Problems of Formation of Architectural and Spatial Composition Organization of the Environment of Donbas Mono City

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Abstract. One of the city-forming factors for the development of the Donbas region is the creation of large full-cycle industrial complexes situated together as a group of several related industries. It allowed for the efficient use of urban lands and opened up wide range of opportunities for achievement of technological, compositional and spatial unity of industrial complexes. During industrial cities development, the residential districts was formed as large industrial complexes expanded. The historic centers of industrial cities are characterized by the grouping of cultural heritage sites around individual (usually the most powerful) industrial enterprises, most often coal mines, metallurgical and coke-chemical enterprises. The most advanced city planning ideas of the 20-50's were fully reflected in the planning structure and features of construction of industrial cities of Donbas. Many preserved and partially lost monuments of industrial architecture, as well as those that can claim such a status, are objects of protection of historical and cultural heritage, characteristic of the industrial type of cities. There are a number of specific problems inherent to cities of different categories. The major ones are those caused by significant discrepancy between the real state of the urban environment and its required state. Finding solutions to problems of corporate cities requires a multifaceted approach, as the prerequisites and characteristics of different cities can vary greatly due to historical and economic factors. Therefore, approaches to addressing the issue of corporate cities should be considered individually, considering global trends and regional peculiarities of individual regions.

1. Relevance
Donetsk region is the largest industrial district of Ukraine, which is very interesting in terms of history and practice of urban planning in Ukraine. However, it remains less explored than other regions and some aspects of its development are not reflected in the history of architecture and urban theory of Ukraine. Because of that, residents of other regions of Ukraine and the world at large perceive the value of the Donetsk region’s cultural image as low.

In the second half of the nineteenth century, when the country's industrial development intensified, the first industrial boom in the East began. It was interrupted by the revolution of 1917, due to which the cities lost foreign investments and the active construction of the Donetsk region slowed down. The
second industrial boom (1945-1970-ies) began after the end of World War II, when the damaged and destroyed factories were rebuilt accompanied by landscaping of the surrounding territories.

A combination of factors influenced the emergence and development of Donbas cities. It is established that the most significant factors were: 1) the presence of minerals; 2) the availability of cheap labor; 3) railroad construction. These factors contributed to the attraction of investments and the emergence of industry in the region. Over time, a large system of cities and towns, specialized by industry, was formed on the basis of it [1-3].

Most of these cities are characterized by the following factors: the presence of a low-power economic base; the narrowness of the industrial sphere; closure of enterprises; population outflow.

Today the city’s historic centers are characterized by a grouping of cultural heritage sites around non-operating industrial enterprises. Objects and areas that used to carry out their traditional function (like housing and recreation) are undergoing significant changes. Because of this, the environment becomes depressed (as it carries a negative socio-psychological message for residents). Therefore, revitalization of the industrial buildings in post-industrial cities, preserving historic sites and changing the territories of industrial zones become an urgent issue.

2. Data analysis
The recognition of the industry as the main factor forming the city led to the emergence of the scientific term “industrial city” – a city of a special type with its own industrial specialization and corresponding development characteristics.

Corporate cities are widespread in all countries of the world that have begun industrialization. These cities were built around business enterprises, initially as working settlements ("industrial colonies" in Spain, "factory settlements" in Germany, "corporate cities" in the United States and Britain, "industrial mono city" in Eastern Europe).

Therefore, a mono city is an industrial center that is dominated by one enterprise (or industry). Other possible characteristics of a mono city include: isolation from large settlements; corporate paternalism; the dependence of a significant part of the population on the town-building enterprise (to varying degrees, but in all aspects – economic, cultural, emotional); economic interconnection of the enterprises of the city, formed after the town emergence [4, p. 8-10].

Typologically, mono city is divided by sectoral affiliation (mono-profile cities of light industry, mechanical engineering, etc.) [5], or by structural features of relations with the enterprise (mono profile satellite cities, cities with several city-forming enterprises, cities with single city-forming enterprise) [6].

The economic development of the Donets region is connected with the discovery of coal deposits in 1721 by Nikita Vepreisky, who represented civilian authority in the Bakhmut district, and Semen Chirkov, commander of the Bakhmut fortress guard battalion [7].

Active development of the region begins with the start of the reforms of Alexander II. Said reforms gave a powerful stimulus to the socio-economic development of both the empire as a whole and its individual regions. The prevalence of subsistence farming in the post-reform period created a market for capitalist production. In the second half of the 1860's of the XIX century, the rapid growth of the factory industry began. Peasant reform of 1861 contributed to the emergence of cheap labor, which contributed to the extremely high standard of its operation. Spatial forms become ambivalent, combining the features of advanced industrial cities and the development of peasant housing. However, the rapid pace of urbanization attracted foreign capital to the country, which bought the shares of Russian companies, financed domestic enterprises. From the end of the 1860's an intensive uplift of the Donbass coal industry began. Capitalist entrepreneurship has gained particular attention in connection with the construction of railways in the south of Ukraine. Because of this, the cities formed rather compactly, creating a large number of agglomerations (as typical for all of the highly urbanized areas of the world). In the early 1870's, the English capitalist J. Hughes built a large metallurgical plant in the Donets basin. In the second half of the 1880s - early 1890s, new metallurgical plants were built in Ukraine, including
the plant of the Donetsk Society in Druzhkivka [7]. The first industrial boom in the East began in the 2nd half of the 19th century and lasted until 1917.

In just a few years the steppe part of Ukraine has acquired industrial features. The natural landscape was being replaced by the industrial - formed by human production activities and subordinate to the needs of industry. Industry was perceived as a visual "highlight" of the region [4, p. 44]. The dominance of industrial objects as spatial dominants became evident.

The location of business enterprises and residences was entirely determined by the interests of entrepreneurs and other individuals seeking to capture the most convenient and profitable areas. The residential development was mostly typical, fulfilling only its main function. However, the external monotony fully corresponded to the advanced urban development trends of its time - a managed and controlled city.

In the early twentieth century, cities already had a more streamlined planning structure. The centers were built by professional architects and town planners, including those who were invited by the business owners from abroad (village Novo-Chaikine - architect Pushkaryov V I, village Zhovtneve - architect Trotenko V, village Radialne - architect Beketov O, social center Makiivka - architect E May, M Stam). For this reason, it is possible to trace the contrasting combination of the chaotic development of the periphery and the clearly defined blocks of the city center. This, in turn, formed a clear social structure of the settlement. The richer residents (management, officials) lived in the central orderly areas, while the poorer residents (workers and their families) lived in the periphery in the barracks or dugouts with mostly chaotic development. However, the entire disparate structure was held together by the factory as a center of gravity, and the urban space was oriented on its buildings (Figure 1, 2).

![Figure 1. Fragment of Sloviansk city panorama. Postcard, 1902 (top) and current status, 2019 (bottom)](image)

According to researcher Rafiyenko V, the main city-forming factor in the Donbas region was not national or cultural, but an economic one (with the enterprise as a center of community), while people as individuals were of no particular interest to anyone. The determining factor was their professional and business suitability [5, 8]. This is typical of most industrial cities in the world.

After the revolution of 1917, the active construction in Donetsk region slowed down. Cities lost foreign capital; many enterprises stopped working and were nationalized. The quality of the manufactured goods dropped, there was a brain drain and loss of technologies.
In the early 1930's, the concept of the “socialist city” began to be actively developed as a means of quickly solving a number of urgent problems. Among these problems were resettlement of the rapidly growing population of industrial areas, the provision of the production process with necessary resources, and the introduction of "new life" practices [4, p. 84-87]. The construction of new social sites began far from the existing settlements, and consequently the buildings were deprived of the urban context. In the late 1930s the territory of the Donbas became the region of the USSR with the largest area of landscapes, altered by human intervention (that will be called anthropogenic landscapes in the Soviet literature since 1970s) [4, p. 54].

Figure 2. Fragment of Kramatorsk city panorama. Photo card, 1920 (top) and current status, 2017 (bottom)

The second industrial boom began after the end of World War II, when the damaged and destroyed factories were rebuilt, landscaping was created, mining villages were reconstructed.

The industrial landscapes and the work of the workers themselves are ideological. Industrial landscapes are the object of aestheticization.

In the 1960s and 1970s, a special program for landscaping was launched. The ideology of landscaping was brought to the level of state instructions and included in the projects of construction of new cities. The cities were to be surrounded by 5 to 30 km of “green” zones.

Another manifestation of traditionalism and historical legitimation appeared in the post-war search for a «national» feature in architecture (the way Stalin saw it). It was in the individual house that the elements of national Ukrainian features of the region's architecture were searched for. Donbas village dwelling is closer to urban dwelling in its architectural and artistic image than the historically formed peasant house. This is accentuated by the presence of a veranda, increased height of the premises with increased window sizes, the use of factory roofing materials, etc. (However, many features of Ukrainian folk housing were preserved in its exterior) [4, p. 90].

The development of new urban areas was separated by significant distance from the historic center of the city. As a result, it became increasingly disordered and disjointed. Discussions about the future development of the Donbas started calling for following traditional features of the coal miner's settlements (proximity of housing to production, manor-building). Industrial mono city reflected their entire life cycle in district and urban spatial development (kindergarten, school, professional lyceum, factory, cultural house). This was supported by the growth of cities that already had a complete
compositional and spatial structure. Thus, each new district had a central industrial facility around which all infrastructure, social security facilities and residential quarters were built. These districts, in turn, were located outside the historic boundaries of cities with their central industrial site (often not in use yet). Consequently, industrial vacant lots formed in the centers of historic cities – as large territories littered with industrial debris.

The process of forming such industrial zones is traced to the master plans of cities. There it can be seen that residential development and social infrastructure of residential areas are formed around industrial zones (Figure 3, 4).

In 2014, Donetsk was one of the most economically developed regions of Ukraine. Its main inter-branch complexes are: energy, metallurgical, mechanical engineering, chemical industry. The suburban type of agriculture is predominant. Well-developed transport and recreation complexes are present.

3. Research results

Donbas is characterized by the specifics of the formation of cities with a high level of urbanization, which have developed historically. Cities of Donbas are multifunctional and monofunctional industrial-administrative centers with developed functional-planning connections.

Identified problems of mono-cities can be structured into the following groups: urban (those that have arisen because of urban and architectural development of the urban environment), regional (caused by the formation of historical regional features), spatio-functional (as a result of volumetric spatial development), socio-economic. In addition, every problem identified has its impact on the architectural planning as well as compositional and spatial organization of the environment of industrial mono city. The problems and the level of their influence are clearly comprehensively presented in Table 1.

4. Conclusions

This study identifies and structures the problems of forming the environment of industrial mono city of Donbas. The classification of said problems is given, and the degree of their influence on the architectural-planning and spatial composition organization of the urban environment is determined. The state of the problem core of Donbas national mono-cities and their planning has been established.

The city is a complex system. The uniqueness of the city is not only in the elements of which it consists, but also in the nature of the interaction between these elements. The nature and mechanism of these relations in accordance with the principle of integrity is deemed interesting. According to it, the city can be considered as a holistic system. The location and relative position of all elements has its own
rationale. Each element of this system has to be interchangeable and variable. At the same time, a complex system of interaction between urban environment facilities should not be linear. This eliminates the possibility of problems of single-industry towns when the exclusion of one element (factory) leads to the failure of the entire algorithm of the city’s life.

Table 1. Problems of formation of environment of industrial mono city of Donbas

| № | Problems | Architectural planning | Compositional and spatial |
|---|----------|------------------------|---------------------------|
| Town planning | External monotony of rational planning | | |
| | The ideology of landscaping | | |
| | Orientation of urban space to the plant | | |
| | Distinct urban space | | |
| | Industry dominating as spatial dominants | | |
| | Social cities without urban planning context | | |
| | Loss of individuality of an image of an urban environment | | |
| | Use of a historical and regular grid of streets that do not correspond to the terrain | | |
| Regional | A large number of agglomerations | | |
| | Vacant industrial lots | | |
| | The combination of chaotic and ordered construction | | |
| | National features - mainly in the housing exterior/construction | | |
| | Prejudices about the need of a special way of life for workers and, consequently, avoiding new trends in architecture | | |
| | Submission to the ideological views of the past | | |
| Spatio-functional | Ambivalence of spatial forms | | |
| | Anthropogenicity of landscapes | | |
| | Absence of hierarchical tissue structure in superficiality and scale | | |
| | The presence of disturbed areas adjacent to the building or included in its structure | | |
| | Underdeveloped social infrastructure that corresponds to the time of its construction, but not to present conditions | | |
| Socio-economic | Clear social structure of settlement | | |
| | Reflection of the whole life cycle in the district and urban development | | |
| | Differences in the ordering of the central, middle and peripheral zones | | |
| | Poor quality of life and high social conflict | | |
| | Deterioration of the environmental situation | | |

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