

HISTORICAL STRATIFICATION OF INDUSTRIAL HERITAGE IN THE CITY OF TUZLA

Abstract

A region's socioeconomic and political conditions greatly influence the interaction between human settlements and natural landscapes. The relationship between man and landscape is, to a great extent, evident in regions where economic development relies on mineral sources. In that regard, the city of Tuzla in Bosnia and Herzegovina offers a unique narrative about the value of salt as an administrative and economic tool. In addition, regime changes conditioned the formation of an industrial network that emerged around salt and coal deposits. The coal and salt industries, thus, gained a leading role in Tuzla's economic development between 1884 and 1992. After 1992, war destruction and changes in society contributed to the transition from secondary to the tertiary economic sector. The resulting high unemployment rate became the primary problem. Therefore, the significance of the buildings and sites, which make up the historically and technologically connected network of Tuzla's industrial heritage, has not yet been determined. Guided by international principles for the valorization of cultural and historical heritage, this article aims to identify industrial heritage in the municipality of Tuzla and holistically evaluate their cultural and historical significance for preserving the identity of its population.

Keywords

industrial heritage, industrial heritage network, salt production heritage, industrial heritage values, Tuzla

HISTORIJSKA STRATIFIKACIJA INDUSTRIJSKOG NASLIJEĐA GRADA TUZLE

Apstrakt

Društveno-ekonomski i politički uslovi u regionu u velikoj mjeri utiču na interakciju između ljudskih naselja i prirodnih krajolika. Odnos čovjeka i krajolika je u velikoj mjeri evidentan u regijama u kojima se ekonomski razvoj oslanja na mineralne izvore. U tom smislu, grad Tuzla u Bosni i Hercegovini nudi jedinstven narativ o vrijednosti soli kao administrativnog i ekonomskog alata. Promjene režima uvjetovale su formiranje industrijske mreže koja je nastala oko ležišta soli i uglja. Industrija uglja i soli je tako dobila vodeću ulogu u ekonomskom razvoju Tuzle između 1884. i 1992. Nakon 1992., ratna razaranja i promjene u društvu doprinijeli su tranziciji iz sekundarnog u tercijarni privredni sektor. Kao rezultat toga, uslijedio je problem sa visokom stopom nezaposlenosti. Stoga još nije utvrđen značaj objekata i lokaliteta koji čine historijski i tehnološki povezanu mrežu tuzlanskog industrijskog naslijeđa. Rukovodeći se međunarodnim principima za valorizaciju kulturno-historijskog naslijeđa, ovaj članak ima za cilj da identificuje industrijsko naslijeđe na području općine Tuzla i holistički odredi njihov kulturno-historijski značaj za očuvanje identiteta njenog stanovništva.

Ključne riječi

industrijsko naslijeđe, mreža industrijskog naslijeđa, naslijeđe proizvodnje soli, vrijednosti industrijskog naslijeđa, Tuzla

Introduction

Salt has been a significant asset for the urban development of the city of Tuzla since the Neolithic period. Ottoman administration initiated organized salt production in Bosnia and Herzegovina in the sixteenth century. Until the Ottoman Tanzimat period, revenues obtained from salt production had a significant role in the construction of public buildings by Ottoman religious foundations (*waqfs*). Namely, the Ottoman salt administration enabled religious foundations to participate in salt production and distribution of yield.

While the earliest settlements formed around salt deposits, the first industrial district developed around coal deposits after 1884. Moreover, the transition to coal for salt brine boiling processes was a crucial determinant for the formation of the industrial district of Kreka. Historical layers of Kreka testify about the migrations of skilled workers during the second wave of the Industrial Revolution. Moreover, controlled migrations and planned workers' settlements contributed to the formation of a disciplined workforce adapted to the factory system. Kreka became a settlement model for emerging miners' colonies around mining areas within Tuzla Municipality. In the following years, the transition from capitalist to the socialist economy in 1945 enabled an interdependent industrial network to form. Centralized planning of the socialist regime envisioned the development of new industrial sectors, such as the chemical and manufacturing industries.

Lack of documentation, institutional support, and statutory protection has enabled the demolition of historic buildings. As a consequence, the urban fabric suffered from irreversible damage. Moreover, the controversy of the negative environmental and social impact of industrialization, such as ground subsidence, pollution, or

the massive unemployment rate caused by de-industrialization, has overshadowed the cultural potential of industrial sites. Such conditions can challenge the formation of a public perception of Tuzla's industrial heritage sites.

The Commission to Preserve National Monuments of Bosnia and Herzegovina proclaimed the Ottoman Salt Well, the Pumping Station with the surrounding cultural landscape, and the old Kreka Saltworks with a chimney, two workshops, a rare materials warehouse, and the Salt Museum with movable heritage as national monuments in 2007. However, due to administrative and territorial fragmentation of national monument sites and legal weaknesses in regulating financial responsibility, statutory protection did not prove efficient for implementing conservation measures.

Defining industrial heritage and its components

Industrial archeology was introduced in an article written by the scholar Michael Rix in 1955 for the "The Amateur Historian".¹ Due to multiple queries on the validity of the expression, Rix wrote another article in 1962 named "Industrial Archeology Progress Report", where he justifies the use of the term 'archeology' for studying the early history of the mechanical industry.²

¹ Kenneth Hudson, *Industrial archaeology: an introduction*, Routledge, London and New York, 2014, 11.

² "The use of the term 'archeology' in this connection has been criticized, since, by definition, it is concerned with things that are old, and mechanical industry is a development that is comparatively recent. The word 'archeology' implies 'early history'-the early history of pottery, metal working and the like. But it is worth remembering that with the speeding up of technological progress in the last few centuries, every period now contains the early history of something." (Michael Rix, Industrial Archaeology: Progress Report 1962, *The Amateur Historian* V/2, London, 1962, 56-60.)

The First International Conference on the Conservation of Industrial Heritage took place in 1973 in Ironbridge, UK. The idea was promoted by Neil Cossons, the director of the Ironbridge Gorge Museum Trust.³ After the Congress in 1973, The International Committee for the Conservation of Industrial Heritage (TICCIH) was established. The Nizhny Tagil Charter for Industrial Heritage was adopted by delegates gathered at the triennial National Assembly of TICCIH held in Moscow in 2003. This document provides a comprehensive guideline for identification, documentation, evaluation and legal protection of industrial heritage. The Nizhny Tagil Charter (2003) specifies that industrial heritage consists of material evidence of industrialization's historical, social, technological, and scientific changes in the development process. While tangible industrial heritage consists of landscapes, complexes, buildings, structures, and machinery, intangible industrial heritage dimensions are reflected in written records and the collective memory of the local population.

Industrial heritage sites can be representative examples of technological innovation, historical events, or “multiple site operations or systems whose many components are interdependent, with different technologies and historical periods frequently present”.⁴

Considering the multiple components of industrial heritage, it is evident that selection criteria must exist to achieve feasible outcomes. However, if the selection is limited to a single theme or area, the

³ The International Committee for the Conservation of the Industrial Heritage. "TICCIH Congress 1975" (1978).
<http://works.bepress.com/theinternationalcommitteefortheconservationoftheindustrialheritage/10/> (28.11.2022).

⁴ ICOMOS – TICCIH, Principles for the Conservation of Industrial Heritage Sites, Structures, Areas and Landscapes: <https://ticcih.org/about/about-ticcih/dublin-principles/> (28.11.2022).

process may exclude significant traces of history and overlook historical stratification.⁵ A values-based approach involves judgments regarding a building or site's historical, architectural and socio-cultural importance. Cultural values of industrial heritage are associated with several aspects that do not necessarily relate to physical or aesthetic qualities. In case of conflicting values, a careful assessment is necessary to balance historical evidence, present needs, and future sustainability.⁶ This article will elaborate on the cultural values of industrial buildings in the city of Tuzla as a technologically and historically related network.⁷

Historical stratification of Tuzla's Industrial Heritage Network

Tuzla's industrial development is assessed from the socio-economic and political perspective to evaluate the influence of diverse ideologies promoted by the ruling regime. In this respect, historical development is explained in four historical periods: the Ottoman period (1468-1878), the Austro-Hungarian period (1878-1918), the period of the Kingdom of Serbs, Croats, and Slovenes, or the Kingdom of Yugoslavia (1918-1941), and the Socialist Federal Republic of Yugoslavia (1945-1992).

⁵ Judith Alfrey, Tim Putnam, *The Industrial Heritage: Managing Resources and Uses*, Taylor and Francis e-Library, 2005, 8.

⁶ Jukka Ilmari Jokilehto, *A history of architectural conservation: The contribution of English, French, German and Italian thought towards an international approach to the conservation of cultural property*, PhD dissertation, 1989, 380; Aylin Orbaşlı, *Architectural conservation: Principles and practice*, Oxford, 2008, 38.

⁷ A chronological review of Tuzla's industrial development and the related schemes were based on the research conducted by the author in her PhD thesis: Tijana Veljković, *Endüstri miras alanlarının bütünlilik korunması için bir öneri: Tuzla (Bosna Hersek)*, PhD thesis, İstanbul, 2022.

Moreover, the article analyzes the development of Tuzla's industrial network at a diverse scale: regional and urban. Historical stratification of industrial heritage in the urban fabric is assessed at a micro-scale, encompassing the historical city center and the old industrial district.

Salt as an Economic and Administrative Tool for Tuzla's Development in the Ottoman Period

Salt's significance in the formation of Tuzla is most evident in historical names of early settlements (Salines, Soli, Ağaç Tuzla, Memleha-i Zîr, Aşağı Tuzla) and the river Jala. Just like the names of the Austrian village Hallstatt and the historic town Hallein are associated with the ancient Greek word for salt, 'háls',⁸ it is assumed that the name of the river Jala derives from the same word. The first written record of the settlement appears in "De Administrando Imperio", written by the Byzantine emperor Constantine VII Porphyrogenitus in the tenth century.⁹

Apart from the Ottoman conquest in 1468, the Arabic-Persian compound name Memleha-i Zîr (Lower Tuzla)¹⁰ started to appear in historical records. Two separate areas formed the subdistrict, named kaza, within the district of Zvornik, which can be found by the name Izvornik Sancağı in Ottoman records.¹¹ The development of the town of Upper

⁸ Samuel Adrian Miles Adshead, *Salt and Civilization*, Palgrave, New York, 1992, 8,30.

⁹ Milica Baum, Župa Soli, *Članci i građa za kulturnu istoriju istočne Bosne I*, Tuzla, 1957, 12.

¹⁰ *Mamlaha* (مملحة) is the Arabic word for saltwork, which derives from the word *milh* (מלח), meaning salt (EtimolojiTürkçe, <https://rb.gy/gfjdpi>, accessed on 30.11.2020).

¹¹ Adem Handžić, *Tuzla i njena okolina u XVI vijeku*, Sarajevo, 1975, 166; Ahmet Yüksel and Zafer Karademir, Osmanli idaresinde Tuzla Sancağı'nın sosyal, iktisadi ve askeri vaziyeti hakkında bazi bilgiler, *Tarih Okulu Dergisi* (TOD)

Tuzla (Memleha-i Bâlâ), however, will not be included in this article.

Upon the conquest of coastal regions, salt mines, salt lakes, or territories containing brine springs, the Ottoman land classification defined occupied areas as hâss¹² territory. In the case of Tuzla, the territory was declared as a hâss in 1477.¹³ The law (kanun) for Tuzla's saltworks (in Upper and Lower Tuzla) provided in the Book of Deeds (Tapu Defteri)¹⁴ of the Zvornik Sanjak from 1548 regulated legal responsibilities and revenues that were distributed between the Imperial Treasury, the local population and lessees of salt sources.

Administrative processes were regulated by state tax collectors (mültezim), while Ottoman government officials (emin) were responsible for operation works.¹⁵ Additionally, the mukataa taxation system allowed private stakeholders to rent salt sources for a certain number of days in return for a defined amount of revenue given in advance.¹⁶ Revenues from salt production were, thus, divided between the state, public and private stakeholders and used for the administration of institutions, salaries, and construction of public buildings.

Lower Tuzla developed from a small Christian town into a typical Ottoman town by the middle of the sixteenth century¹⁷. By 1548 there

XVIII, 2014, 269-283.

¹² According to the Ottoman administrative classification of land, a hâss was an estate that could generate a revenue of at least 100.000 'akçes' or silver coins (Has, Cengiz Orhonlu, Nejat Göyünc, <https://islamansiklopedisi.org.tr/has--arazi>, accessed on 20.08.2022).

¹³ A. Handžić, *Tuzla i njena okolina*, 168.

¹⁴ Ibid, 9.

¹⁵ Lütfi Güçer, XV.-XVII. asırlarda Osmanlı İmparatorluğunda Tuz İnhisarı ve Tuzlaların İşletme Nizamı, *İstanbul Üniversitesi İktisat Fakültesi Mecmuası* 23/1-2, İstanbul, 1963, 109, III.

¹⁶ Ekin Kasım, *İstanbul Üniversitesi İktisat Fakültesi Mecmuası*, Master thesis, Ankara, 2016, 10.

¹⁷ Ottoman towns were characterized by a sizeable Muslim population and public buildings (mosques, madrasas, hamams, fountains, imarets, hans,

were five Muslim neighborhoods (mahalle) and one Christian neighborhood (varoş) in Lower Tuzla. In the middle of the sixteenth century, a wooden fortress or palanka surrounded four Muslim neighborhoods.¹⁸

High-ranking military officers (Sancak Bey) were appointed as district governors. The former Sanjak Bey of Smederevo by the name Tur Ali Bey had invested, among others, in the development of Lower Tuzla. His contribution to the town's development was documented in a charter of a charity foundation (waqf)¹⁹ by the name Tur Ali Bey's Waqf. The charter, dating from 1572, was first published by the historian Kreševljaković in 1941. This charter indicates that Tur Ali Bey had donated one-fourth of salt water, for which he probably obtained a lease or was bestowed by the state.²⁰

Due to frequent fires in the second half of the 16th century, which are thought to have been caused by continuous boiling of salt water, the town spread eastwards and southwards, outgrowing the palanka. By the seventeenth century, there were 13 Muslim and 1 Christian neighborhood in Lower Tuzla.²¹

Tuzla had an important military and strategic role due to its proximity to the border. Numerous soldiers, belonging to the

and bazaars) founded by religious foundations, or waqfs that provided the local population with necessary amenities (Hatice Akin, *Ahmet Cevdet Paşa'nın Bosna müfettişliği*, Master thesis, Antalya, 2004, 23; Behija Zlatar, Balkanski grad u osmanskom periodu - XV i XVI stoljeće, *Godišnjak Centra za balkanološka ispitivanja* 42, Sarajevo, 2013, 135.)

¹⁸ A. Handžić, *Tuzla i njena okolina*, 155-156.

¹⁹ The study conducted by historian Adem Handžić in the Waqf Archives (Yevmiye Defterleri) in Ankara showcases abundant evidence of the participation of waqfs in Lower Tuzla's salt production between 1701 and 1774 (*Ibid*, 181-182, 184-185, 188).

²⁰ *Ibid*, 183.

²¹ *Ibid*, 187.

infantry and cavalry ranks, had resided within the fortified area. In 1739, 388 cavalry soldiers (süvari) resided within Lower Tuzla's palanka.²² Revenues from salt production were partly used to provide salaries to military personnel.²³

Salt monopoly was first introduced in 1862 during the Ottoman Reform Movement. Since the promulgation of the Salt Regulation (Tuz Nizamnamesi), leasing to individuals was abolished. Jurisdiction over salt production sites was transferred to civil servants (memur).²⁴

Formation of the Industrial Network (1878-1918)

The Austro-Hungarian occupation in 1878 had triggered changes in the socio-economic realm of the Province of Bosnia and Herzegovina. Under the Dual Monarchy, the state regulated trade and public revenue with laws on indirect taxation of commodities (meat, sugar, and alcoholic beverages). State-regulated industrial production was further extended in 1879 with the introduction of tobacco and salt monopolies, which constituted the primary sources of revenue, as direct taxation was not sufficient within the underdeveloped rural community.²⁵

²² Ottoman Archives of the Prime Minister's Office (in continuation: İstanbul BOA), Ali Emiri Mahmud I (in continuation: AE.SMHD I), 159/12013.

²³ Ahmet Yüksel, Zafer Karademir, Osmanlı, 273.

²⁴ İstanbul BOA, Sadâret Defterleri - Nezâret-Devâir Giden Defteri (in continuation: A.MKT.NZD), 417/68; İstanbul BOA, A.MKT.NZD, 418/57.

²⁵ Iljas Hadžibegović, *Postanak radničke klase u Bosni i Hercegovini i njen razvoj do 1914. godine*, Sarajevo, 1980, 74; Ferdo Hauptmann, *Privreda i društvo Bosne i Hercegovine u doba austrougarske vladavine (1878-1918)*, *Prilozi za istoriju Bosne i Hercegovine*, 1987, 129; Dževad Juzbašić, *Politika i privreda u Bosni i Hercegovini pod austrougarskom upravom*, Akademija nauka i umjetnosti Bosne i Hercegovine, Posebna izdanja, CXVI/35, Sarajevo, 2002, 132.

Revenues obtained from state-owned saltworks were, therefore, a valuable source of income for the Province.²⁶ Salt production levels increased significantly by introducing large pans made of metal sheets and placed over coal-fired furnaces²⁷. Thus, investments made by the National Treasury (Ärar) were quickly redeemed. The provincial government successively redeemed brine sources in the vicinity of Tuzla, while the Mining Law of 1881 appointed all coal mining territory to the provincial government.²⁸ The state-owned salt production industry developed in three mutually distant areas (Figure 1): the Trnovac-Hukalo hills (Area A), Simin Han (Area B), and Kreka (Area C).

Due to outdated production methods, the Ottoman salt wells, which were approximately 60 meters deep, were substituted by deep drilling equipment, reaching between 300 and 400 meters of depth. Extraction was initiated in Simin Han in 1885, which later shifted to the northeastern edge of the historic city center due to higher saturation of brine. The extraction area occupied part of the old Varoš, Ciganska, and Džindić neighborhoods. Among these historic neighborhoods the experimental saltwork was constructed in 1886 to assess the required amount of brine, coal, and electrical energy for a new and improved saltwork planned at the western edge of Tuzla, in Kreka.²⁹ From here, salt was distributed to salt factories and the

²⁶ Article 3 in the Constatinopole Convention of 1879 determined financial sources to serve exclusively to the Province of Bosnia (Mustafa Imamović, *Položaj i unutrašnjo-pravni razvitak Bosne i Hercegovine 1878-1914*, Sarajevo, 1997, 49).

²⁷ This production method was implemented for centuries in Austrian salt production regions like the city of Hallstatt, Tirol, and Bad Ischl (Via Salis, <https://en.viasalis.at/saline>, accessed on 20.08.2022).

²⁸ Iljas Hadžibegović, *Postanak radničke klase*, 80-81; Salkan Užičanin, *Utjecaj industrijskog razvoja na društvenu strukturu u Bosni i Hercegovini (1918-1929)*, doktorska disertacija u rukopisu, Mostar, 2014, 41.

²⁹ Suad Buljagić, *Tuzlanske solane i solari*, Knjiga I, Sarajevo, 1990, 39.

caustic soda factory, which was established in the village of Lukavac.

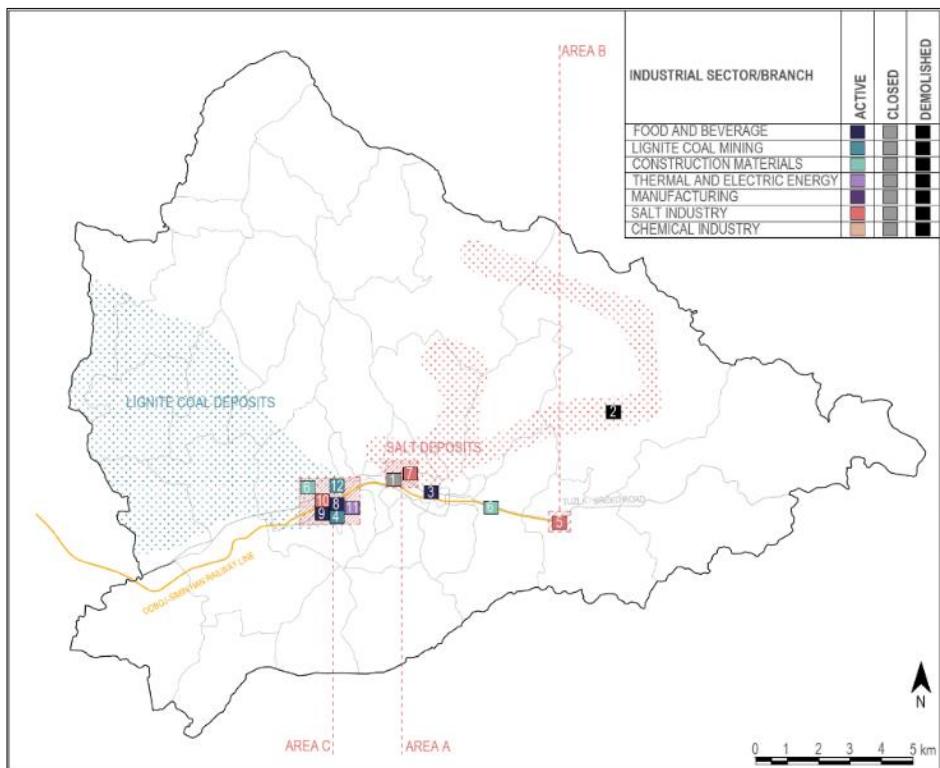


Figure 1. Schematic representation of the industrial network development between 1878 and 1914 within the present area of Tuzla Municipality: 1- Ottoman salt wells in Lower Tuzla; 2- Ottoman salt wells in Upper Tuzla; 3- Beer factory built in 1884; 4- Kreka colliery (Krojčica and Vilma pits) initiated in 1884; 5- Saltworks in Simin Han built in 1885; 6- Brickworks built in Kreka and Slavinovići in 1885; 7- solution mining area at the Trnovac and Hukalo hills initiated in 1886; 8- Spirits factory built in 1887/1888; 9- Steam mill built in 1890; 10- Saltworks in Kreka built in 1891; 11- Electric power plant built in 1906; 12- Kreka colliery (Benjamin and Moluhe pits) initiated in 1907 (scheme of the Spatial plan of Tuzla Municipality modified by Tijana Veljković)

Shortly after the construction of the Simin Han Saltworks was completed, the state issued the construction of a narrow gauge railway between Doboј, Tuzla, and Simin Han in 1886. In this way, a connection was established with the main railway line connecting

the Province with the developed railway network of the Monarchy.³⁰ The central railway station was built on the former praying area (musalla) near the Tur Ali Bey Mosque.³¹

The Austro-Hungarian state initiated coal mining in Tuzla in 1885. The first largest lignite coal mine in Bosnia and Herzegovina was the coal mine in Kreka. Coal mining was administratively related to the saltworks.³² Moreover, two brickworks were constructed in 1885 as part of the salt and coal mining enterprise.³³ With the commencement of deep drilling operations, the proximity of coal mines and railway connections determined Kreka as the optimal location for the new salt factory constructed in 1891.

By 1906, salt extraction by uncontrolled solution mining methods resulted in a significant increase of annual yield. In total, 711.429 hl of brine was supplied to the saltworks, while 1.173.944 hl was delivered to the caustic soda factory in Lukavac.³⁴ The salt factory in Simin Han, reached 5.500.000 kg of annual production by 1906. The salt factory in Kreka reached an annual capacity of 20.000.000 kg of fine salt by 1906.³⁵

³⁰ Iljas Hadžibegović, *Postanak radničke klase*, 189; Dževad Juzbašić, *Politika i privreda*, 162.

³¹ Hatidža Fetahagić, Enes Mukić, Izgradnja željezničke pruge Doboј - Simin Han, *Arhivska praksa* 21, Tuzla, 2018, 46.

³² Iljas Hadžibegović, *Bosanskohercegovački gradovi na razmeđu 19. i 20. stoljeća*, Sarajevo, 2004, 189; Bego Omerčević, Osvrt na historijske okolnosti razvoja rudnika Kreka, u: *Kreka - stotinu i dvadeset godina*, Tuzla, 2006, 13.

³³ Brick and tile production were mechanized at the Kreka Brickworks in 1892, and after 1895 the Hoffman kiln technology was introduced (B. Omerčević, Osvrt na historijske okolnosti, 13-14).

³⁴ Izvještaj o upravi Bosne i Hercegovine, *Bosna i Hercegovina u brojkama*, 1911, 13 (Digital access: <https://digital.bgs.ba/bosna-i-hercegovina-u-brojkama-2/>, accessed on 20.08.2022).

³⁵ Sead Selimović, Senaid Hadžić, *Tuzlanski kraj 1851.-1991: demografske i socijalne promjene*, Tuzla, 2007, 117.

In 1888, the Siemens & Halsk Company from Vienna initiated the Electric Power Plant project, which would form part of the coal mining enterprise. Due to insufficient investments, construction was postponed to 1905/1906. The state prioritized the electrification of industrial buildings. However, the capacity of 500 kS achieved in 1906 was sufficient to supply electrical energy to public and residential buildings adjacent to the main roads.³⁶

By 1910, 3.049 foreign skilled workers, mainly from Austria, Hungary, Russia, Czechoslovakia, Poland, Romania, Serbia, Croatia, and Slovenia, migrated to the Province of Bosnia.³⁷ Tuzla's industrial facilities employed 1.046 foreign and domestic workers in 1892.³⁸ The Kreka neighborhood became a multicultural industrial district containing a multilingual primary school, a sports and cultural center, as well as two social clubs. Between 1878 and 1918, the Austro-Hungarian government founded 12 industrial facilities, most of which were situated in the industrial district of Kreka (Figure 1).

Expansion of the Industrial Network during the Kingdom of SHS/Yugoslavia period (1918-1941)

The state-owned mines in Kreka and all ancillary facilities belonging to the mining administration became property of the newly established state after the Paris Peace Conference in 1919. Industrial faci-

³⁶ Vjekoslav Kovačević, Tehničko-tehnološki razvoj rudnika Kreka u periodu 1885-1944. godine, u: *Sto godina rudnika Kreka*, Tuzla, 1985, 74-75.

³⁷ S. Selimović, S. Hadžić, *Tuzlanski kraj*, 124.

³⁸ According to the Report of the districts' authority (Okružna Oblast) in Tuzla from 1892, the number of workers in industrial enterprises was as follows: saltworks in Simin Han 351, saltworks in Kreka 88, Kreka Coal Mine 451, Spirit Factory 80, Brickworks 80, Coal Research Section in Jasenica 50, Hrabovskogo Steam Sawmill 10 and Holzman's Brickwork 16 (Tonči Grbelja, Učešće tuzlanskih solarskih radnika u naprednom radničkom pokretu i NOB, *Zbornik radova Devedeset godina industrijske proizvodnje soli u Tuzli*, Tuzla, 1975, 39).

lities of the Kreka salt and coal mining industry (including the Brickwork and the Electric Power Plant), the salt factory in Simin Han, and the solution mining area on the Trnovac and Hukalo hills became part of the Sarajevo-based Directorate of State-Owned Mining Companies.³⁹ The salt industry in Tuzla was subordinated to the Ministry of Mining and renamed to State Directorate of Kreka Saltworks⁴⁰ (*Direkcija državnih solana Kreka*). As the coal mines, ditches, and shafts of Kreka were named after authority figures of the Austro-Hungarian regime, the new authorities changed the names of certain shafts and pits to be in compliance with the new nationalistic ideology.⁴¹ In 1919, a new colliery containing a miners' colony in the village of Bukinje was constructed.⁴² Following the workers' settlement model in Kreka, duplex houses for families and officials, a dorm for bachelors, an elementary school, and green areas were included in the design of the colony. Between the colliery and the residential area, a railway station with workshops was built.

The economic crisis between 1920 and 1931 reverberated throughout the population employed in industrial facilities. Due to unstable economies and high rent prices in urban areas, the number of workers employed in industry varied yearly⁴³. Following a series of attempts to achieve an agreement with authorities to counter financial

³⁹ S. Užičanin, *Utjecaj industrijskog razvoja*, 159.

⁴⁰ From 1932 onwards salt production was under the jurisdiction of the State Monopolies Administration (Jusuf Ćilimković, Važniji datumi u istoriji tuzlanske solane, *Zbornik radova Devedeset godina industrijske proizvodnje soli u Tuzli, zbornik radova*, Tuzla, 1975, 135).

⁴¹ For instance, the coal pit named after the Austro-Hungarian statesman Benjamin von Kallay was renamed to Vojvode Stjepe (Vjekoslav Kovačević, Tehničko-tehnološki razvoj rudnika Kreka, 68-69).

⁴² Ibid, 68-69; Suad Buljugić, Nihad Buljugić, *Tuzla: sjećanja na bisere stare gradske jezgre*, Tuzla, 2010, 147.

⁴³ S. Buljugić, N. Buljugić, *Tuzla*, 148.

difficulties, the miners of Bosnia and Herzegovina proclaimed a general strike on December 21st 1920.⁴⁴ The strike culminated with an armed conflict in the village of Husino six days later.

Meanwhile, the old industrial district of Kreka was expanded by new residential and social facilities. The workers' colony of the Spirits Factory in Kreka, designed by Dr. Bruno Bauer⁴⁵ in the Austro-Hungarian period, was extended with an additional living unit in 1921. Bauer designed an apartment building for officials in the same year.⁴⁶ Expansion of the residential building stock associated with industrial facilities clearly coincided with expansions within the production area. Similarly, the state-owned saltwork commissioned the construction of three apartment buildings for officials opposite the Kreka Saltworks' colony. In 1925 a hospital was built opposite the saltworks colony for workers.⁴⁷

The coal crisis did not have a significant impact on the salt industry. Successive expansion of brine boiling facilities was evident in the increase of annual production. The maximum production rate was recorded in 1927 when 54.765 tons of refined salt was produced. In the same year, 3.399.855 hl of brine was extracted from the Trnovac and Hukalo hills.⁴⁸

⁴⁴ Luka Đaković, Kraći historijski pogled na proteklih stotinu godina razvitka rudnika Kreka, u: *Sto godina rudnika Kreka*, Tuzla, 1985, 25; B. Omerčević, Osvrt na historijske okolnosti, 13-23.

⁴⁵ Bruno Bauer was a Czech architect, who specialized in industrial building construction. He designed industrial buildings across the territory of the former Austro-Hungarian Monarchy (Bruno Bauer and the Industrial Architecture in the Czech Lands, summary translated by Robin Cassling. <http://vcpd.cvut.cz/bruno-bauer-and-the-industrial-architecture-in-the-czech-lands/>, accessed on 20.08.2022)

⁴⁶ Arhiv Tuzlanskog kantona (in continuation: ATKT), Tvornica špirita Kreka (in continuation: TŠKr), K-1, A4/2

⁴⁷ V. Kovačević, Tehničko-tehnološki razvoj rudnika Kreka, 76

⁴⁸ S. Užičanin, *Utjecaj industrijskog razvoja*, 163.

On the contrary, the economic crisis caused the Bukinje coal mine to cease operation, and the Posavina Coal Mine to be terminated in 1934.⁴⁹ Nevertheless, the old industrial district of Kreka continued to grow, when a mechanical workshop made for repairing mining equipment was built between the salt factory and the hospital in 1936, which operated as part of the Kreka salt and coal mining enterprises. In the short time range of the SHS Kingdom period, only two additional production facilities were constructed, both associated with the coal industry (Figure 2).

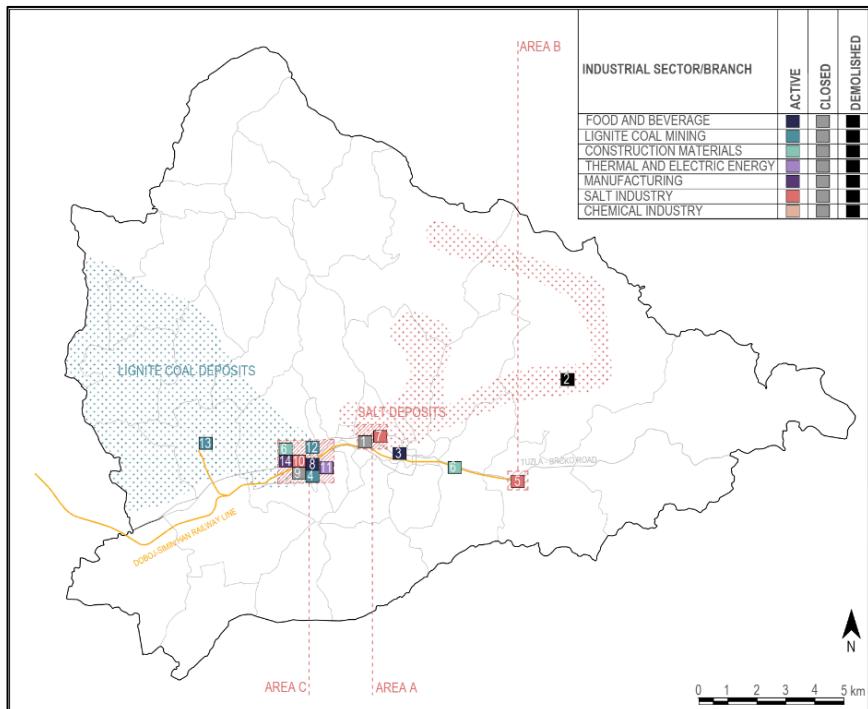


Figure 2. Schematic representation of the industrial network development between 1918 and 1941 within the present area of Tuzla Municipality: 13- Bukinje colliery initiated in 1919; 14- mechanical workshop (scheme of the Spatial plan of Tuzla Municipality modified by Tijana Veljković)

⁴⁹ V. Kovačević, Tehničko-tehnološki, 73; S. Buljugić, N. Buljugić, *Tuzla*, 149.

Expansion of the Industrial Network during the Socialist Federative Republic of Yugoslavia (1945-1992)

Industrial production sites in Bosnia and Herzegovina were severely damaged during the Second World War. Military actions were organized by the National Liberation Army of Yugoslavia to prevent the German troops from exploiting mining sites, as well as industrial facilities and railways. As industrial production relied on the supply of electrical energy, electric installations were the primary target. After the National Liberation Army entered the city of Tuzla in 1943, parts of the Kreka Saltworks, Spirits Factory, Kreka Coal Mines and the Electrical Power Plant were destroyed.⁵⁰ Water pumping equipment within the coal mines, which operated on electrical power, were thus disabled. As a consequence, certain pits were terminated.⁵¹ Therefore, to enable industrial production, the socialist regime prioritized the revitalization of damaged industrial plants.

Development was coordinated by special planning commissions at Federal, Republican and District levels. On June 27th, 1950, the National Assembly of the Federal People's Republic of Yugoslavia adopted the Basic Law on the Management of State-Owned Enterprises by Workers' Collectives.⁵² Until the beginning of the socialist period, the old industrial district consisted of three neighborhoods: Kreka, Solana, and Moluhe. In the first five-year plan (1947-1951), reconstruction of industrial facilities and increasing of production to pre-war levels was planned.⁵³

⁵⁰ S. Selimović, S. Hadžić, *Tuzlanski kraj*, 156, 161.

⁵¹ B. Omerčević, Osrvt na historijske okolnosti, 20.

⁵² Dušan Otašević, Solana u obnovi i socijalističkoj izgradnji, *Zbornik radova Devedeset godina industrijske proizvodnje soli u Tuzli*, Tuzla, 1975, 84-86, 98.

⁵³ Husnija Kamberović, Karakteristike društva u Bosni i Hercegovini

Inefficient exploitation of salt deposits by solution mining caused the initiative to implement rock salt mining methods. The most favorable location for constructing a salt mine was near the stream Tušanj. After systematic geological research, the excavation of mining shafts in Tušanj began in 1949.⁵⁴ The Solana salt factory was expanded with an additional brine boiling plant in 1952.

By 1953 there were five collieries (Moluhe, Bukinje, Dobrnja and Mramor) within the Municipality of Tuzla and one colliery in Lukavac.⁵⁵ Each colliery contained a miners' settlement designed according to the Kreka model. The socialist regime supported the development of recreation and culture among the working class, which is evident in the number of swimming pools, sports fields and cultural centers constructed in the proximity of each workers' colony.

The second five-year plan (1957-1961) envisaged increase of national income by reestablishing trading relations with the Eastern Bloc, and by increasing investment in manufacturing industries.⁵⁶ In order to balance the distribution of national funds, the third five-year plan (1961-1965) considered the development of heavy industries, such as electric energy, metallurgy, and processing industries.⁵⁷

In compliance with the aforementioned development plans metal processing industries started to be developed after the iron

neposredno nakon Drugog svjetskog rata, Naučni skup *Bosna i Hercegovina prije i nakon ZAVNOBiH-a*, Akademija nauka i umjetnosti Bosne i Hercegovine, Posebna izdanja 37, Sarajevo, 2007, 225.

⁵⁴ Predrag Jovanović, Ležište kamene soli u Tuzli, *Zbornik radova Devedeset godina industrijske proizvodnje soli u Tuzli*, Tuzla, 1975, 139.

⁵⁵ Enes Atić, O upravljanju i rukovođenju rudnikom Kreka, u: *Kreka - stotinu i dvadeset godina*, Tuzla, 2006, 34-36.

⁵⁶ Branko Petranović, *Istorija Jugoslavije, Knjiga III - Socijalistička Jugoslavija*, Beograd, 1988, 347-348.

⁵⁷ Branko Horvat, *Privredni sistem i ekonomска politika Jugoslavije: Problemi, teorije, ostvarenja, propusti*, Beograd, 1970, 29-30.

foundry and agricultural machinery factory (Livnica i tvornica poljoprivrednih strojeva - LIPOS) was founded in 1947 near Kreka. In 1959, the mechanical workshop was integrated with LIPOS in 1962 and became known as the Machinery Industry and Foundry (Industrija Mašina i Livnica - IML). IML was integrated into the Sarajevo-based company Energoinvest and again divided into two separate enterprises in 1970 for producing Weso furnaces within the foundry.⁵⁸

In the early 1960s, the significance of coal in the global economy had begun to decline. The coal crisis forced the government to search for alternative markets and rationalize production methods. Apart from underground mining, open-pit mining was initiated due to its economic and technological advantages.⁵⁹ In 1965 open-pit mining was initiated at the western end of the Tuzla Municipality.⁶⁰ The coal crisis additionally created surplus labor in the mining industry. The Kreka Coal Mines established manufacturing, construction, and extractive industrial facilities to accommodate unemployed or disabled workers. In such manner, the quartz sand mine started to operate in Bukinje (1965), while the aerated concrete factory Siporex (1969), and the Aida shoe factory (1970) were opened in Tuzla.⁶¹ More than 50% of produced coal was consumed by the Thermal Power Plant (TE Tuzla) after its construction between 1963 and 1978.⁶²

⁵⁸ Tadija Martinović, Tehničko-tehnološki razvoj u periodu 1945-1985. godine, u: *Sto godina rudnika Kreka*, Tuzla, 1985, 99.

⁵⁹ Ibid, 96.

⁶⁰ Slavka Sufi Mičić, Pristup Zaštiti Okoline u Razvoju Rudarske Djelatnosti, u: *Kreka – stotinu i dvadeset godina*, Tuzla, 2006, 85.

⁶¹ T. Martinović, Tehničko-tehnološki razvoj u periodu 1945-1985, 99-100.

⁶² V. Kovačević, Tehničko-tehnološki razvoj rudnika Kreka, 99.

Simultaneously, technological developments in the salt industry led to a significant increase in salt production. While 70.000 tons of salt were produced in 1946, successive expansion of production plants resulted in annual production of 147.000 tons by 1970. The vacuum evaporation plant was constructed in the same year, which caused production levels to double by 1990.

Inefficiency of five-year plans led to legal reforms in the 1970s. Labor organization was re-structured with the Constitution promulgated in 1974. Organizations responsible for making administrative decisions regarding specific production units became known as OOUR (Osnovna Organizacija Udruženog Rada), or the Basic Organizations of Unified Labor.⁶³ Tuzla's industrial enterprises formed part of several unions of OOURs that formed Complex Organizations of Unified Labor (Složena Organizacija Udruženog Rada - SOUR).

One of the most significant of such organizations in the territory of former SFRY was the SOUR SODASO Company, which issued the construction of the first Chloralkali Complex (HAK 1) in 1974. The second Chloralkali Complex (HAK 2) was built shortly after, in 1983. The Dita Detergent Factory was constructed between 1974 and 1975 next to the Chloralkali Complex and opened in 1977.⁶⁴

Until the establishment of the chemical industry, the extracted brine was distributed to the salt and soda factories. About 150 boreholes were drilled on the Trnovac and Hukalo hills until 1975.⁶⁵ Increased demand and introduction of updated technologies

⁶³ E. Atić, O upravljanju i rukovođenju rudnikom Kreka, 34.

⁶⁴ SODASO holding Tuzla, Programme of revitalization of polyurethane chemistry within the framework of the SODASO holding, 1997, 160.
https://openjicareport.jica.go.jp/pdf/11421427_03.pdf (20.08.2022)

⁶⁵ P. Jovanović, Ležište kamene soli u Tuzli, 148-149.

resulted in intensified brine extraction, from 4.120.000 hl in 1946 to 25.500.000 hl in 1990. However, less than 20% was distributed to salt factories. The largest consumer of salt was, in fact, the chemical industry.⁶⁶

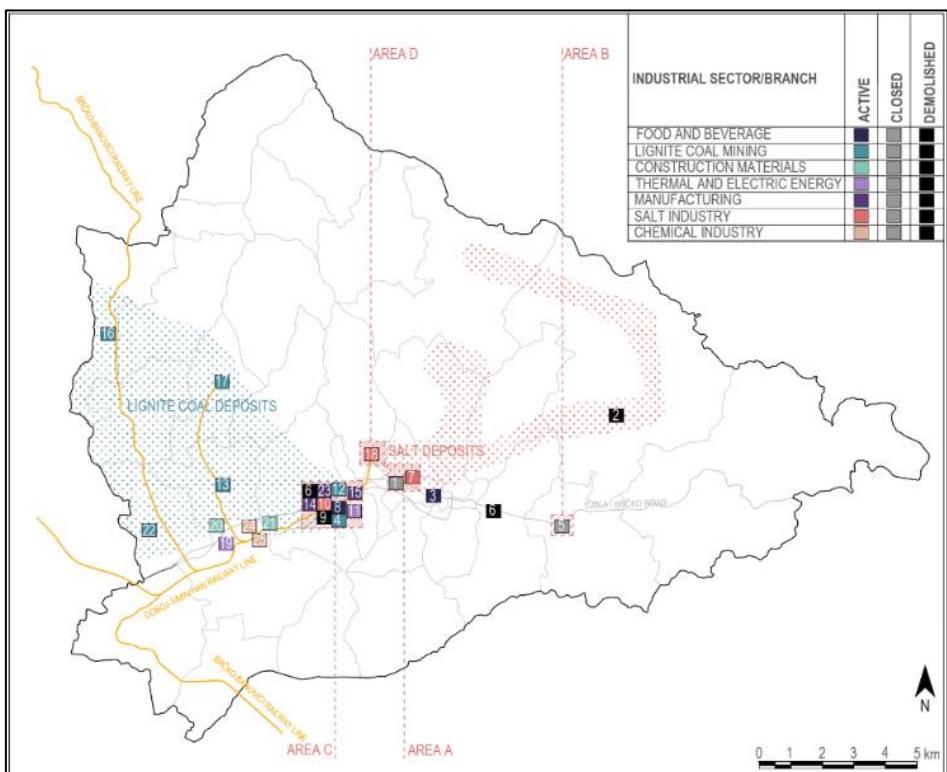


Figure 3. Schematic representation of the industrial network development between 1945 and 1992 within the present area of Tuzla Municipality: 15- Iron Foundry, built in 1947; 16- Dobrnja-Mramor Colliery, initiated in 1949; 17- Lipnica Colliery, initiated in 1950; 18- Tušanj Rock-Salt Mine, initiated in 1952; 19- Thermal Power Plant, initiated in 1963; 20- Quartz Sand Mine, initiated in 1965; 21- Aerated Concrete Factory, built in 1969; 22- Šćiki Brod Open-Pit Coal Mine, initiated in 1970; 23- Aida Shoe Factory, constructed in 1970; 24- Cloralkali Complex, initiated in 1974; 25- Dita Detergent Factory, built in 1977 (scheme of the Spatial plan of Tuzla Municipality modified by Tijana Veljković)

⁶⁶ Muharem Klapić, *Tuzla kao razvojni centar sjeveroistočne Bosne*, Tuzla, 2002, 290.

Investigations on ground movements caused by the exploitation of salt deposits started in the 1950s⁶⁷. In spite of early signs of ground subsidence, maximum sinking depth reached 14 m in the 1970s.⁶⁸

The number employed in industrial enterprises increased radically during the socialist regime. In the final years of the 1980s, the salt and chemical industries employed more than 10,000 workers, including the affiliated research facilities and administration.⁶⁹

In total, 11 industrial facilities were constructed during the socialist period. Most of them are situated in remote industrial areas of Tuzla Municipality's western side (Figure 3). They represent an extension of existing industrial sectors, or manufacturing and processing industries based on the existing mineral sources. Moreover, industrial enterprises of the socialist period facilitated the foundation of universities and research institutes to support industrial expansion.

Destruction of industrial production during the aggression against Bosnia and Herzegovina (1992-1995) and the current state of industrial premises

The disintegration of the Socialist Federal Republic of Yugoslavia had a devastating impact on the population of Bosnia and Herzegovina. In addition to human losses, great material damage was caused by the war between 1992 and 1995. Besides direct damage to industrial buildings and equipment, the loss of workforce and absence of market had degraded the Tuzla's industrial power. Total direct

⁶⁷ Fethulah Smailbegović, *Studija o ispitivanju deformacija terena u gradu Tuzli geodetskim metodama*, Sarajevo, 1961, 70.

⁶⁸ Nedreta Kikanović, *Uticaj slijeganja terena na urbani razvoj i ranjivost prostora kao determinante razvoja*, master rad u rukopisu, Tuzla, 2010, 41-43.

⁶⁹ M. Klapić, *Tuzla kao razvojni centar*, 201.

damage to economic and non-economic activities at the end of 1995 was estimated at 227.6 million DEM.⁷⁰

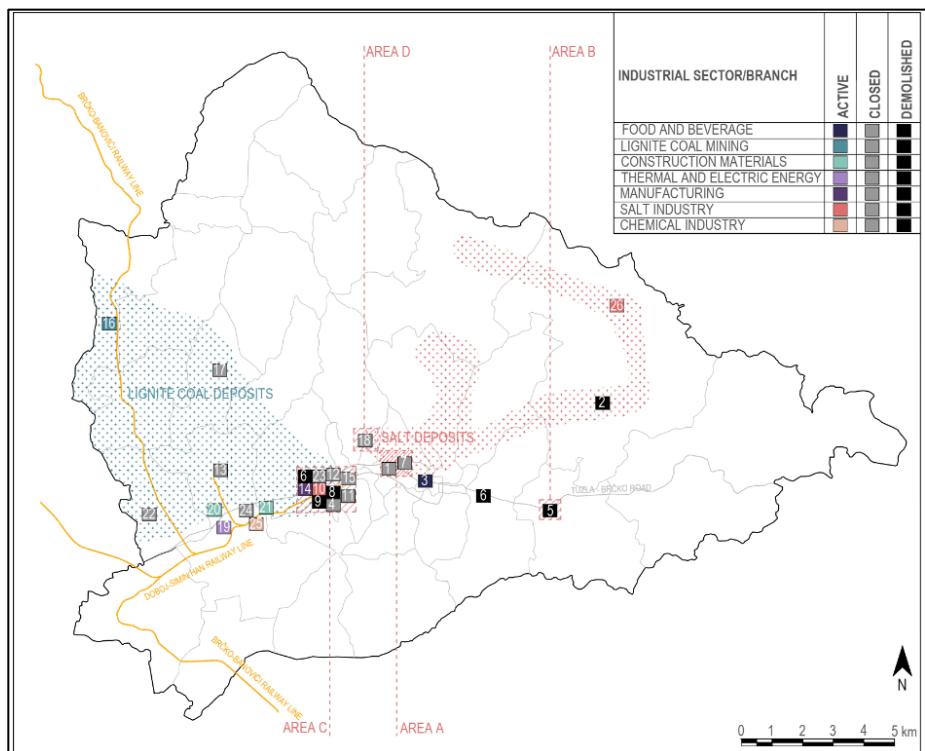


Figure 4. Schematic representation of the active, closed and demolished industrial facilities and mining areas of Tuzla in 2022 (scheme of the Spatial plan of Tuzla Municipality modified by Tijana Veljković)

Although the salt factory Solana was preserved during the war, only 60% of production capacity recorded prior the war was obtained. Most of the extracted brine was, however, released into the river Jala, as demands for brine decreased. This was partly affected by the halt in production of chemical products.⁷¹

⁷⁰ Ibid, 217-221.

⁷¹ Ibid, 221.

Sustaining the Thermal Power Plant during wartime was essential to provide the affected population with heating and electricity. Despite the presented challenges, the administration of the Kreka Coal Mines and employed miners have successfully sustained coal supply to industries and public facilities in need.⁷²

Bosnia and Herzegovina's political and economic restructuring that followed the Dayton Peace Agreement of 1995 launched the country's transition from socialist to market economy. Industrial enterprises went through a privatization process orchestrated by privatization agencies at Federal and Cantonal levels. The transition was not implemented successfully in most industrial enterprises of Tuzla, causing substantial social and economic degradation.

Out of 26 industrial facilities and mining areas discussed in this article, 8 have retained their original function, 12 have been abandoned or adapted into a new function, and 6 have been demolished (Figure 4).

Heritage values of Tuzla's salt production heritage as part of an industrial network

Evaluation of cultural heritage sites and buildings in Bosnia and Herzegovina is implemented by assessing a set of criteria: essential properties – value qualifiers⁷³, function and importance – value

⁷² Mujesira Džambić, Rudnik „Kreka“ Danas, u: *Kreka – stotinu i dvadeset godina*, Tuzla, 2006, 163.

⁷³ Qualifiers determine the level of significance of a certain cultural heritage asset. According to the Principles and Guidelines for the Preservation of national Monuments they consist of the following: authenticity, uniqueness, integrity, context, and physical state or compactness (Komisija za Očuvanje Nacionalnih Spomenika Bosne i Hercegovine, *Principi i smjernice za očuvanje nacionalnih spomenika*, Sarajevo, 2018, 40-41).

typology, general characteristics of the property – physical state of the property (age, preservation and endangerment), specific criteria according to the type of good or its special characteristics, which determine its general or special value.⁷⁴ Value typology is based on the Burra Charter and the typology developed by English Heritage in 2008, as adopted by the Commission to Preserve National Monuments in Bosnia and Herzegovina.⁷⁵

Assessment of cumulative values of industrial heritage sites reveals unexplored cultural potentials of places, which may not be evident when considered individually. This article proposes the assessment of significance for salt production heritage sites as part of technologically and historically related industrial systems within the Municipality of Tuzla.

Aesthetic values⁷⁶ are closely related to sensory stimulation and often reflect the stylistic expressions of a particular period in time and civilization. Exposed structural elements, industrial steel window frames, large interior openings, or weathered metal surfaces contribute to a sense of the industrial character of a building. On a larger scale, industrial complexes or collieries with winding towers, coal separation plants, and a network of railway tracks can provide an immersive sensory experience. Tall structures such as industrial chimneys provide unique historical landmarks to rural or urban landscapes.

After the Spirits Factory in Kreka was demolished in 2015, only one industrial chimney (Figure 5) has survived as a reminder of the old

⁷⁴ Ibid, 40.

⁷⁵ Ibid, 45.

⁷⁶ Aesthetic values are perceived as "form, scale, color, texture, and material of the fabric; the smells and sounds associated with the place and its use" (The Burra Charter, *The Australia ICOMOS Charter for Places of Cultural Significance*, 1999, 12. https://australia.icomos.org/wp-content/uploads/BURRA_CHARTER.pdf (30.11.2022)).

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industrial district's character. The chimney is located within the production zone of the Kreka Saltwork as part of the designated national monument area.



Figure 5. Solana Saltworks's chimney (photograph taken by Tijana Veljković in May 2019)



Figure 6. (a) An officials' house in the saltworks' workers' colony; (b) Spirits factory's officials' apartment building - presently used as an administrative building for the State Investigation and Protection Agency (photographs taken by Tijana Veljković in April 2022)

A repetitive urban pattern of workers' colonies formed around industrial facilities produce a sensory experience, typical for workers'

settlements of the nineteenth century. Most buildings dating from the Austro-Hungarian period were adapted to contemporary needs by additional floors, annexed structures and contemporary materials. Nevertheless, part of the built stock has preserved original architectural features, such as neoclassical façade elements on former officials' houses (Figure 6).



Figure 7. Thermal Power Plant's cooling towers (photograph taken by Tijana Veljković in June 2022)

The industrial zone in Husino forms a cluster of large industrial complexes. The largest complex is the thermal power plant, containing tall concrete cooling towers that form landmarks for the western entrance to the city (Figure 7).

The historical value⁷⁷ of industrial heritage is associated with past political, social, and economic dynamics caused by the Industrial

⁷⁷ Historical value relates to a specific or a set of past events that connect the cultural property or place to a stage of human development in a particular field (J. I. Jokilehto, *A history of architectural conservation*, 310, 379).

Revolution. Due to the transformative character of places of production and surrounding settlements, industrial heritage sites often contain multiple layers of history shaped by technological or social development. Industrial sites that convey information about a particular historical period attain higher historical value.

The landscape that evolved on the hills adjacent to the city center bears witness to the technological transfer imported by the Austro-Hungarian administration and the destructive consequences of industrial growth during the socialist regime. The double effect of continuous exploitation of salt deposits manifests in the existing empty land plots of the historical urban fabric.



(a)



(b)



(c)



(d)

Figure 8. (a) miners' colony in Kreka; (b) miners' colony in Bukinje; (c) miners' colony in Lipnica; (d) miners' colony in Mramor (photograph taken by Tijana Veljković in May 2019 and June 2022)

Frequently overlooked workers' settlements are essential components of Tuzla's industrial heritage in terms of social history. Workers' colonies in the western part of the city are indicative of social developments of the late nineteenth century when foreign skilled labor migrated to the city to work for salt, coal, and alcoholic beverage industries. Common characteristics of these settlements, such as duplex houses with gardens, cultural, sports, and educational facilities, served as a model for new workers' settlements across the Municipality during the socialist period (Figure 8).

SFRY's five-year planning system resulted in numerous industrial facilities until 1980. The authorities either constructed new factories on territories owned by the Kreka Coal Mines in the old industrial district. Technological and urban development of the socialist regime contributed to clustering industrial complexes in the mono-functional industrial zone of Husino, thus dividing industrial from residential areas.

*Age value*⁷⁸ is one of the oldest evaluation criteria in heritage conservation theory. Cultural assets that testify about distant historical periods are considered more valuable. Minimal intervention approaches are preferred to conserve traces of the past. Age value for industrial heritage sites can be attributed to places that document early production methods, tools, and skills.

While the Ottoman Salt Well is preserved in its original setting, all the salt production facilities dating from the Austro-Hungarian period have either been demolished or have gradually disappeared by this date (Figure 9). Not only does the Ottoman Well represent one of Tuzla's rare Ottoman heritage assets, but it stands as the single remaining evidence of brine extraction in the historical center.

⁷⁸ Age value can also be attributed to historical value (*Ibid*, 306, 379).

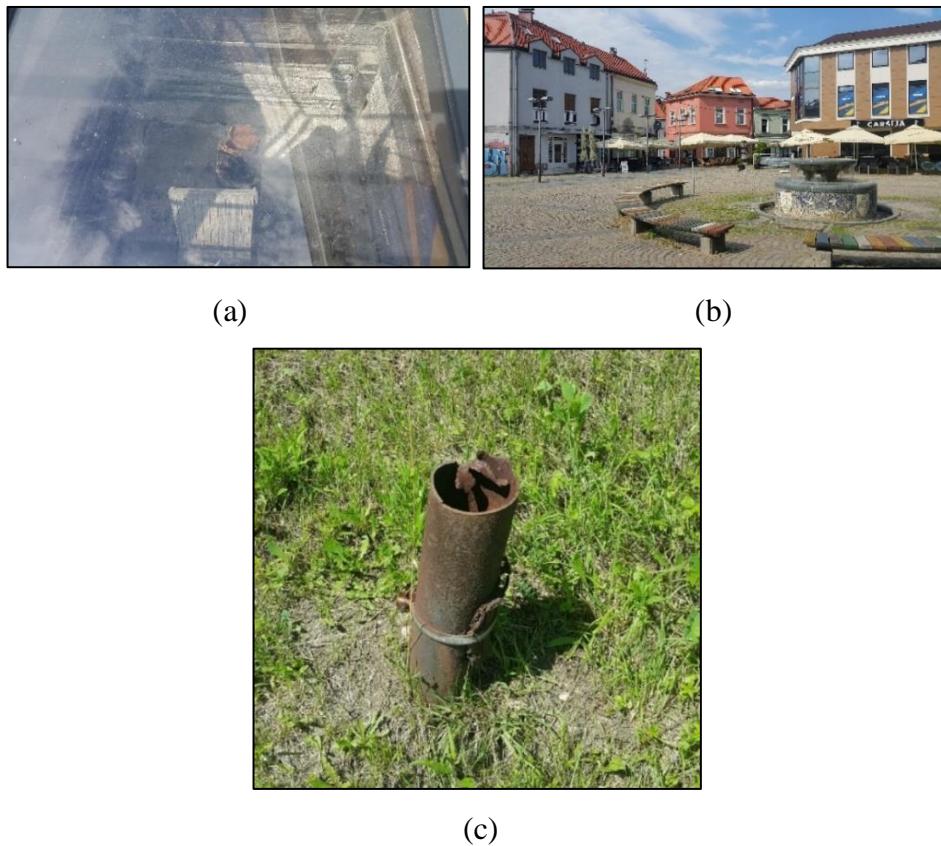


Figure 9. (a) Ottoman Salt Well; (b) Salt Square; (c) remains of deep drilling boreholes at the Trnovac hill dating from a later period (photographs taken by Tijana Veljković in June 2022)

Scientific value is attributed to heritage assets or places that can contribute to expanding knowledge in specific scientific fields.⁷⁹ Industrial sites that contain original machines and technological equipment can provide valuable information about technological development.⁸⁰ Therefore, such qualities can also be attributed to historical or technological values.

⁷⁹ Australia ICOMOS, *Burra Charter*, 12.

⁸⁰ English Heritage, *Conservation Principles Policies and Guidance for the Sustainable Management of the Historic Environment*, London, 2008, 29

Tuzla's industrial heritage is based predominantly on extractive industries, which can contribute to research in the geoheritage field. If access can be provided, the coal mines in Kreka can offer insight into the early mining technologies applied during the Austro-Hungarian regime. Metal and Machines Manufacturing industries of the socialist regime form part of the production chain within coal mining processes. Preservation of these facilities and the associated technological equipment can contribute to a comprehensive understanding of Tuzla's technologically related industrial network. Similarly, the Tušanj Salt Mine has the potential to educate about engineering solutions provided by Polish engineers in the middle of the twentieth century. Along with the designated national monuments for salt production, the vacuum evaporation plant within the Solana Saltworks (Figure 10) and Tušanj Salt Mine can educate about a developmental phase of the salt industry in Tuzla.



Figure 10. Vacuum evaporation plant within the Solana Saltworks (photograph taken by Tijana Veljković in June 2022)

Social value relates to the spiritual, political, national, or other cultural sentiments attributed to a heritage property by a group of people.⁸¹ While spiritual value tends to be vulnerable to changes in the historical texture or character of the place, social value may be more resistant to physical changes, provided that social and cultural elements are preserved.⁸² Social value of industrial heritage involves communities that reside in settlements near production sites. Living memories of retired workers are a valuable source of information about industrial production and customs and beliefs passed on within workers' communities.



(a)



(b)

Figure 11. (a) Husino Miners' statue; (b) Miners' Memorial center in Moluhe (photographs taken by Tijana Veljković in June 2022)

Schools, universities, memorial centers, and sports clubs that emerged from communities in workers' settlements are indisputable material evidence of social value that can be attributed to the industrial heritage sites of Tuzla. Moreover, traditional gatherings

⁸¹ Australia ICOMOS, *Burra Charter*, 12.

⁸² English Heritage, *Conservation Principles*, 32.

take place in a reconstructed cultural center in Kreka (Partizan), which was originally constructed during the Austro-Hungarian period to be used as a social club by foreign workers. Since its establishment, various cultural activities have been continuously developed. Furthermore, the Husino Miner statue commemorates the historical event that is considered an important milestone in class struggle in Bosnia and Herzegovina (Figure 11).

Specific interactions between different cultures at a heritage site and material evidence of periodic transformation are defined as **authenticity**. Diversity of cultures and heritage contributes to the development of humankind by acknowledging and respecting the social and cultural values of all societies.⁸³ The concept of authenticity in conserving heritage sites assumes all subsequent modifications to the original fabric that possesses artistic or historical value are preserved.⁸⁴

Historical stratification of Tuzla's industrial heritage manifests a unique narrative about Tuzla's development conditioned by natural, socio-political, and economic environment. Industrial development did not solely contribute to technological transfer, it also facilitated the exchange of cultural values between various ethnic and social groups. Industrial enterprises endorsed cultural exchange by constructing cultural centers, sports and recreation facilities, restaurants, and cinemas (Figure 12: a and b). Such support was particularly favorable during the socialist regime to promote shared values among the working class. In terms of physical manifestations of industrial development, stylistically diverse buildings with a common function are associated with the socio-economic narrative of a place (Figure 12: c and d). To preserve authenticity of industrial areas, all historical

⁸³ ICOMOS, *The Nara Document On Authenticity*, 1994.

⁸⁴ UNESCO, *Operational Guidelines for the implementation of the World Heritage Convention*, Paris, 1978, 4.

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layers of production and the associated settlement area, which represent physical manifestations of Tuzla's socio-economic development, should be preserved.



Figure 12. (a) Bosnian Cultural Center (former Moša Pijade Cultural Center) constructed by Kreka Coal Mines in 1954; (b) former workers' restaurant located next to the Aida Shoe Factory; (c) former administrative building of Kreka Coal Mines, which was constructed during the Austro-Hungarian period; (d) the present administrative building of Kreka Coal Mines, which was constructed during the socialist period (photographs taken by Tijana Veljković in June and December 2022)

Integrity denotes the wholeness of elements representing and conveying heritage site values.⁸⁵ Jokilehto divides these elements into socio-functional, structural, and visual categories.⁸⁶

⁸⁵ UNESCO, *Operational Guidelines for the implementation of the World Heritage Convention*, Paris, 2005, 22.

⁸⁶ „The social-functional integrity of a place is referred the identification of the functions and processes on which its development over time has been based,

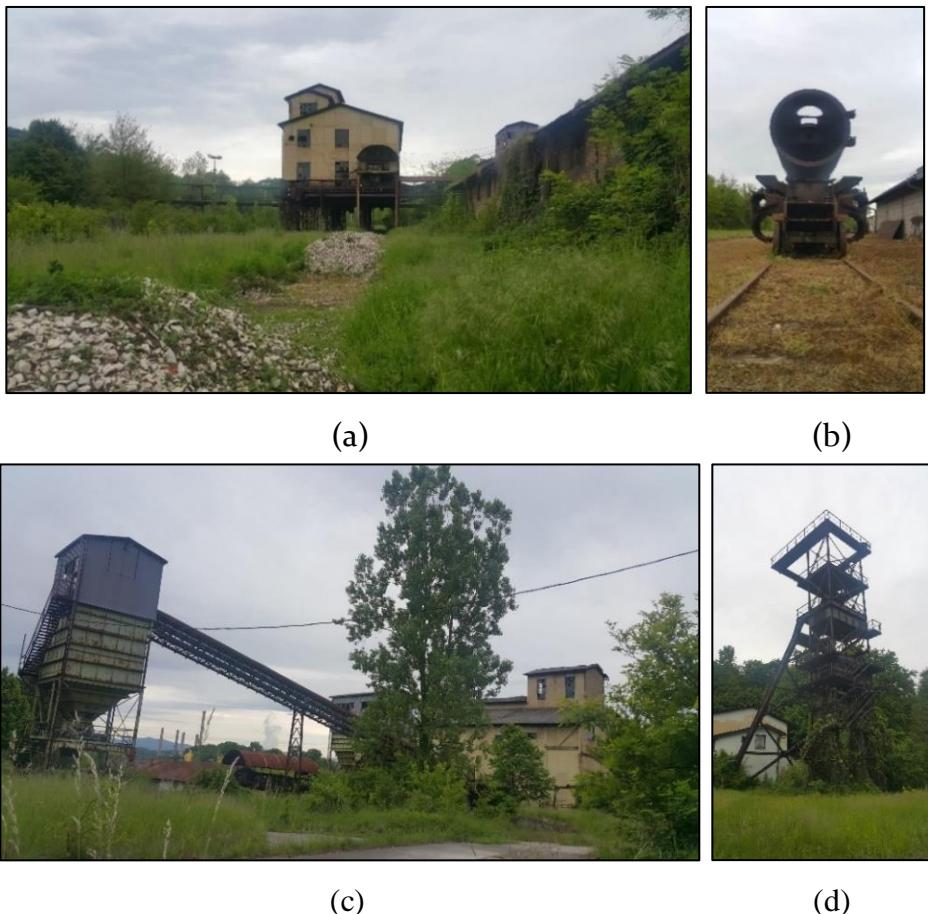


Figure 13. (a) Separation plant in Bukinje Coal Mine; (b) old railway and steam locomotive workshop in Bukinje Coal Mine; (c) coal loading tower in Bukinje Coal Mine; (d) winding tower in Bukinje Coal Mine (photographs taken by Tijana Veljković in June 2022)

such as those associated with interaction in society, spiritual responses, utilisation of natural resources, and movements of peoples. The spatial identification of the elements that document such functions and processes helps to define the structural integrity of the place, referring to what has survived from its evolution over time. These elements provide testimony to the creative response and continuity in building the structures and give sense to the spatial-environmental whole of the area. Visual integrity, on the other hand, helps to define the aesthetic aspects represented by the area“ (Jukka Ilmari Jokilehto, Considerations on authenticity and integrity in world heritage context, *City & time*, 2(1), 2006, 14).

The notion of integrity in Tuzla's industrial heritage is mainly associated with the social-functional category. In this regard, specific industries have continued to base their existence on natural resources like salt and coal. At the settlement scale, numerous residential, administrative, educational, and cultural buildings that industrial enterprises constructed have preserved their original function. Moreover, functional continuity in exploiting salt deposits within the urban center has been preserved by developing wellness tourism associated with salt. Nevertheless, the spatial-environmental and visual integrity of Tuzla's industrial heritage, which is not given statutory protection, is greatly affected by urban development. It is possible to state that remotely located industrial facilities can possess higher integrity. For instance, the Bukinje Coal Mine is one of the rare examples in the Municipality of Tuzla that contains socio-functional, spatial-environmental, and visual integrity (Figure 13).

Conclusion

The transformative character of industrial areas and buildings differentiate it from other cultural heritage categories. Namely, numerous historical layers are manifestations of developmental phases that contributed to the economic and social development of a region or city. Cultural and technological exchange is evident in industrial heritage's material and immaterial legacy, contributing to its universal value. This article demonstrates Tuzla's industrial heritage as a technologically and historically related network and its influence on the urban fabric and social development. An exponential rise in urban population and increased investment in education and culture to support industrial productivity links industrial heritage with the communities' identity.

Despite the statutory protection of salt production heritage, effective conservation measures cannot be implemented without developing awareness within the existing community and administrative institutions. Moreover, identifying Tuzla's industrial heritage assets and comprehending their values requires a multi-scaled assessment of industrial buildings, complexes, landscapes, and associated social infrastructure. A limited selection of industrial heritage in Tuzla's multilayered urban fabric threatens to misinform the public about the cultural significance of Tuzla's industrial network. An appropriate solution would require relevant institutions to cooperate in preserving the industrial character of old industrial districts instead of opting for urban renewal projects and demolition. Involving communities in industrial heritage rehabilitation programs has the potential to reconnect places with people and consolidate community identity.

Sažetak

Transformativni karakter industrijskih područja i zgrada razlikuje ih od ostalih kategorija kulturnog naslijeđa. Naime, brojni historijski slojevi predstavljaju manifestacije razvojnih faza koje su doprinijele ekonomskom i društvenom razvoju jedne regije ili grada. Kulturne i tehnološke razmjene su evidentne u materijalnim i nematerijalnim dimenzijama industrijskog naslijeđa što doprinosi univerzalnoj vrijednosti. Ovaj članak demonstrira tehnološki i historijski povezanu mrežu industrijskog naslijeđa Tuzle i njen utjecaj na razvoj urbanog tkiva i društva. Eksponencijalni porast gradskog stanovništva i ulaganja u razvoj obrazovanja i kulture, da bi se podržala industrijska produktivnost, povezuje industrijsko naslijeđe s identitetom zajednice.

Uprkos zakonskoj zaštiti naslijeđa proizvodnje soli, efikasne mjere očuvanja ne mogu se provesti bez razvijanja svijesti unutar

postojeće zajednice i administrativnih institucija. Štaviše, identifikacija nepokretnih dobara industrijskog naslijeđa Tuzle i razumijevanje njihovih kulturno-historijskih vrijednosti zahtijeva procjenu više mjerila: industrijskih zgrada, kompleksa, pejzaža te srodnih objekata društvene infrastrukture. Ograničena selekcija industrijskog naslijeđa u višeslojnom urbanom tkivu Tuzle prijeti dezinformisanju javnosti o vrijednostima tuzlanske industrijske mreže. Kako bi se izbjeglo dalje rušenje kroz projekte transformacije starih industrijskih zona, odgovarajuće rješenje zahtijevalo bi uspostavljanje saradnje između relevantnih institucija u očuvanju industrijskog karaktera mjesta. Uključivanje zajednica u programe rehabilitacije industrijskog naslijeđa ima potencijal da ponovo poveže mjesta sa ljudima i konsoliduje identitet zajednice.

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