over the state of the environment in these territories.
- Create a system of incentives for investors engaged in the redevelopment of BROWNFIELD-type property complexes.
- Develop effective brownfield management mechanisms.

The development of brownfields can make a significant contribution to the economic development of the country. They can become a source of new jobs, investments and tax revenues.

Successful examples of brownfield redevelopment show that these projects can be effective and contribute to the development of the economy of the region and society and a certain territory.

The following aspects of brownfield redevelopment are especially important:

- Consideration of environmental aspects.
- Involvement of private investors.
- Strategic foresight in the context of circular economy and green recovery.

For Ukraine, which is going through the process of deindustrialization, the redevelopment of brownfields is an important opportunity for creating new jobs and economic growth. The Government of Ukraine can introduce appropriate measures to stimulate this process, for example, develop legislation that would facilitate the attraction of private investors and provide financial support for redevelopment projects.

In further scientific research, it is advisable to devote to the search for new solutions for the use of property complexes of the BROWNFIELD type for waste processing and solving the problem of the accumulation of construction waste, which leads to environmental pollution.

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