INDUSTRIAL ARCHITECTURE OF ODESSA FROM THE CONTEXT OF RENOVATION OF INDUSTRIAL OBJECTS

Scientific paper

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Nadiia Dmytrik
Odessa State Academy of Civil Engineering and Architecture, PhD Student
Corresponding author: nadja.dmitrikk@gmail.com
Valery Urenev
Odessa State Academy of Civil Engineering and Architecture, Doctor of Architecture, Professor

Abstract: This paper discusses the importance of studying and rethinking the history of the development of domestic industrial architecture. The chronology of the development of industrial architecture in Odessa against the background of the industrial history of Russia and Ukraine is considered. The main stages and time frames typical for Odessa are identified as pre-industrial (1791–1861), the stage of formation (1861–1917/20), industrial (1918/20–1985), and post-industrial (1986–present day). The paper presents a brief description of each stage along with the analysis of the current state of industrial architecture. In addition, the experience of the renovation of industrial facilities in Odessa is considered, and the main spectrum of new functions is revealed. Two types of renovation objects are identified: historically significant and typical. The renovation is considered as a method of stabilizing urban space.

Keywords: Industrial architecture, renovation of industrial facilities, stabilization of urban space.

1 INTRODUCTION

Odessa is filled with contradictions and has many historical features. The most famous feature is the southern imperial city with a hippodamic street system, luxurious palaces and mansions, and beautiful squares and architectural ensembles. The concept of Odessa can be observed in the design of Deribasovskaya Street, Primorsky Boulevard, Potemkin Stairs, and modern and classic styled buildings similar to those in the southern cities of Italy and streets of Vienna and Paris.

This contrasts with the industrial side of Odessa, which is surrounds the historical center with red brick facades and pipes of the pre-industrial stage, reinforced concrete buildings, special constructions of the industrialization era, and grain depots in the port area from the period of independent Ukraine. These two contrasting features of Odessa coexist but are currently in deep conflict with each other owing to the socio-economic and political changes occurring in the country.

Since 1992, Ukraine has been undergoing a process of de-industrialization. In large cities, such as Odessa, a number of depressed territories have already been established. Despite abandoned industrial areas being one of the most acute urban development problems of the city, the current reconstruction of Odessa is being conducted on a local basis, without a comprehensive approach to the existing problem and without considering the needs of the city. Recently, the need to study Odessa's industrial architecture and its vast range of modern problems has become increasingly apparent, and there is a need to solve these. One of the solutions is to renovate the enterprises and industrial territories that have stopped functioning in the city.

2 LITERATURE REVIEW

The theoretical basis for this study is the fundamental work, articles, and essays in the field of industrial architectural development in Ukrainian, Russian, and other foreign specialists.

Scientific and methodological studies in the field of architectural and planning development of urban planning systems of different hierarchical levels have been presented by Glazychev [1] and Gutnov [2].

The formation of industrial architecture has been reported by Kim [3] and Vershinin [4]. In addition, Lobov [5] and Senkovskaya [6] reported on the issues in the organization of architectural and spatial environments based on the reconstruction of industrial areas.

Suprunovich [7] and Popov [8] recommended the renovation of the nonfunctioning industrial architectural objects for public and residential use. Further, Fel [9] and Stieglitz [10] reported on the issues of preserving the industrial heritage.

Rashkovsky [11], Goncharuk [12], Sherstobitov [13], and Timofeenko [14] reported on the current conditions of industries in Odessa and proposed their development.

3 METHODOLOGY

The methodological basis of the study provides an integrated approach, which involves the consideration of the object of study as an element of a single urban structure, excluding the possibility of making limited and noncomplex decisions. To achieve the goals of the present study, the following methods were used.

• A method of historical and genetic analysis was used to identify the evolutionary development of the industrial architecture of Odessa and identify its features.

• A method of comparative analysis of design and graphic materials (master plans and plans of industrial buildings as well as archival documents) was used to determine the method of renovation, compare the results, and identify the features of the formation of new functions in the nonfunctioning industrial enterprises of Odessa.

• Deductive and inductive methods were used to generalize and comprehensively systematize the data and results obtained in general.

• A graphoanalytical method was used to identify frequently used new functions in renovation objects.

• A method of visual observation and photographing of territories with objects of industrial architecture was used to identify the current state of the waste areas of Odessa.

4 HISTORY OF THE DEVELOPMENT OF INDUSTRIAL ARCHITECTURE OF ODESSA

4.1 A brief history of Odessa lands

Odessa is located on the northern coast of the Black Sea, which has been occupied by generations of people. This area constitutes ancient Greek settlements and has been known to be home to Slavic tribes in the past. In the 13th–14th centuries, the Mongol-Tatar conquerors ruled here; these lands were then passed on to the Grand Duchy of Lithuania. In the 15th century, the Northern Black Sea region became the prey of the Ottoman Empire. In 1764, on the site of the future Odessa, the Turks founded the Yeni-Dunya fortress, in some sources referred to as Hadzhibey. During the Russo-Turkish war in 1789, this fortress was seized by the Russian army, and in 1794, Catherine II laid the foundation of the city of Odessa here [14].

4.2 Stages of development of industrial architecture of Odessa

The industrial development of Odessa began with its inception. The rapid growth of the city resulted from the intensive economic development of Russia in connection with the displacement of the center of mining from the Urals to the south. This city became the country's gateway to the Black Sea. The industries were built for processing exported and imported goods, serving the ports, railways, agricultural industries, and satisfying the needs of the population [13]. The study of this issue revealed the following chronology of the development of the industrial architecture in Odessa against the background of the industrial history of Russia and Ukraine (Fig.1).

4.2.1 The pre-industrial period covers the period from ancient times to 1861

This stage is divided into the period of agrarian and craft production (from ancient times until the end of 1791) and manufacturing (from 1792 to 1861) [16]. The lands of the modern Odessa region are a kind of corridor of history; frequent wars and raids did not allow the people to settle here over a long period, thus causing the conversion of these lands into wild fields, until 1791 (Yassy World). Therefore, the monuments of the industrial architecture, which originated from the period of manufacture, were not preserved until 1791.

During this period, Odessa quickly became the largest center of mill production in the Kherson province. The first windmills appeared a few years after the foundation of the city, and in 1803, their number increased to 21 [12]. In 1820, the so-called near and far mills with rectangular grids of neighborhoods were formed next to the windmills [14]. Today, the microdistricts with the same names are located here; one of the streets was named in honor of Fyodor Pishenin as it housed three of its mills. Up to the end of the 19th century, about 20 windmills were preserved in the Ivanovo overpass area.

Buildings of manufactories were built using wood, stone, shell rock, and brick. The architectural planning of these objects followed the principles of civil engineering, and they were built as single-story buildings or were as high as four floors.

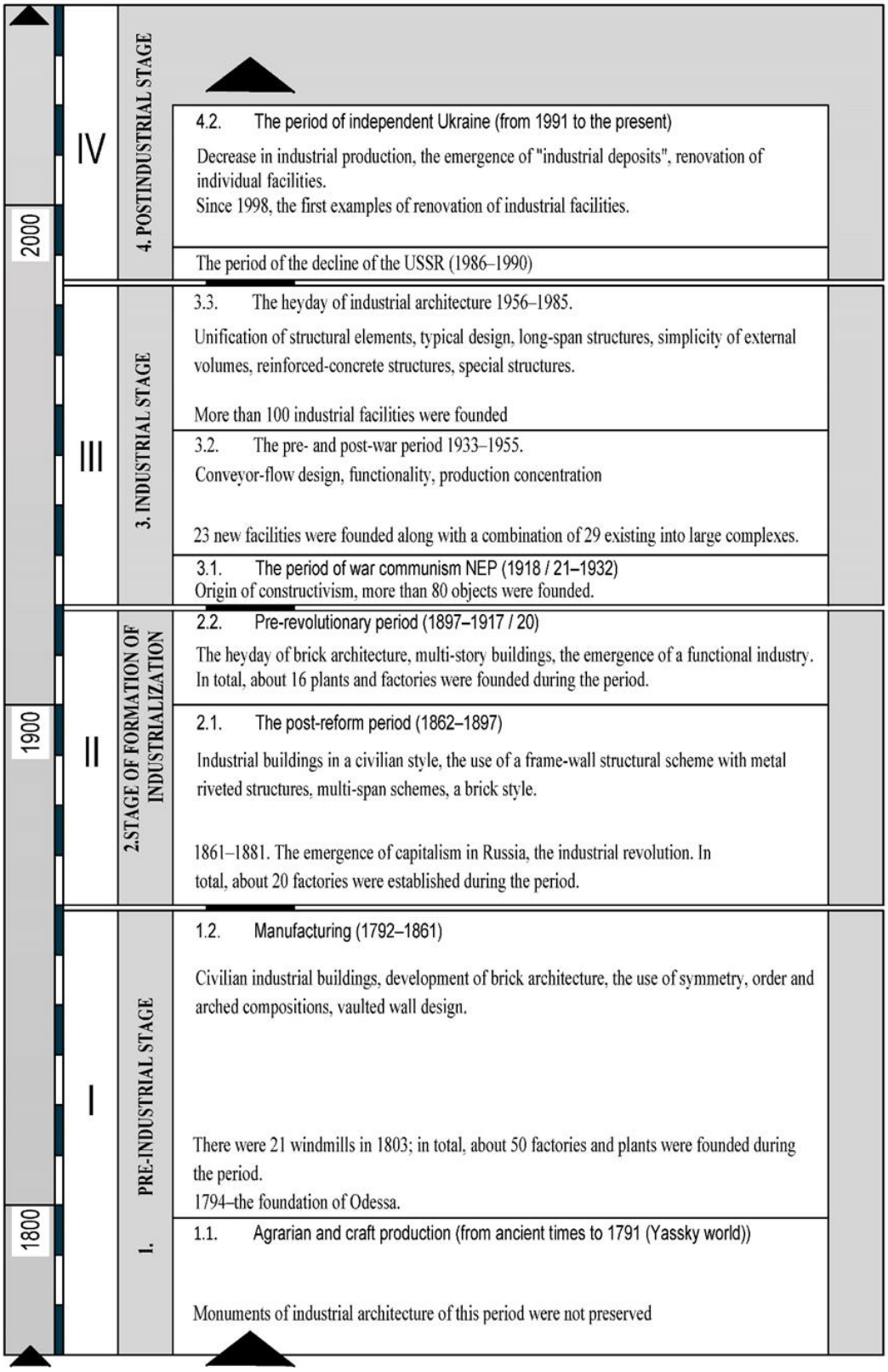


Figure 1 Stages of the development of the industrial architecture of Odessa

The structural system included vaulted and frame walls that were distributed over single and double span of buildings. By inheriting the techniques of civil architecture, a regular plan, symmetry, and a п-shaped development was applied. In addition, ordered and arched compositions were used along with a brick architecture. Examples of buildings of this period that have survived to this day include cereal shops (the Papudovs' house) of the 1st half of the 19th century along the Preobrazhenskaya Street and grain stores (later the Saban barracks), built by the architect, Toricelli in 1827 (Figs. 2a and 2b). The Rabinovichi warehouses along Pushkinskaya and Skalkovsky streets along Zhukovsky street are also of interest (Fig. 2).

4.2.2 The stage of the industrial formation (1862–1917/20)

This stage was associated with the abolition of serfdom in 1861 along with other reforms, which contributed to the rapid development of the "industrial revolution" in the Russian Empire. This stage can be divided into two periods: the post-reform (1862–1897) and the pre-revolutionary periods. The prerevolutionary period began at the end of the 19th century and ended in 1914–1917/20 [15].
This stage is famous for buildings such as the steam locomotive workshops of Baron Ungernsternberg, (architect A.D. Todorov), Vainshtein mill, Reshelevsky tram depot (architect A.B. Minkus), tram depot on the Alekseevskaya square (architects Lev Vladek and Semyon Landesman), and red warehouses on the territory of the Quarantine Harbor. All these significant objects are designated today as architectural and historical monuments.

a)

b)

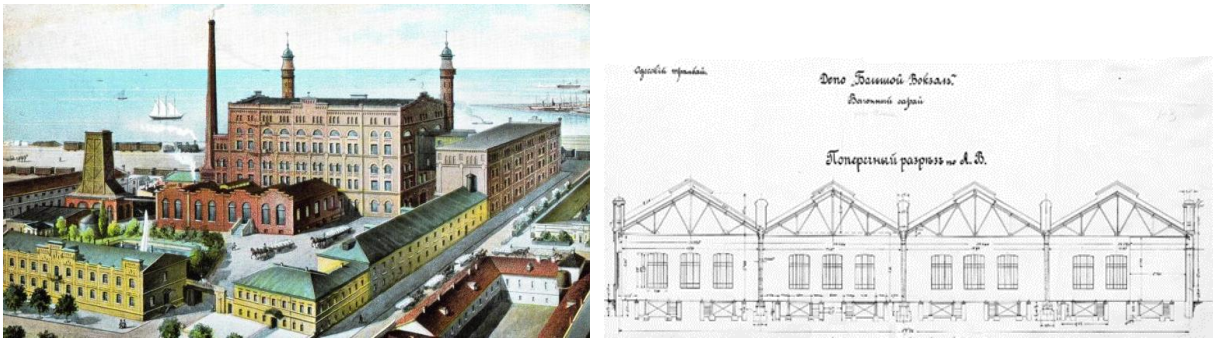
Figure 2 a) Grain shops (House of Papudovs) built in the 1st half of the 19th century [17] and b) Grain shops that were later converted to Saban barracks in 1827 [18]

The Odessa locomotive workshops of Ungernsternberg (later, the origin of the January Uprising) at the time of foundation (1863) were the second largest in terms of the number of employees (1000 people) after the jute factory (1200 people). The greatest interest from the architectural and constructional point of view is the steam-engine repair shop. This is a one-story, two-span building with dimensions of about 12 m (high) × 80 m (length) × 35 m (width) and three-story extensions at the ends. The annexes were designed in the form of towers with decorated cornices, parapets, and belts. The bottom of the outbuildings comprises vestibules and gates for the entry of steam locomotives into the workshop.
The wall masonry is made of red bricks of high quality. For architectural and artistic expressiveness of the building, motives of Romanesque and Gothic architecture were used, as well as decorative brickwork techniques of individual facade elements, which was traditionally used in factory architecture during those years [11] (see Fig. 5a).
Weinstein's Odessa mill was founded in 1844. After repeated reconstructions and rebuilds, the original wooden complex of the mill buildings was rebuilt into a brick building with an internal reinforced concrete frame and silos. The building consists of two volumes: a four- and a six-story building. Note that this is the first multistory building of Odessa. This architectural solution used civil engineering techniques, such as arched windows, twin window openings, a special pattern of masonry towers, and domes (Fig. 3 a). In total, over 35 factories and plants were founded over the entire period.

In summary, the main features of the industrial architecture of Odessa of the industrial formation stage can be distinguished. The continuation of the inheritance of architecture would include the use of a regular plan, symmetry, coloring of brick architecture (e.g., the Reshelevsky tram depot by architect A.B. Minkus shown in Fig. 3b), and a unique building in terms of architectural expressiveness. In addition, a frame-wall system with riveted metal structures along with a multispan type of building was used. This era also saw the development of residential territories, workers settlements (Bolshevik), and the town-forming role of the industry. Moreover, multistorey industrial buildings started emerging in this era.

4.2.3 The industrial stage (1918/21–1985)

This stage can be divided into three periods: the first period is from 1918 to 1932, which is termed as the period of war communism and the new economic policy; the second period comprises pre- and post-war timelines from 1933 to 1955; and the third period includes the heyday of industrial architecture, i.e., from 1956 to 1985 ((Fig.1). During this period, Ukraine attained modern borders and boasted the most powerful economy in the Union of Soviet Socialist Republics. The countries proposed products, including those used in ferrous metallurgy, chemical industry, and mechanical engineering, in large volumes. Odessa, being one of the largest industrial cities of Ukraine, clearly demonstrates the process of industrialization in the country.
From 1917 to 1927, 37 new enterprises were built in Odessa, and during the first five-year period of 1928–1932, these grew to about 50 [12]. This implies that a new facility was built every 1.5 months. In addition, the region observed an active development of the material and technical bases of enterprises that already existed before 1917. For example, locomotive workshops and their territories were redesigned for crane-building plants, named after the January uprising (later "Krayan"). During this period, the Prodmash plant was founded. Moreover, the industrial boom was so high that along with the construction of new facilities using the latest construction and design technologies, public buildings were adapted to industrial functions. For example, the Lombard building (1904; by architect V.I. Prokhaska) was redesigned in 1930 as a sewing factory.

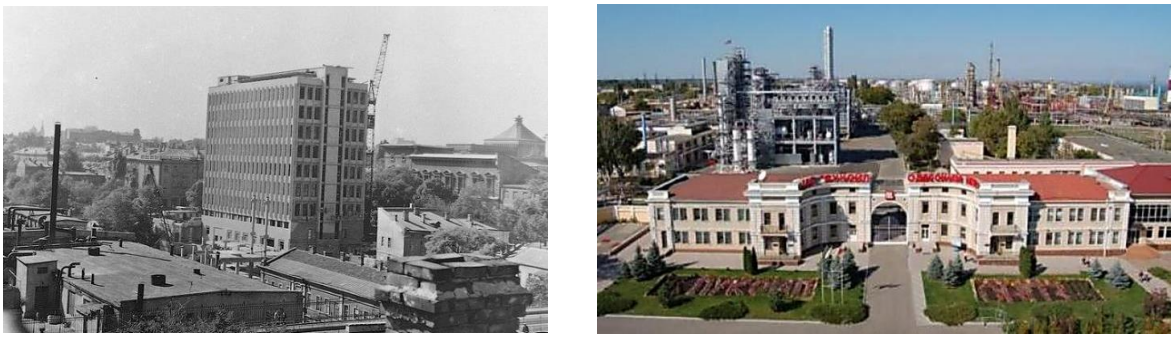


a) b)

Figure 3 a) Weinstein mill, 1880 [19] and b) Plan of Reshelievsky depot, 1910 [20]

From 1934 to 1937, the Komsomolets machine-tool plant was built in Odessa, the Kinap plant was launched to produce narrow-film fillers, and an oil refinery was developed in Shkodova Gora.
In the Peresyp district in Odessa, during the 1920s up to 1965, the area under the factories significantly increased, demonstrating the methodology of the concentration of production. About 11 of the largest enterprises of all-Union significance functioned from this area and cooperated with smaller and auxiliary industries. This area has developed as an industrial enclave and includes a plant named after the October Revolution, a mechanical-repair plant, Bolshevik, Prodmash, a meat-processing plant, a sugar refinery, paint and varnish factories, and oil depots. The concentration of production made it possible to optimize technological connections, reduce territories and communications, and reduce the cost of construction and operation, thereby reducing the cost of production.
From 1933 to 1955, 23 factories were built in the city along with the consolidation of the 29 factories existing in large complexes; about 100 old enterprises were abolished. From 1956 to 1985, more than 100 enterprises were established [12].

In summary, the main features of the industrial architecture of Odessa can be distinguished; these are typical of the industrial architecture of the Soviet cities of this period. Function mapping was conducted on plans and facades (functionalism) using the typical reinforced concrete structures and metal frames [5]. Standard projects were linked to existing sites, and structural elements were unified. The period lacked unique objects from the point of view of architectural and artistic expressiveness (for example, the new building of "the Epsilon plant," Fig. 4a), while high-tech productions were developed. Moreover, multistorey cellular buildings with large-span structures were widely used. Furthermore, industrial constructions were carried out using industrial methods and played a leading urban development role, often being assigned the best land plots, i.e., the coastal parts in the city center.



a) b)

Figure 4 (a) The new building of the Epsilon plant in the 1970s [21] and b) Odessa oil refinery, founded in 1937 [22]

4.2.4 The post-industrial stage (1986–till present)

This stage is divided into two periods: (1) the period of the decline of the USSR, from 1986–1990 and (2) the period ranging from 1991 to the present day. At the beginning of 1985, the Soviet Union collapsed along with its industries. However, from 1986 to 1990, about 30 enterprises were built in Odessa. Since gaining independence in 1992, Ukraine has been undergoing a process of progressive de-industrialization, which is nearing completion. For example, till 2008, 135 enterprises were functioning in in Odessa. Furthermore, as of 1st February, 2013, the number of functioning industrial facilities decreased to 89, and in 2016, about 70.97% of these were privately owned and operating at their minimal capacity. Moreover, since 1991, only one enterprise has been built: Telecommunication Technologies LLC (2001).

The modern architectural space of Odessa is characterized by the prevailing "industrial deposits," the lack of modern industrial architecture, and the desolation of industrial monuments (Figs. 5a and 5b). In addition, "Brooklyn-Kiev Port" LLC and "The Odessa Grain Terminal Corporation" have been expanding their territory in the port area. If Odessa was known as the center of mill production in the province in 1803, today it is the largest center for transshipment of grain crops in the country. However, if two centuries ago, "winged cars" were located outside the city limits, today huge barrels of grains are located at the foot of the historical center, blocking the sea view.

5 RENOVATION OF INDUSTRIAL OBJECTS AS A METHOD OF STABILIZING SPACE

In modern conditions, Odessa is unlikely to revive the industries as they were in the era of industrialization, and a large number of buildings and structures should be demolished or redesigned.

At present, the extensive growth of Odessa has slowed down, and thus the urban fabric within its borders requires restructuring. If the separation of functions was observed earlier, today their integration is necessary. However, these processes occur gradually, without a development strategy for waste territories and buildings.

The domestic works devoted to the conversion of industrial facilities to new functional organizations tend to designate these processes as “renovation” (Latin, Renovatio: restoration). This term implies a set of measures, as a result of which a waste industrial zone, complex, or facility acquires a public, residential, or mixed function.
Renovation is not only a comprehensive event but also a unique one, which is determined by architectural and planning decisions as well as the most complicated system of agreements between the municipality, businesses, and citizens.
The survival of urban development is not only historically important but occurs owing to functional migrations based on the mantra, “functions come and go, but space remains.” The determination of a method to adapt space to the stream of functional migrations is one of the tasks of renovating industrial facilities. The stabilization of space could occur with the development of a sufficient amount of internal potential.

a) b)

Figure 5 (a) Photograph of the “Krayan” plant (locomotive workshops of Ungernsternberg) by Alexander Levitsky. b) Plant of the January Uprising [23]

6 CURRENT STATE OF RENOVATION OF INDUSTRIAL OBJECTS IN ODESSA

Studies have revealed two types of industrial buildings that have undergone renovation in Odessa: historically significant and typical. Historically significant buildings are monuments of industrial architecture and history, i.e., buildings with high architectural and artistic significance as well as objects that have the characteristics of an object of cultural heritage but are not listed. Typical buildings are objects that are not of aesthetic value but have good architectural, planning, and design indicators, and are located within urban areas. Table 1 lists the industrial facilities that are currently undergoing renovations.
In Odessa, the territory comprising the former production facilities of “Aggregatmash” is one of the first to observe the redesigning of industrial facilities for a new function. In 1998, the empty workshops were converted to the exhibition and trade center of “Srednefontanskaya”. Later, some of these workshops were demolished and a modern building was constructed comprising a shopping and entertainment center.
In the early 2000s, a “Fozzy” supermarket and a “Prestige” business center (Figs. 7a and 7b) were built in the buildings of the former plant of construction and finishing machines in Odessa. Further, a retail space of the “Ideal” store was opened in one of the shops of the radial drilling machine plant based on the Novorossiysk Mechanical and Iron Foundry (1884).

Table 1 List of some industrial facilities that have undergone renovation

№	Name	Year Built, Founder	Architectural monument	New feature
1.	“Agroinvest,” a scientific and technical company	1983	-	Canteen, dormitory, shop
2.	Production Association "The Ring"	1984	-	“Stilhaus” Gallery, Visa Application Center, Fitness Club,

3.	Machine Tool Plant "Komsomolets"	1864: Foundation of the factory based on workshops, 1934	-	Shops, cafes, offices
4.	Plant of automobile refueling units "Aggregatmash"	1944	-	Shopping center “Srednefontansky”
5.	Tram depot, repair plant of the electric transport	1910: Reshelevsky tram depot, arch. A.B. Minkus	+	Hotel, shopping center, offices, museum
6.	Plant of construction and finishing machines "CFM"	until 1983	-	Hypermarket "Fozzy", business center "Prestige"
7.	Radial Drilling Machine Plant	1884,	-	Gipper market, "Ideal"
9.	“Epsilon” Production Building	1970 г.	-	Business center, clinic of plastic surgery "Virtus"
10.	Plant named after the January Uprising	1863, 1883: Buildings of locomotive workshops of Ungernsternberg, architect A.D. Todorov. 1930.	+	The administrative and production building (1960s) was reconstructed as a department of the Odessa City Council
11.	Sewing Association	Founded in 1934, Lombard in 1904, Arch. V.I. Prokhaska	+	Multifunctional Art Center "Bridge"
12.	Tea packing factory No. 2	1907, Tea packing factory "A. Kuznetsov and Co”, arch. Beitelsbacher H.	-	Computer Academy "Step", Theater on the Tea Room, 2010–2018 Demolished
13.	Dairy plant No. 4	1966–1983	-	SEC "City Center"
14.	Workshops of the City Dairy Plant No. 2	1955s	-	Banking center
15.	Kirov freezer plant	1944	-	Business center, residential building construction
16.	Sewing factory "Acacia"	1924	-	Odrex Clinic, 2013

The tram depot at the City Elektrotransport Repair Plant (GRP) was built in 1910 and is an architectural monument. It is partially used today as the Tokyo-Star Hotel, a business center, a shopping center, and a depot museum (Fig. 8a). Note that the depot buildings are included in the register of protection of architectural monuments. However, their renovation did not solve the architectural and urban issues in this place and did not reveal the area’s potential.

The building of the scientific and technical company “Agroinvest” on Uspenskaya Street was redesigned as the “Zharyu-Paryu” catering network on the ground floor and hostel No. 4 of the Odessa Law Academy on the floors above. The production association “Koltso” at Minavtoselkhozmash has been reorganized into a Visa center, a fitness club, and a business center, “Albatros.” Previously, the area comprised the “Stilhaus” Gallery and Cafe.

An example of the conversion of industrial buildings to new functional centers is the former Epsilon plant of military industrial complex and conversion. Today, one of its buildings houses a bank, the “Morskoy” business center, and the “Virtus” plastic surgery clinic (Figs. 6a and 6b).

a) b)

Figure 6 a) "Morskoy" Business Center, photo by N. Dmytrik. b) Public space of the Odrex clinic [24]

Another interesting example is the reprofiling of the former tea-packing factory No. 2 that was built in 1907. This area now locates the theater laboratory "Theater on the Tea Room," founded by the graduates of the Odessa Theater Lyceum. The main production hall was redesigned into a theater hall with 50 seats and an art gallery of modern art. In 2017, the building was demolished for the construction of a multistorey residential building.
The art center "Most" (Bridge) was created in place of a nonfunctional sewing association, named after "Rosa Lyukskmburg." The factory was founded in 1934 in a building comprising a former pawnshop, built by the architect V. Prohask in 1904–1905. The building is an architectural monument, and is currently a multifunctional organization, which includes many small stores, such as a modeling agency, sports club, cafe, table tennis room, quest room, hairdresser studio, dance studio, retail outlets, and optic centers. Outwardly, the building has not changed from its massive architectural and artistic appearance, and the internal filling, in general, was modernized to be attractive to visitors by using modern techniques in solving the interior space from the context of reconstruction (Fig. 8b).

a) b)

Figure 7 a) Fozzy Shopping Center [25] and b) Prestige Business Center [26]

"The Odrex" private clinic in 2013 was located in the building of "The Akatsiya" garment factory (Fig. 6, b). One of the best examples is the reprofiling of the administrative building of the Krayan plant under the department of the Odessa City Council.

Figure 9 presents a list of accepted functions in the redesigned facilities, demonstrating that the most common include trade enterprises (shops, galleries, opticians, and hyper- and supermarkets), business centers and offices, catering and fitness centers, and then banks and medical centers, in this order. In addition, almost every object gravitates toward multifunctionality (shopping and entertainment centers, the Art Center "Bridge", etc.).
Modern Odessa has embraced the construction boom of multifunctional multistory residential complexes. When choosing a place for new development, especially in the central part of the city, the most convenient sites include the nonfunctional industrial facilities. These areas are then cleared for building residential housing. However, such decisions are made in favor of the builder, and not the city, and often in such situations historically significant industrial objects disappear from the urban planning fabric of the city.
An example of such events is the Sanzenbacher brewery, built in 1890. In terms of its equipment, the plant had no analogues in Russia and very few abroad. A somewhat harsh and medieval style of the plant complex is reflected in the plasticity of the facades, laconicism, and minimalism of the decor [13]. After 1920, the plant continued to operate as brewery No. 1. In the early 2000s, the company ceased operations, and in 2007, a large-scale fire occurred, and the plant was removed from the list of architectural monuments. Today, the area has been allocated for the development of a 20-story residential complex.

a) b)

Figure 8 a) Hotel "Tokyo-Star" [27] and b) Art Center "Bridge," photo by N. Dmytrik

Object name of renovation	Name of new function																		Partial retention of the original function
	Catering	Dormitory	Shops, supermarket, optics	Fitness club, sport	Administrative Center	Business center	Offices	Shopping and entertainment center	Hotel	Hypermarket	Art center	Bank	Theater	Medical Center	Museum	Courses, training	Housing demolition	
A scientific and technical company "Agroinvest"	●	●	●																
Production Association "Ring"			●	●	●	●					●								
Machine Tool Plant "Komsomolets"	●		●				●												
Plant of automobile refueling units "Aggregatmash"	●		●	●			●	●		●									
Tram depot, repair plant of city electric transport							●		●						●				●
Plant of construction and finishing machines "COM"			●			●													
Radial Drilling Machine Plant										●									
Epsilon Production Building						●						●		●					
Plant them. January uprising					●														
Sewing Association	●		●	●			●				●					●			
Tea packing factory №2													●			●	●		
Dairy plant number 4	●		●				●	●		●									
Workshops of the City Dairy Plant No. 2												●							
Plant milling machines named after Kirov																	●		
Sewing factory														●					
	5	1	7	3	2	3	5	2	1	3	2	2	1	2	1	2	2	1	

Figure 9 The list of functions in the studied objects of renovation

It is obvious that Odessa, as well as in other large cities of Ukraine, require a radical revision of the attitude to the industrial heritage. In addition, methods should be devised for its competent adaptation to new realities and the preservation of historically important objects. This requires the development of a unified strategy for renovation.

The architectural and historical significance of an object also affects the choice of algorithms for renovation actions. Regarding the architectural and historical monuments, their renovation can be carried out by preserving the objects in their existing forms or with a partial change. The different areas of renovation are as follows: rehabilitation, conservation, museumification, lofting, industrial landscape park, and environmental rehabilitation.

The renovation of neutral territories and objects can be carried out with a complete or partial change of the object, or with its complete liquidation and construction of a new object. Here, the areas of renovation could include adaptation, revitalization, lofting, building of an industrial landscape park, and environmental rehabilitation.

Furthermore, the algorithm of actions for renovation can have a combined character when the renovation is focused on a complex of buildings and structures of different types.

Before starting the design process, thorough studies of the industrial facility must be conducted; these include urban planning analysis, historical and sociocultural analyses, technical-condition analysis, architectural and planning analyses, and monitoring of public opinion. After choosing a new function and method of renovation, a conceptual design can be developed, based on which the economic component of renovation could be calculated [16].

CONCLUSIONS

The analysis of the evolution of industrial architecture in Odessa showed that transitions from the pre-industrial stage to the stage of industrial formation, and then to the industrial stage, significantly influenced the planning structure of industrial facilities, the size of their territories, production technologies, their architectural and artistic appearances, and their location in the structure of the city.

At the present stage, as a result of the de-industrialization over the course of 28 years, "industrial deposits"—peculiar wounds of the city that require rethinking—now exist in Odessa. Monuments of industrial architecture in Odessa are in poor condition, and most are on the verge of extinction.

The analysis of renovation facilities in Odessa showed that the renovation process has been continuous since 1998 and is currently gaining momentum. Two types of industrial renovations have been identified: historically significant and typical. The most common new features of these buildings include trade enterprises and shopping and entertainment centers, followed by business centers, housing, and banks. In addition, almost every object has three or more functions, and this demonstrates a multifunctional tendency, guaranteeing its sustainable survival. The object is renovated in whole or part; however, the process occurs selectively, without the development of a unified strategy for the renovation of industrial facilities in the city.

Thus, from the perspective of the identified results, further research is required in the field of renovation of nonfunctional industrial facilities to stabilize the urban space under modern conditions.

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