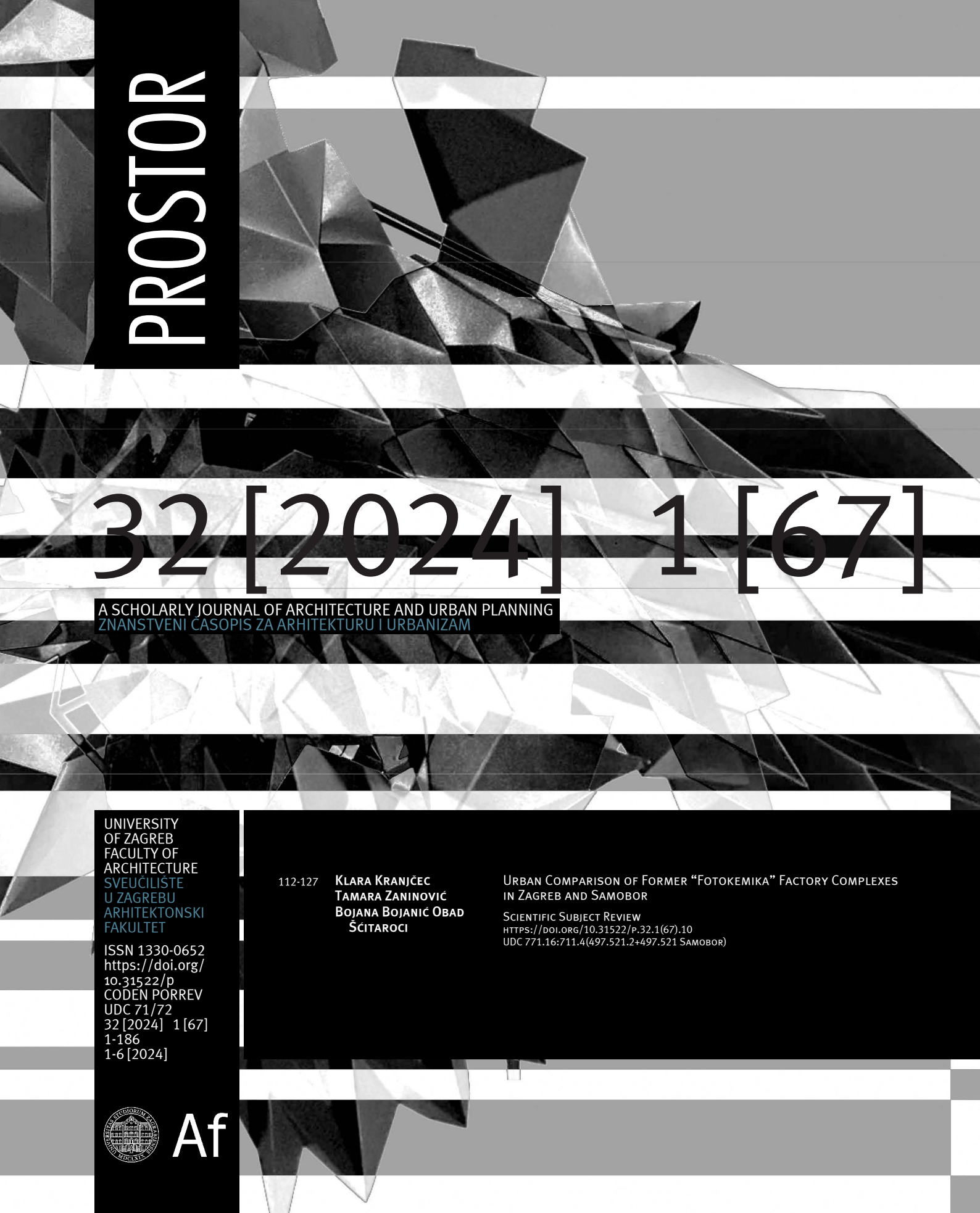

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Fig. 1 “Fotokemika” Zagreb (above) and Samobor (below), photos from 1978 (left) and 2024 (right)

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Urban Comparison of Former "Fotokemika" Factory Complexes in Zagreb and Samobor

"Fotokemika" Samobor
"Fotokemika" Zagreb
industrial heritage
photographic material
urban peripheries
urban transformation

The urban fabric of cities is in constant flux. This paper is focused on two areas of former "Fotokemika" industrial complexes for production of photographic materials, located in Zagreb and Samobor. The complexes are analyzed based on previous studies, archive material and field research. The results compare their urban transformations in contemporary urban context with new uses. The aim is to detect urban, micro-urban and architectural characteristics in order to understand how they change through time within each city by comparing the initial contexts in the first half of the 20th century and contemporary situations followed in the period between 2020 and 2024.

Introduction

A photographic paper factory began production in Zagreb in 1947 as the first and only factory of its kind in southeast Europe. In 1951, a film factory opened in Samobor, a small town near Zagreb. Only a year later they merged into a single factory known as "Fotokemika". Built as part of Yugoslavia's Five-Year Plan (1947-1951)[1] "Fotokemika" played an important role in the history of Croatian industry and the development of photography as a widely available form of art.

Photographic material factory, Fotokemika was created by the merger of the Zagreb branch of the German company "Ozacel", founded in 1936 for the production of diazo paper (ozalid) for photocopying (diazotype), and the Zagreb company "Foto", founded in 1945 for the production of photographic paper and films. The factory manufactured photographic paper and chemicals for its processing, as well as other (mainly wooden) accessories and devices intended for the photographic process (tripods, retouching desks, picture presses, frames, boxes for negatives, etc.). Later they produced many then popular products such as X-ray film *Sanix*, dental X-ray film *Dentix*, photographic papers *Fokembrom*, *Fokemkontakt* and *Fokembromax*, highly sensitive amateur films *Efka 20* and *Efka 25* and black and white negative films *Efke KB* and *Efke R* (*** 2021).

Both Fotokemika complexes were built at the time of intensified construction activity, immediately after the Second World War. Reconstruction was imperative, and the new industrialization program of the country was taking on a major role in society. Post-war architecture emphasizes functionality, the focus is on the urban solution, and architecture is predetermined by the requirements of fast and economical construction. In the specific circumstances of the post-war period, the construction of basic industrial facilities was, at the time, one of the primary tasks in the state. The problems faced by industrial architecture at the very beginning were usually unfavorable locations and phased construction, which had a particularly unfavorable effect on the architectural design of the buildings. Only a few factories were built on free land and according to the unique project of one designer. Among the more successful achievements, we should single out "Jedinstvo", factory of processing equipment for the food and chemical industry (Milan Tomičić), electrical machinery factory "Rade Končar" (Stjepan Gomboš, Mladen Kauzlarić, Otto Werner i Vladimir Juranovic (Gomboš, 1950: 40), machine tool factory "Prvomajska" (Milan Tomičić), ceramics factory "Jugokeramika" (Ivo Vitić) and "Fotokemika" (Bruno Milić) in Zagreb (Domljan, 1969: 13).

The 1960s are considered the golden age of Fotokemika when the company's enviable reputation in the country and the world was created. A famous Croatian graphic designer and painter, Dušan Bekar, at the invitation of Josip Sudar, a well-known Croatian economist and at the time head of the propaganda department at "Fotokemika", developed a distinctive visual identity for the company.[2] In the 1980s, during a strong development of the photographic industry, Fotokemika established cooperation with the world's leading manufacturers, and exported its products worldwide (Matičevic, 1993: 6-8).

With the popularization of digital photography, from the end of the last century, the technology and techniques for analog photography were slowly disappearing, and with them the once important photography industry. The rapid process of digitization that we are witnessing represents the same shift in civilization as the industrial revolution did in its time (Ilić, 2016: 18).

Since the end of the 20th century, the development of the photochemical industry in Croatia stagnated. Parts of the factory complexes in Zagreb and Samobor were closed, the quality and quantity of products decreased, leading to a reduction in the market. From 1992 "Fotokemika'' continued to operate as a joint-stock company (*** 2021). In the early 2000s, the main headquarters of

the factory in Zagreb was sold. The production of films was continued under a new company name by a few workers in the factory complex in Samobor. The new company "Fotokemika-Nova d.o.o." went bankrupt in 2012 thus ending the 65-year long history of production of photographic materials and equipment in Croatia (*** 2021).

After the closing of both Fotokemika factory complexes, the premises in Zagreb and Samobor are occupied by various companies. From March 2023, The Faculty of Architecture University of Zagreb, temporarily moved into two buildings that are a part of the former Fotokemika complex in Zagreb, while the original faculty building in Kačićeva street is under reconstruction.

Methodology

The aim of this research is to observe and learn from the comparison of Fotokemika industrial complexes in Zagreb and Samobor within the context of their urban transformation processes. The study uses a combination of methods linking literature review with tabular and graphical comparison. Data tables, interpretative maps and photo collages are based on multiple field work in Zagreb and Samobor during the period of three years, from 2021 to 2024, and archive research of available Fotokemika documentation (Fig. 2).

In order to successfully define comparative levels of analysis this paper consults the methodology for the evaluation of industrial heritage proposed by Sonja Ifko (1999), outlined in *'Industrial Architectural Heritage – Scheme for a Methodology of Evaluation'*. The terminology used for comparative research in this paper correlates to Ifko's definitions (1999) and analytical approach and represents observed scales: urban, micro-urban and architectural.

The urban scale implies an analysis of the parameters regarding the positioning of an industrial complex in the city, analysis of its relationship to the surrounding environment and analysis of influences on the development of the environment which it has co-created. Micro-urban scale refers to the analysis of main characteristics of industrial complexes as complete wholes – in regard to their plot area. The values analyzed in those scales are defined through functional/morphological characteristics, planning/compositional design and semantics of complexes. Architectural scale refers to the characteristics of individual facilities in the complex. The main characteristics of industrial architecture are designated by function (functional analysis), construction (structural analysis) and aesthetic expression (stylistic analysis; Ifko, 1999: 123-151).

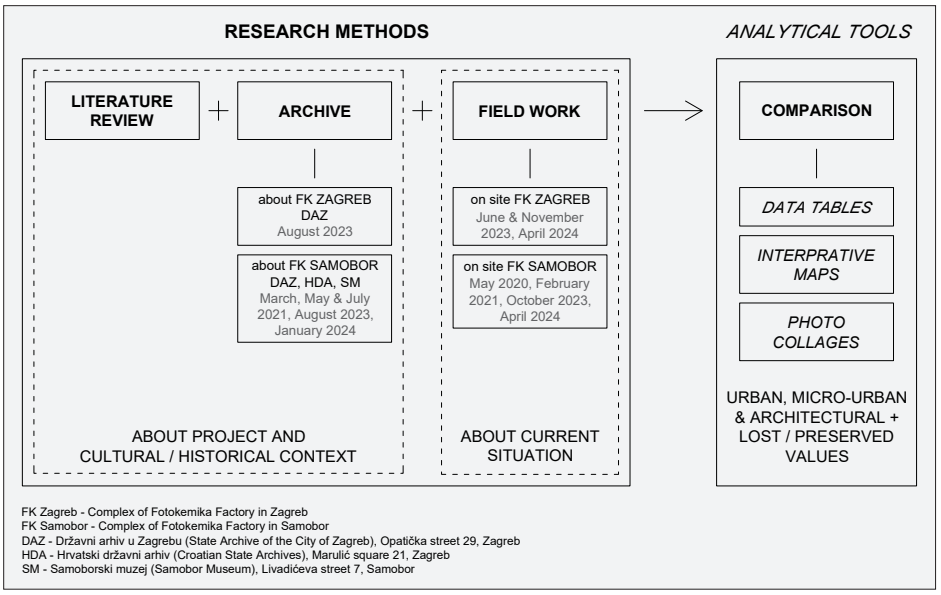

Fig. 2 Research framework

Therefore, the objective of the comparative analysis is focused on detecting urban, micro-urban and architectural characteristics of Fotokemika's complexes. The first research question is focused on the city-periphery analysis (in urban scale) by asking what were the initial positions of complexes in relation to the city center and its periphery and how that situation changed in the contemporary urban context. The second research question is focused on detecting changes in relation to built and unbuilt areas of factory plot (in micro-urban and architectural scale) by looking at what are lost, preserved and gained values in the urban transformation process of Fotokemika complexes in Zagreb and Samobor.

Literature Review

Fotokemika Zagreb and Samobor are sporadically mentioned in several books about industrial architecture in former Yugoslavia.

1 The five-year plan in Yugoslavia was modeled after similar plans in the Soviet Union. In April 1947, the National Assembly adopted the Law on the First Five-Year Plan for the Development of the National Economy of the Socialist Federal Republic of Yugoslavia. The aim of the plan was to speed up the post-war reconstruction and industrialization of the country (Arćabić, 2018: 10-20).

2 This creative duo designed the legendary series of ads for "Fotokemika" from the end of the 50s – posters like *Look forward to life – shoot!*, *Catch the Catch* and many others. Dušan Beker is responsible for an enviable amount of visuals – brochures, catalogs, prospectuses, leaflets, manuals, posters and calendars, but also the most important recognizable company logo and an unforgettable protective figure – a black and white silhouette of a man with a camera. He also created the logo and packaging of eFKe films. His packaging for Fotokemicolor paper was awarded the Yugoslav Oscar for packaging in 1973 (Hrabar Oremović, 2019).

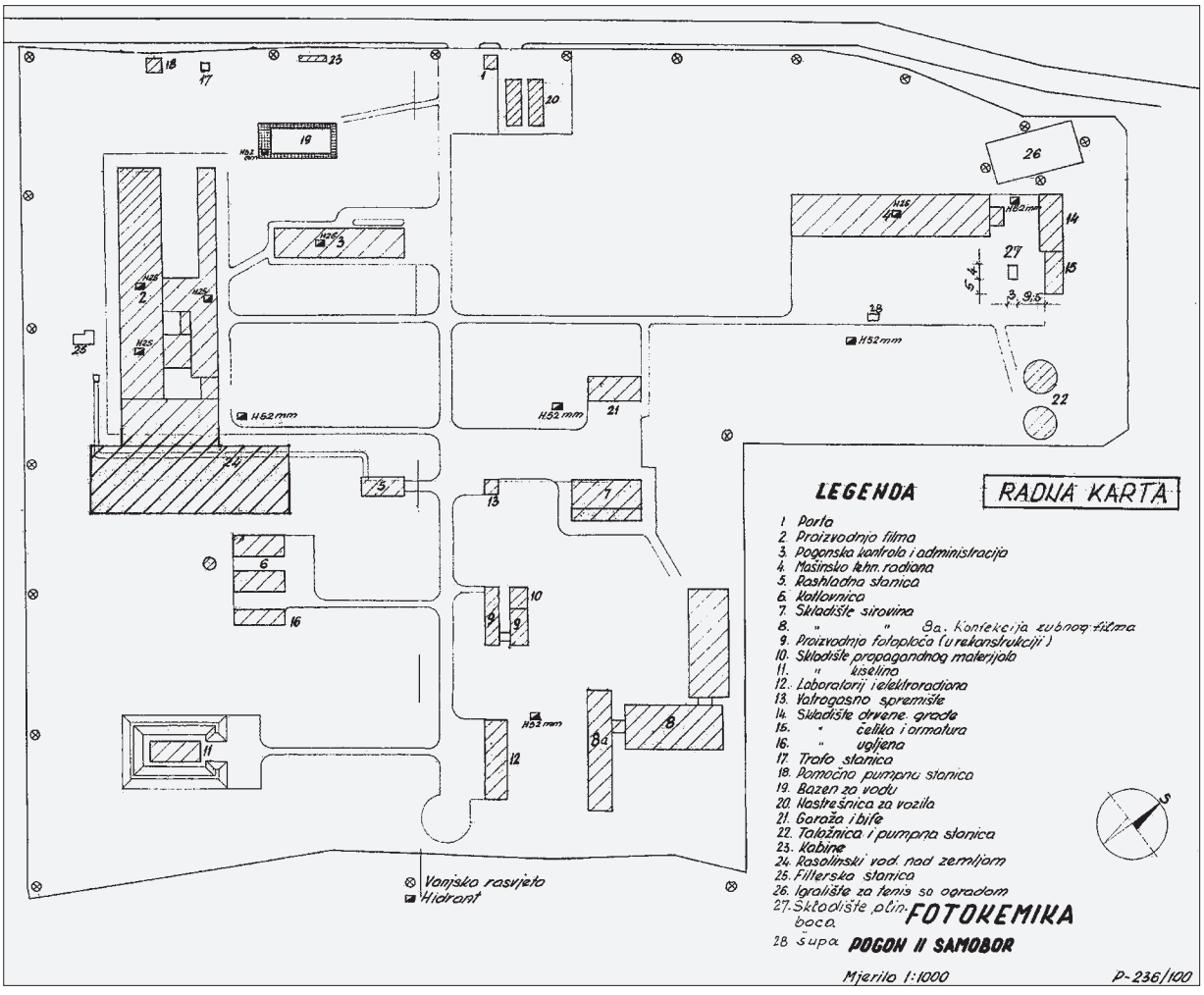

FIG. 3 FOTOKEMIKA IN SAMOBOR / DEFENSE PLAN / PLAN FOR FUNCTIONING IN WAR, 1989

Furthermore, Fotokemika Samobor is mentioned in monographs of the city of Samobor published through the second half of the 20th century in the context of the development of the city's economy (Šijan, 1971; Brunović 1972). Fotokemika is mentioned in several publications as a work of architect Bruno Milić[3], a former professor at the Faculty of Architecture at the University of Zagreb. Bruno Milić himself, in magazine *Arhitektura* (1951: 66-67) brought a concise description of Fotokemika Zagreb, its layout and the challenges encountered during the design process.[4]

From 1954 until the end of 1960s Fotokemika published (monthly) a factory magazine called *Fotokemika, magazine of the working collective of the company Fotokemika factory of films and photo paper*. Besides the attempt to republish the magazine in the mid-70s, *Fotokemika* was not published after the mentioned period. With the reorganization of the factory from the early 1990s to the year 1998, Fotokemika published the *Efke magazine of the joint stock company Fotokemika*, the successor of magazine *Fotokemika*. The issued magazines are important because they are the only written material in which information about all aspects of the factory, from business, propaganda, science to the social component, can be found.

Regarding Fotokemika's history, the complete concise overview was given in a catalog of the exhibition *Croatian photography from 1950 to today; Development of Fotokemika from 1947 to today* held in 1993 at the Gallery of City Zagreb forerunner of the Museum of Contemporary Art. The official chronology of establishment and development of the Fotokemika factory was published here for the first time.

Today, the majority of important documents, site plans (Fig. 3) and plans of individual buildings of Fotokemika factory complexes in Zagreb and Samobor are kept in the State Archive of the city of Zagreb.[5] Photographs and urban plans of Fotokemika factory complexes

are kept in the Croatian State Archives.[6] Samobor Museum preserves certain collected material about Fotokemika, mainly propaganda materials and important articles from newspapers that carried news about the construction and development of the Fotokemika factory complex in Samobor.

Fotokemika Samobor was the theme of and exhibition titled *Silvestar Kolbas: Fotokemika* (Fig. 4) held in the Technical museum Nikola Tesla in Zagreb (from December 19, 2020 to February 7, 2021) and gallery Prica in Samobor (from January 29 to February 28, 2021). The exhibition is a homage to Fotokemika Samobor[7] – an artistic and research project, which includes archival and field, in situ research of the factory in the manner of industrial archaeology. On Fotokemika's original films of different ages, formats, sensitivity and uses, Silvestar Kolbas[8] records the neglected and collapsed remains of the factory in Samobor and found remains of factory inventory (Tehnički muzej Nikola Tesla, 2020).

Fig. 4 Exhibition *Silvestar Kolbas: Fotokemika* in the Technical museum Nikola Tesla in Zagreb, 2021, © I. Buvinić

Fotokemika Samobor has been a subject of two master's thesis: *Former factory Fotokemika as a museum of photography* by Nevena Ilić and *Preservation and revitalization of industrial heritage on the example of Fotokemika factory* by Ana Telišman.

In 2016, Nevena Ilić obtained her master's degree in Management and Enhancement of Historic and Cultural Heritage at Institute of Research and Advanced Training at University of Évora in Portugal with a thesis examining the history of Fotokemika and its achievements in the field of science, technology, advertisement and design. The thesis deals with ''Fotokemikas influence on the development of analog photography on the territory of Croatia and creates criteria for the valorization of analog photography heritage" (Ilić, 2016: 18). It analyzes the position of Fotokemika in an intricate transmission process of photography medium, from analog to digital, and shows what this transmission process means on a local and global level. In her thesis Nevena Ilić proposes the conversion of Fotokemika Samobor into a museum of photography: "The research aim is to examine how museums, like an institution for protection and safeguarding of heritage... can give a solution in maintaining industrial heritage in a process of reusing former industrial buildings into museums" (Ilić, 2016: 18).

In 2018, Ana Telišman obtained her master's degree in Art History at Faculty of Humanities and Social Sciences at University of Zagreb with a thesis focused on the revitalization of the former Fotokemika factory in Samobor. Her study deals with the history of the development of industry and industrial architecture in the world and in Croatia and highlights the need for its protection. Ana Telišman pro-

3 Bruno Milić (1917-2008) is the author of the original project for Fotokemika Zagreb from 1947 (Karač, 2018: 30). Project was not fully realized according to his proposal (Milić, 1951: 66). Different authors of the Fotokemika complex in Samobor are listed in different available sources mentioned in this research. In the article entitled 'New era of our film industry' (December 16, 1952) from *Narodni list* (newspapers), it was stated that the author of the project for Fotokemika Samobor is engineer Zajec. According to project documentation for Fotokemika reviewed in the State Archives of the city of Zagreb, authors of the project are architect Novak S. and construction engineer Zajec V.

4 From 1946 to 1948, Bruno Milić worked very meticulously and successfully as an independent architect at the Architectural Design Institute on capital industrial architecture projects for which he was successively praised and awarded in 1946, 1947 and 1948. This period of his work was marked by projects and realizations of industrial complexes that would establish Milić as an excellent architectural designer (Fotokemika in Zagreb, 1947; Wood-Industry Combine Bosanka in Blažuj near Sarajevo, 1948-1951, etc.). Both can be considered pioneering works because, at the time, construction of larger modern industrial buildings had not yet been developed in Yugoslavia (Karač, 2018: 29-30).

5 Located in Opatička Street 29, Zagreb.

6 Located at Marko Marulić Square 21, Zagreb.

7 When describing the initial motive for photographing Fotokemika Samobor, Kolbas says: "There was something in that space that attracted me and made me return to it. I don't even fully understand the reasons that led me to it. During almost every visit, I discovered something new, some new detail, some new sight that I had not noticed before." ("*Nešto je bilo u tom prostoru što me privuklo i navelo da se u njega vraćam. Ni sam posve ne razumijem razloge koju su me naveli na to. Prilikom gotovo svakog posjeta otkrivao sam nešto novo, neki novi detalj ili neku novu vizuru koju do tad nisam uočio.*") (Kolbas, 2020: 5)

8 Croatian photographer, cinematographer, director and film teacher, born in 1956.

Table I Overview of literature and previous study with the focus on Fotokemika complexes (in chronological order)

Author	Title	Year	Type	Fotokemika Zagreb	Fotokemika Samobor	Historical overview of Fotokemika	Architectural and urban overview of Fotokemika	Events throughout Fotokemika's history
Bruno Milić	*Factory "Fotokemika" in Zagreb*	1951	professional article in a journal	+			+	
Matićević (ed.)	45 years of Fotokemika – chronology of foundation and development	1993	text in an exhibition catalog (Matićevic, 1993: 6-8)	+	+	+		
Group of authors	*Fotokemika, magazine of the working collective of the company Fotokemika factory of films and photo paper*	1954-1987	magazine	+	+			+
Group of authors	*Efke magazine of the joint stock company Fotokemika*	1987-1998	magazine	+	+			+
Nevena Ilić	*Former factory Fotokemika as a museum of photography*	2016	master thesis		+	+	+	
Ana Telišman	*Preservation and revitalization of industrial heritage on the example of Fotokemika factory*	2018	master thesis		+	+	+	
Silvestar Kolbas, Kosjenka Laszlo Klemar and Leonida Kovač	*Silvestar Kolbas: Fotokemika*	2020	exhibition catalog		+	+		

poses the conceptual project of the interpretation center – project for conversion of Fotokemika Samobor that "was intended to highlight the possibilities offered by former industrial plant spaces and to encourage active reflection on the potential of these spaces in society" (Telišman, 2018: 2).

Both theses observed only complexes in Samobor without a comparative urban approach and focused on architectural reuse proposals. In contrast, this research takes on a holistic approach observing and comparing complexes within all scales and spatial layers.

Apart from the aforementioned works, Fotokemika has not been a subject of research studies, therefore there is a lack of written literature (Table I). Scientific research of Fotokemika factory complexes based on its urban, micro-urban and architectural values is fragmented and deficient, which was a direct motive for this research.[9]

Urban Transformations

Fotokemika in Zagreb

Area of the former Fotokemika Zagreb is located in Croatia's capital, in the Maksimir city district at Hondlova street 2. The biggest and most populated Croatian city, its capital, Zagreb, is situated in the north of the country, along the Sava River, beneath the southern slopes of the mountain Medvednica. The main and largest square of Zagreb is Ban Josip Jelačić Square, a well-known meeting space and the main part of the pedestrian zone in the city center. Area of the former Fotokemika Zagreb is positioned 3.5 kilometers from the Ban Josip Jelačić Square (Fig. 5).

Fotokemika Zagreb was built in 1947 on an, until then empty, 2.3 hectare plot of land in the immediate vicinity of City Park Maksimir (Fig. 5). At the time it was built, as visible from Fig. 6, Fotokemika was situated on a plot bounded from the north by an empty green area that stretched along Maksimirska Street, from the east by Hondlova Street and the gardens of the Faculty of Forestry, from the south by a

9 From 2020 to 2021, Fotokemika Samobor was the subject of research by the first author, then a student at the Undergraduate and Graduate study at The Faculty of Architecture University of Zagreb. The research was conducted under the following titles as part of three different faculty courses: *Factory of photographic materials, Fotokemika, Samobor, 1952.* – in 2020, as part of the compulsory course *Building Heritage Protection and Restoration*, under mentorship of Alan Braun, Ph.D.; *Factory of photographic materials, Fotokemika, Samobor, 1952.* – in 2021, as part of the elective course *Industrial Archaeology*, under mentorship of prof. Zrinka Barišic Marenić, Ph.D.; *Factory Fotokemika, Samobor*, in 2021 as part of the elective course *Heritage Urbanism* (course is a result of HERU research project 2014-2018), under mentorship of academic Mladen Obad Šćitaroci, Ph.D. The history of the area where the former Fotokemika Zagreb is located, in the period before its construction, is partially covered in the research that is a part of Marin Duic's master thesis titled *Maksimir's Homestead – urban and architectural renovation and revitalization* at The Faculty of Architecture, University of Zagreb in 2019.

10 Croatian Academic Sports Club *(Hrvatski akademski sportski klub)*

11 In chapter *8.2. Consolidated urban areas* of the *General urban plan of the city of Zagreb from 2016 (Generalni urbanistički plan grada Zagreba 2016.)* in urban rule *2.8. Arrangement and urban renewal of mixed-use buildings.*

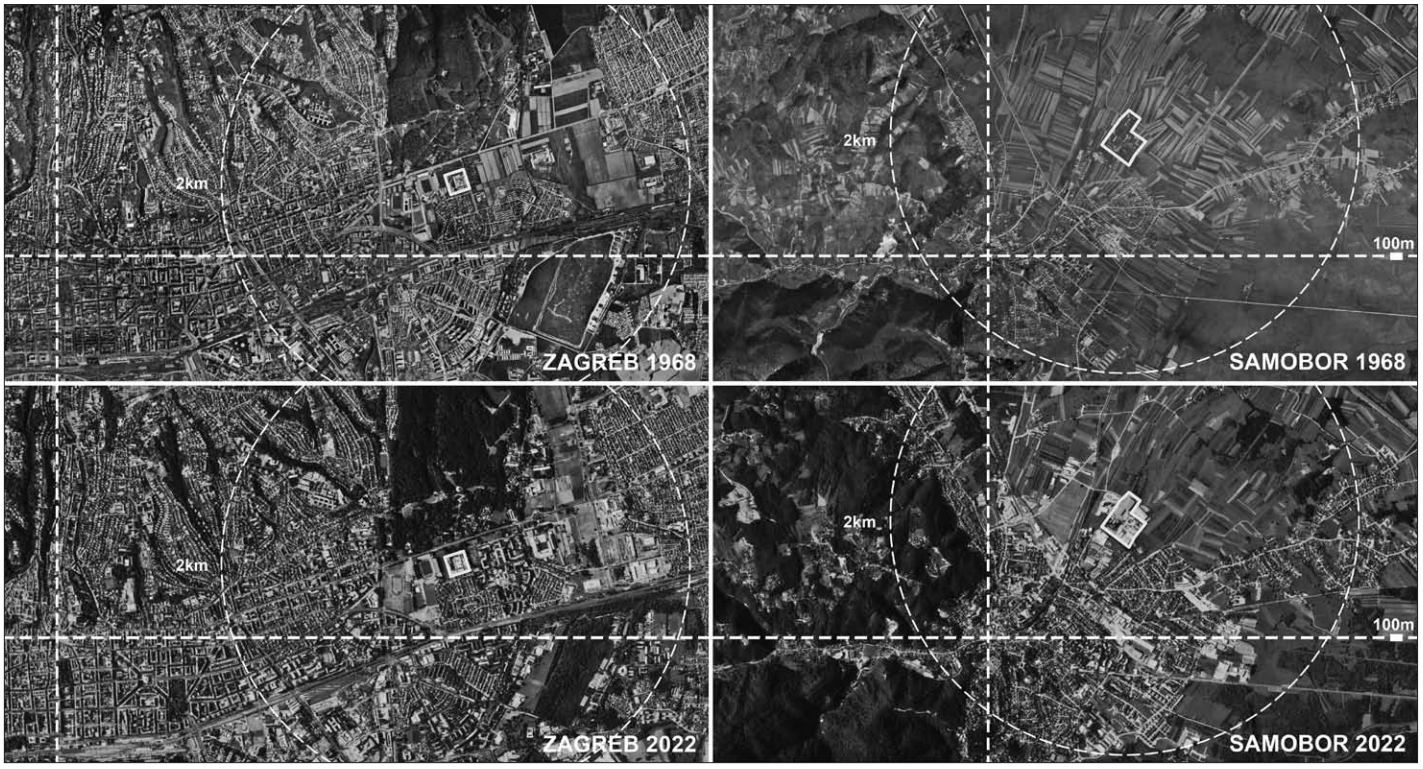

Fig. 5 Parallel preview of Fotokemika in Zagreb and Samobor on orthophoto maps from 1968 and 2022 with marked historical centers (Ban Josip Jelačić Square in Zagreb and King Tomislav Square in Samobor) and urban radius of 2 km

row of detached family houses that are part of a planned settlement known as the Railway colony, and from the west by an empty green area, an elementary school and the old wooden stadium of HAŠK[10] (where later, in 1954, the Maksimir stadium was built). In the middle of the 20th century, several other factories were operating within a radius of 2 kilometers (Fig. 5) – *Patria* liqueur factory at Maksimirska street 2, later *Badel* at Šubićeva street 55, *Lipa Mill* paper factory at Maksimirska street 10 and *Kraš* confectionery factory at Ravnice 48.

At present (2024), former Fotokemika Zagreb is located at the end of a linear stretch that we can recognize as the urban center of Maksimir city district, a high-density area with commercial and residential buildings. This is the area along the very busy Maksimirska Street that spans from Eugen Kvaternik Square to the entrance to Park Maksimir and the Maksimir Stadium. The area is very well connected by public transport lines, including bus and tram. It is located near two tram interchanges – Maksimir and Borongaj. The city railway is also very close, the Maksimir railway station is located 700 meters from the former Fotokemika Zagreb.

The general urban plan of Zagreb[11] in the area of the former Fotokemika complex envisages the urban renewal of the mixed-use space and the preservation of elements of the identity and memory of the settlement without additional information on which particular elements of identity and memory. The possible interventions include the renewal and completion of the urban matrix by building new buildings, interpolation, reconstruction and replacement of dilapidated buildings.

Fotokemika in Samobor

Area of the former Fotokemika Samobor is located at Nikola Šubić Zrinski Street 14-16, in a small town of Samobor situated approximately 25 kilometers from Zagreb. Samobor is part of the Zagreb metropolitan area. It is situated west of Zagreb, in the Sava River valley, between the slopes of Samobor Hills and Žumberak Mountains. Area of the former "Fotokemika" Samobor is positioned 1.5 kilometers from the city center – Samobor's main square, King Tomislav Square (Fig. 5).

Fotokemika Samobor was built in 1951 on a, until then empty, 9.9 hectare plot of land. At the time it was built, as visible from Fig. 7, Fotokemika was situated on a plot bounded from north, east and west by agricultural fields and from the south by *Chromos* paint and varnish factory. At a distance of 400 meters from the factory complex, there was a local narrow-gauge railway. Popularly called *Samoborček*, the train operated between 1901 and 1979 on the route between Zagreb

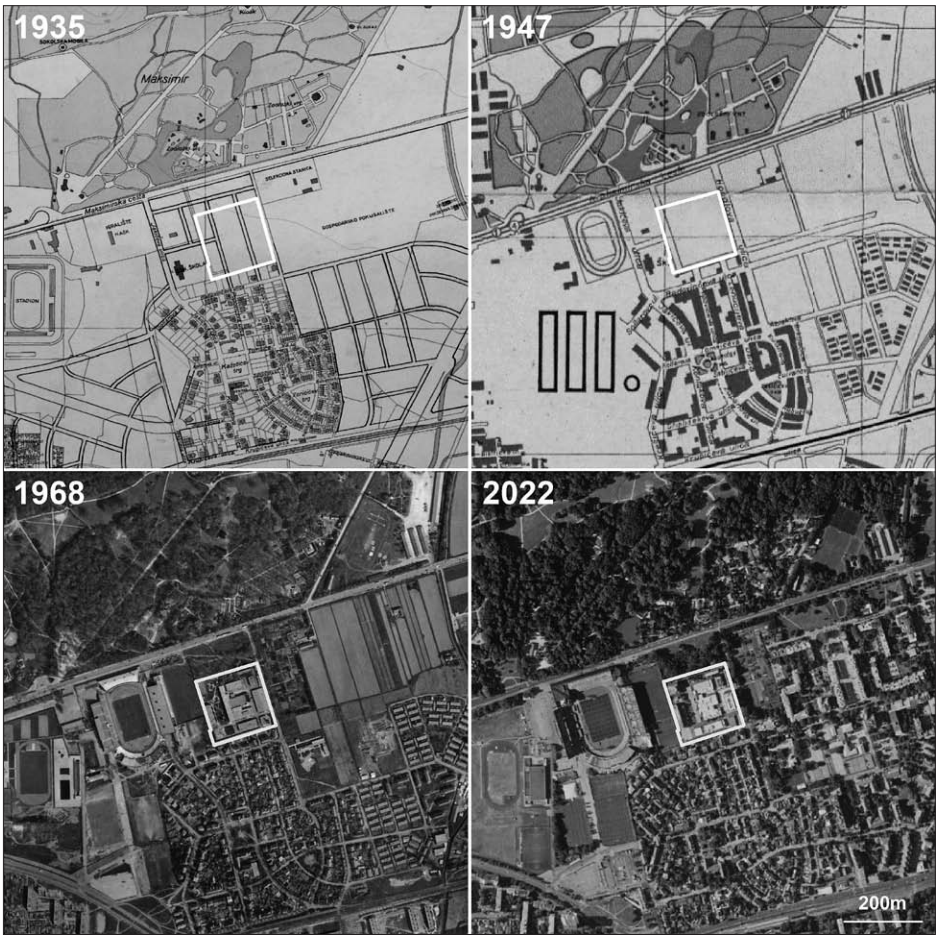

Fig. 6 Area of Fotokemika Zagreb before it was build: left up on the map from 1935; right up on the map from 1947; left down Fotokemika in Zagreb on orthophoto map from 1968 and right down former Fotokemika in Zagreb in 2022

and Samobor and later Bregana. In the middle of the 20th century, several other factories operated within a radius of 2 kilometers (Fig. 5), construction material factory S*amoborka* at Grada Wirges street 2, *Elektron*, the first Yugoslav factory of electrical household appliances (later *Kontakt*, currently *Končar*) at Bobovica 9, the aforementioned *Chromos* at Zagrebačka street 30 and others.

At present (2024), the former Fotokemika Samobor is situated right next to the county road (Zagreb-Bregana), near the Samobor bus station. It is 3 kilometers away from the entrance to the Ljubljana-Zagreb-Belgrade highway (international route sign E70) and is connected by traffic to the main streets of Samobor. It's a part of a bigger territory known as *Samobor business zone*[12] – production zone predetermined for small and medium-sized companies, for production and other types of business, with the condition that the mentioned facilities and activities do not endanger the environment.

The general urban plan of Samobor[13] in the area of the former Fotokemika complex envisages future urban transformation of the economic and production zone which means that the usage has not been changed significantly from factory purpose as in the Zagreb case. The Samobor urban transformation rules include construction of free-standing buildings up to 12 meters high and mandatory natural landscaped terrain of at least 20% of the building plot area.

Comparison and Discussion of Urban Transformation Processes

From the middle of the 20th century to its current status, the area of the former Fotokemika Zagreb and Samobor remained within its original borders. In Zagreb, the new or adapted construction remained within the dimensions of the original, and in some parts, the height was significantly increased. In the Samobor area, the built space was increased by the construction of new production plants and halls of various companies. Large areas of the former green outdoor space are now concrete surfaces intended for heavy vehicle traffic.

Areas of former Fotokemika Zagreb and Samobor have undergone significant changes regarding adaptation to contemporary spatial needs including new construction, additions and conversion of existing construction both during the factory time and especially afterwards. The comparison is focused on analyzing differences between the initial (project) state of Fotokemika complexes and their current resulting state in 2024 from multiple perspectives to detect urban, micro-urban and architectural values which were either preserved, lost or added in the process of urban transformation.

Urban Values – Environment Analysis (City – Periphery Relation)

Urbanization greatly affects the development of the city. Zagreb becomes a metropolis, the expansion of the built-up area and the number of inhabitants and its importance as an administrative and economic center increas-

12 http://localismarket.gdi.net/TourMap/content/doc/HR_ZGZUP_PodZone_hr/Izvod%20iz%20Elaborata%20-%20Samobor.pdf [Accessed: 26 November 2023]

13 In article 78 of the *General urban plan of the city of Samobor from 2007*.

14 Based on the unpublished text *Periphery – Locus Amoenus* by Prof. Bojana Bojanić Obad Šćitaroci, Ph.D. and Prof. Mladen Obad Šćitaroci, Ph.D., prepared for the Master thesis workshop in the academic year 2010/2011 at the Faculty of architecture University of Zagreb when the students assignment was under the topic of 'Periphery'.

15 "Since Maksimir [park] was far from the city at the time of its creation and until the middle of the 20th century, it became a favorite excursion spot for the people of Zagreb." (Duić, Obad Šćitaroci, 2020: 258)

es. The trend continues, but the industry within its perimeters shuts down. Outdated factories are abandoned and left to decay – for example 'City meat packing plant and cattle market' complex in Heinzelova street, Liqueur factory 'Badel' in Šubićeva street and 'Gredelj' railway vehicle factory complex. The 'Gredelj' factory complex located at Trnjanska road 1, 7-11c built in 1894 as the 'Main engine room of the Hungarian State Railways', is now a strategic urban regeneration city project although a significant part of the building structures protected as a cultural asset is dilapidated, partially collapsed (mainly interiors) or in a bad condition, and valuable fragments of the historical industrial plant (tools, machines, metal substructures, etc.) have been removed (Gradski ured za strategijsko planiranje i razvoj Grada Zagreba, Arhitektonski fakultet Sveučilišta u Zagrebu, 2015: 8-53).

Samobor is becoming a popular city to live in because of its proximity to Zagreb and good transport connections. The city is slowly expanding, but remains within its appropriate limits, so that the majority of economic and business contents remain outside the boundaries of its built area.

Periphery is the farthest border of a space, in this case the city. It represents a part of space in which changes in structure and purpose can be seen. It is more than the perimeter of a place, it is also, and above all, a threshold between different territorial realities. The periphery is a part of the city that we can observe through the historical traditional periphery and the contemporary development periphery.[14] Historical traditional periphery is a series of peripheral areas that, with the expansion of the city, become solid, centralized parts of the city recognizable through the difference in structure and content compared to the areas they surround. The contemporary periphery can be defined as an interaction of the peripheral part of the urban fabric and built spaces that want to penetrate the center from the outside (for example rural areas that are urbanized over time). Fotokemika Zagreb is located on a historical traditional periphery of Maksimir area in Zagreb. Fotokemika Samobor is located on the contemporary development periphery of the city of Samobor.

The periphery acts as a space of confrontation – as a space between. They are an unpredictable and often unwanted result of the center's growth. Peripheries are potential, generative spaces – sources of innovation and adaptation. The location of Fotokemika on the outskirts of the city of Zagreb and Samobor potentiates the constant change and transformation of the area.

Fig. 7 Parallel preview of former Fotokemika in Samobor on orthophoto maps from 1968 and 2022

At the time it was built (1947), Fotokemika Zagreb was located on the edge of the city – then a built and inhabited periphery of the city of Zagreb. Maksimir[15], the city district where former Fotokemika Zagreb is positioned, is currently a green urban district in the wider city center with numerous residential buildings and various sports, educational and business facilities. At the time it was built (1952), Fotokemika Samobor was far from the city area – then a vacant periphery of the city of Samobor. Currently, although the residential part of the city is rapidly growing, the area of former Fotokemika Samobor is still outside the wider urban area – urban fabric did not spread up to or around the industrial area where Fotokemika is located.

Locations for both Fotokemika complexes were not selected solely on the basis of utilitarian conditions. Adequate spaces were chosen so that factories can adapt to the structure of the environment, natural and built and even subordinate to it (Ifko, 1999: 148). Both complexes are surrounded by spacious green areas of different character – in Zagreb in close proximity to a large park, recreational and agricultural areas, and in Samobor in the middle of endless mostly uncultivated fields. Considering its former landscaping, each site was suitable in regard to ecological effects on the environment, which is questionable today. Both complexes shaped the environment in different ways, attracting different types of users over time that further influenced the character of development or deterioration of the site.

Micro-Urban Values – Landscaping and Spatial Arrangement Analysis

Fotokemika Zagreb and Samobor were built in the form of pavilion buildings around a cultivated park. Buildings form a closed complex

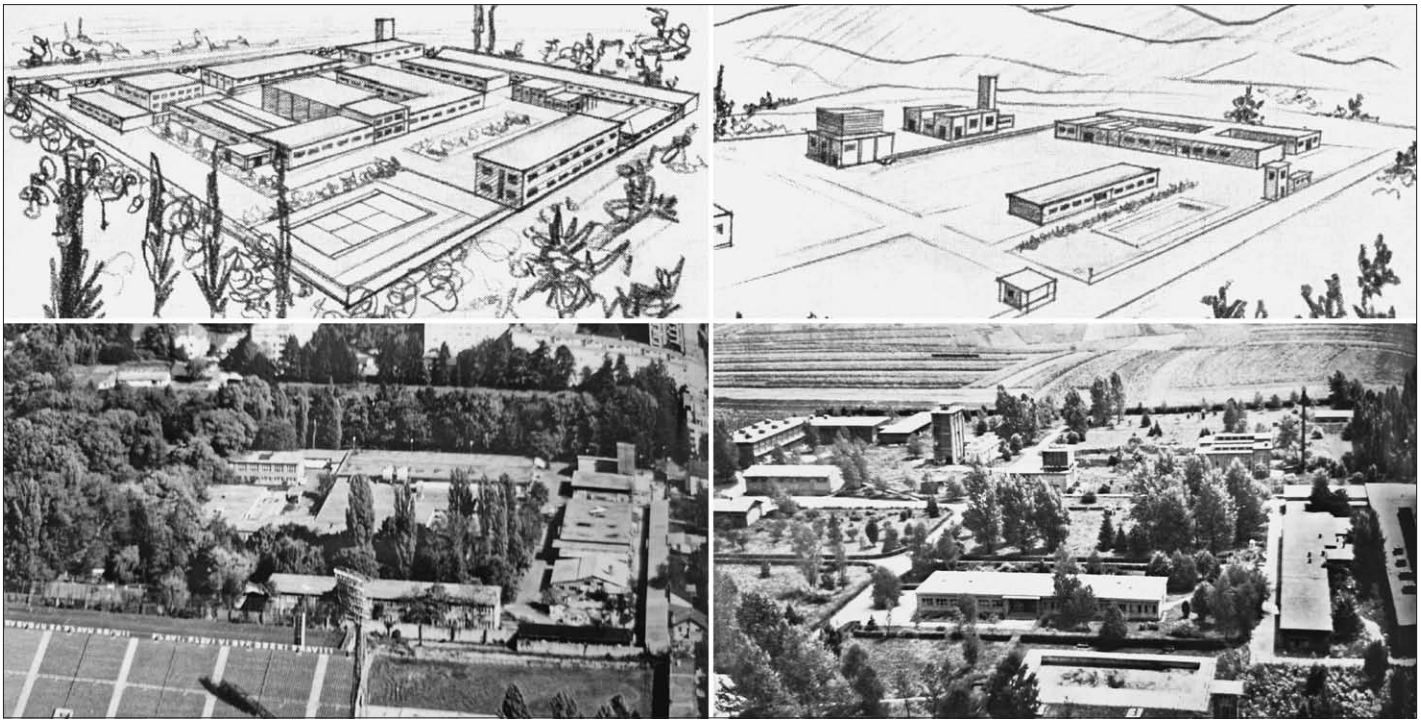

Fig. 8 Axonometric drawings (1962) and photos (1999 and 1972) of Fotokemika in Zagreb (left) and Samobor (right)

ensemble. The design and realization of landscaped areas had a corresponding importance and significance in the industrial architecture of the time (Fig. 8).[16] This was especially important in the chemical industry, as one of the most polluted, where such arranged spaces served workers for rest and the possibility of recreation (tennis court in the complex in Zagreb, volleyball court in both complexes and swimming pool in the complex in Samobor). Production process itself and the type of work in the factory (toxic fumes, humidity, darkness) are the main reasons why Fotokemika complexes are positioned on spacious plots with greenery around and between individual buildings.

In the exterior the rare, single-story pavilion construction has been reduced to basic forms (Fig. 9). The pavilions in Fotokemika Zagreb are only communicatively connected to each other by covered passages[17] (Milić, 1951: 66-67). Due to the larger open area of the plot, which resulted with larger distances between buildings, passages were not constructed in Fotokemika Samobor. At the time it was built, Fotokemika Zagreb had more built area and less total area of the plot, thus less area of landscaped green areas in relation to Fotokemika Samobor. The complex of Fotokemika Zagreb forms a whole with the landscaped environment in which it is located – public green areas, surrounding plantations, sports fields and Park Maksimir. Fotokemika Samobor is situated in a rural undeveloped environment of Samobor city periphery with no nearby public spaces. At the time it was built, the complex in Samobor thus formed a spacious landscaped public area inside itself contrasting vast agricultural fields surrounding it.

At present (2024), the original micro-urban values in terms of the relation between pavilions and open space of both complexes have changed significantly (Table III).

The change of purpose in the complex in Zagreb started in the early 2000s. The change from factory (production) to mixed-use (two residential and several office buildings) happened gradually. Once a single plot was now sub-parceled into several smaller plots. A new purpose has moved into buildings, the users are various and numerous: office spaces (A1 Hrvatska, MojPosao, Genos and others), medical facilities (Medilab, Medicom polyclinic Bonifarm, Avitum), university facilities (Faculty of Architecture), sport facility (CrossFit Maksimir). Until 2019, part of the former Fotokemika complex area were the Canon-Kodak Digital World photo and video center (used to be ground level building and is currently new 8 story high housing building with mixed ground level) and FujiFilm (temporary Faculty of Architecture in renovated building).[18] The once spacious and free area of the park has become a labyrinth with limited visual connections because of the newly introduced heights of the buildings. Moving through the former area of Fotokemika Zagreb is now complex and complicated – there

are numerous parking ramps, illogically positioned (multiple) fences with a small number of passages/entrances. Trees within the plot were demolished in great numbers. Green landscaped areas became paved or asphalted pedestrian and vehicular communication surfaces instead of possible shared space and linear circular plaza urban design much needed for the relocated college. The priority, in terms of contemporary standards, is the organization of a large number of parking spaces on the plot (Fig. 10). In the north the complex no longer forms a visual whole with landscaped public areas and Park Maksimir.

The resulting transformed state of Fotokemika Samobor has 20% less open space and 70% less landscaped green space. Landscaping is completely neglected, vegetation is destroyed or left to overgrow (Fig. 11). Area is divided into several parcels with different owners. Existing buildings are adapted to new use or demolished and replaced with larger industrial halls. The complex is now inhabited by production plants of various companies (Tehnoplast d.d., Intereuropa, Hvar d.o.o., Lim Samobor, Miltonia d.o.o.).[19]

Acquiring photo-documentation for the state of the outside complex took around 25 minutes for the complex of former Fotokemika Zagreb and around 45 minutes for the complex of former Fotokemika Samobor.[20] In both cases, the tour of the complex starts at the first entrance from the main road. Tours require careful searching for possible passages. It is not possible to tour whole complexes in one route. North-west part of the complex in Samobor is not open and accessible to the public.

Fig. 9 Parallel preview of Fotokemika in Zagreb and Samobor on orthophoto maps from 1968 and 2022

New buildings and production facilities implemented within the complex disrupt the original spatial concept established in the once harmonious whole. Due to the need for frequent vehicle traffic within the complex and large parking areas the complexes lost their valuable landscaping, and with it the feeling of pavilion construction.

Architectural Values

Fotokemika factory complexes in Zagreb and Samobor were designed according to design requirements for the chemical industry. The most important of these being separating individual working environments into special facilities. This achieves good insulation and prevents all negative mutual influences and transmission of noise and vibrations. Bilateral introduction of light and efficient ventilation of working spaces is enabled, the possibility of fire spreading is significantly reduced and upgrading or adapting existing construction is possible without stopping production for a long period of time (Damjanović, 1972: 43-47).

All buildings have a clear rectangular floor plan, more or less elongated, depending on the function of the rooms. Walls of pavilions were perforated with large openings of a simple rectangular shape. Roofs are flat. The design of the architecture was subordinated to the function. In short, the factory buildings were built according to the most modern

16 Other examples of industrial architecture with similar design characteristics include: 'City meat packing plant and cattle market complex' in Zagreb (1928-1931) by Walter Frese and 'Institute for the production of medicines' in Kalinovica (1939-1944) by Zoja Dumengjić.

17 Covered passages that connect individual pavilion buildings as a characteristic architectural element can be found in various public buildings in Zagreb, For example, public complexes with covered passages or similar elements (the elongated entrance porch, atrium connections): Ivan Zemljak, Primary school, Selska cesta 95, 1931.; Zvonimir Vrkljan, Faculty of Veterinary Medicine, Heinzelova street 55, 1935-1962; Zoja Dumengjić, Health Center Trnje (today Health Center Kruge), Kruge 44, 1954-1961.

18 Based on the Google Street View, photos from July 2019.

19 Based on the Google Street View, photos from July 2019.

20 Journalist Stjepan Kizvat, when describing the tour of Fotokemika complex in Samobor, says: "The area occupied by the Fotokemika factory is impressive, it took 2 hours to tour the whole complex. Outside, between the factory buildings, an orchard. Even now, in the middle of February, the gardener had work to do." (Kizivat, 1961: 5)

FIG. 10 FOTOKEMIKA ZAGREB ON HISTORICAL PHOTOS (ABOVE) IN THE SECOND HALF OF THE 20TH CENTURY AND ON CONTEMPORARY PHOTOS (BELOW) IN 2024

principles[21] of industrial construction at the time. The facilities were dominated by large, spacious rooms, full of light and clean air, inside which precise and modern machines were located (Milić, 1951: 66-67).

In both Fotokemika complexes some buildings were demolished and replaced, a few were added within the once harmonious ensembles and a large part was upgraded or adapted (Table II). New replacement buildings are taller and built within the same floor dimensions as existing ones. Some buildings in the area of the former Fotokemika Samobor are deteriorated and currently in unusable condition.

Visually, in the context of exterior architectural character, in both complexes, individual build-

TABLE II CURRENT USE OF BUILDINGS IN FORMER FOTOKEMIKA COMPLEXES IN ZAGREB AND SAMOBOR

	Fotokemika Zagreb	Fotokemika Samobor
abandoned (original)	0	6
demolished	6	11
adapted	8	4
newly built	4	6

21 Refers to the use of materials common in the period of extensive construction after the Second World War (ready-made reinforced concrete elements and solid brick filling) and characteristic design features (reduced facade design, large, rectangular openings and flat roofs).

FIG. 11 FOTOKEMIKA SAMOBOR ON HISTORICAL PHOTOS (ABOVE) IN THE SECOND HALF OF THE 20TH CENTURY AND ON CONTEMPORARY PHOTOS (BELOW) IN 2024

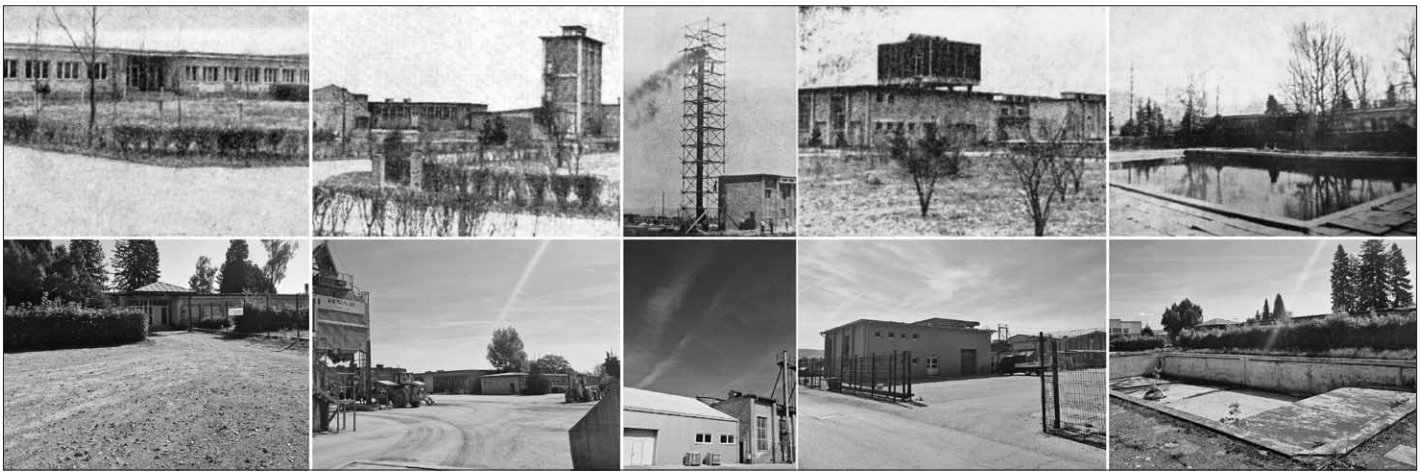

Table III Comparison of urban transformation processes between former Fotokemika complexes Zagreb and Samobor

Space-time context	Zagreb		Samobor		Research scale	Conclusion: transformation result and category of observed value*	
	established: 1947 closed: 2003		established: 1952 closed: 2012				
	20th c.	21st c.	20th c.	21st c.			
use of space	industry	mixed use (residential and business)	industry	economic-production purpose	urban and micro-urban	change of use affects the development of the environment; complex loses its unity	–
position in the city	urban periphery	wider center	periphery (disconnected)	periphery (urban edge)	urban	the significance of the space slightly changes as the city expands	+
total area of the complex	28 296 m²	28 296 m²	98 837 m²	98 837 m²	urban and micro-urban	size corresponds to the position in the city and character of the surroundings; size enables functional and safe production	/
number of cadastral parcels	1	11	1	9	micro-urban	creates visible boundaries within the complex	–
number of main entrances to the complex	1	2	1	2	urban and micro-urban	inappropriate location in the environment in the context of traffic connections; problems with navigating the space	–
number of buildings**	13	12	14	15	micro-urban and architectural	not a relevant indicator alone – tendency towards reducing open space with new buildings	/
built area	11 862 m²	12 029 m²	8 282 m²	29 796 m²	micro-urban and architectural		
percentage of built area	42 %	43 %	8 %	30 %			
percentage of open areas	58 %	57 %	92 %	70 %	micro-urban	reduction and loss of open, green and recreational areas is the most relevant lost value	–
percentage of green spaces	25 %	5 %	82 %	7 %	micro-urban		–
percentage of recreational areas	2 %	0 %	2 %	0 %	micro-urban		–
percentage of paved area	31 %	52 %	8 %	63 %	micro-urban	the complex is no longer perceived as pavilion form	–
percentage of parking area	2 %	20 %	⟨ 1 %	12 %	micro-urban	loss of green spaces	–
distance from the historic city center	3.5 km		1.5 km		urban	no changes	/
distance from the populated part of the city	0 m		200 m	100 m	urban	with development, the city expands towards the observed area	/

* recognised as: + positive outcome, – negative outcome, / neutral outcome
** more details in Table II and Fig. 9

ings no longer form a whole. The original, repurposed and new buildings are no longer coordinated with each other, they differ in the choice of facade finish, roof covering, type of windows and doors. The buildings have retained their flat roofs and, in part, the original uniform grid of openings on the facade.

Discussion of Lost and Preserved Values

Table III summarises the comparative analytical approach of this research through quantitative relations between former situations in the 20th century and contemporary situations in the 21st century as well as qualitatively by analyzing characteristics through positive (+), negative (–) and neutral (/) outcomes in the transformation processes. Negative outcomes directly point to lost values – mainly regarding the loss of valuable open and landscaped areas. In their current form it is questionable whether complexes have any preserved micro-urban and architectural values.

Conclusion

The focus of this research was to compare the two areas of former Fotokemika factory complexes located in Zagreb, Croatia's capital city, and in the town of Samobor, west of Zagreb. The available archive and literature data point out that this topic evoked interest of various disciplines from social to architectural fields as well as artists, but still without a systematic and holistic approach. This research is a step towards filling in the research gap of comparative overview and urban analysis within the historical and cultural context of the production of photo-materials in former Yugoslavia and contemporary Croatia.

The results show that in urban scale the closest surrounding of the Fotokemika complexes in Zagreb and Samobor did not change significantly in regard to city-periphery relation question. Both complexes are located northeast from the city center and on peripheral area. For the Zagreb complex it was built peripheral area near the Maksimir urban park while for the Samobor complex it was mostly unbuilt periphery, which is now starting to become urbanized.

The comparison of the transformative process during and after the Fotokemika factory informs on the urban, micro-urban and architectural values of the original projects of these complexes. In regard to the ratio of built and unbuilt area before and after urban transformation process, the tendency in both cases was in favor of more and higher building. The Fotokemika factories were situated in regard to their function and urban surroundings as a balanced architectural system within the human-scaled and useful open spaces designed as parks. After the transformation process this balance has been changed and disrupted, with most of the open spaces becoming parking lots. Both areas have been segregated into multiple plot areas and more owners which resulted in discontinuous open areas separated with fences. This loss of integration and unity of the complex areas is especially problematic in the case of Zagreb complex where the pedestrian connectivity is lost and the movement of the pedestrian is non-intuitive as it should be since its location is right across the historical urban park of Maksimir. In both complexes, the architecture has been changed to serve new purposes, transforming the pavilion typology into various building types. In Samobor, buildings are primarily halls while in Zagreb it is office buildings of various heights. The new buildings have emerged where the open common gathering areas used to be and in places of old ones.

In the context, the lost relations between urban, micro-urban and architectural values which were achieved in the original projects are now transformed to new function and architecture. These locations and historical complexes deserve rethinking their current urban and micro-urban values for better integration with its surroundings. In Zagreb, its surroundings are complex and diverse which means that connectivity needs to be higher to achieve integration between this highly mixed-used area. In Samobor, the peripheral moment is still present, therefore new concepts for organizing current industrial tendencies would be useful before the whole identity of what used to be Fotokemika is lost.

Both locations of former Fotokemika complexes should in future development include the memory of their origin. The history in the form of photographs in this part of the cities is an important element of how the world observes and remembers today in the forms of photographs.

The history of these spaces in the form of photographs shows important elements of the observed development about 70 years ago, which can be an instruction on how we should behave in the transformation of these spaces without forgetting all three layers of the project. The value and uniqueness of researching photographic material factories is in the way they enabled the creation of the history of cities through photographs, but at the same time the decay of these factories shows the transformation of the possibility of recording city history through digital photography.

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Illustration sources

Fig. 1 Collage by authors combined from photodocumentation (2024), historical photographs and archive materials – State archives in Zagreb, HR-DAZG-1233, Fotokemika d.d., box no. 35 (Marincel, 1978: 1 and Kauzlarić, 1978: 4-5)

Fig. 2 Diagram by authors (2024)

Fig. 3 State archives in Zagreb, HR-DAZG-1233, Fotokemika d.d., box no. 2

Fig. 4 Photo by Ivan Buvinić (Habjan, 2021)

Figs. 5, 7, 9 Collage by authors with orthophoto basemap available at: https://geoportal.dgu.hr/ [Accessed: 25 November 2023]

Fig. 6 Collage by authors with historical basemap available at: https://digitalna.nsk.hr/?pr=i&id=10385 and https://digitalna.nsk.hr/?pr=i&id=574135 [Accessed: 25 November 2023] and orthophoto basemap available at: https://geoportal.dgu.hr/ [Accessed: 25 November 2023]

Fig. 8 Collage by authors combined from axonometric drawings – Samobor Museum, Collection Ivica Sudnik, Fotokemika (*** 1962: 1) and historical photographs (*** 1999: 142; Brunović, 1972: 288)

Fig. 10 Collage by authors combined from photodocumentation (2024), historical photographs (Milić, 1951: 67) and archive materials – State archives in Zagreb, HR-DAZG-1233, Fotokemika d.d., box no. 35 (Kerin, 1978: 4, Doljak, 1957: 4-9)

Fig. 11 Collage by authors combined from photodocumentation (2024), historical photographs and archive materials – State archives in Zagreb, HR-DAZG-1233, Fotokemika d.d., box no. 35 (Kauzlarić, 1978: 4-5, Kauzlarić, 1995: 10) and Samobor Museum, Collection Ivica Sudnik, Fotokemika (Kizivat, 1961: 5)

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