RETHINKING UTOPIA: THE INDUSTRIAL LANDSCAPE AS A GENERATOR OF URBAN CHANGE

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Introduction

The topic of research

Methods of transforming inactive industrial spaces within urban areas is a novel theme in Croatia, and is a result of shutting down factories in the last couple of decades. Thus the focus of the perception of the industrial city shifts from economic and productive themes, to the topic of the perception of industrial heritage within and as a part the city structure.

The spatial and historical context

Founded in the 4th century B.C. by the Illyric peoples, on the western outskirts of the Pannonian basin, the space of Sisak spans 25 centuries of settlement, thus being a unique place where dozen archaeological layers from the pre-roman and roman antiquity up to modern areas of industrial archaeology are found. Since the mid 1800’s Sisak had seen constant growth of its industry ranging from transit, wood and masonry, food, textile, glass, chemical industries, yet the two of the largest industrial branches rose in the period between the two World Wars: oil and metal industries were to become the staple of Sisak’s economic and urban growth. According to the first five year plan after the Second World War, Sisak was to become one of the leading industrial cities of the country, and in the course of only two decades it did. The industrial areas in the northern and southern parts of the city, along with its infrastructure, became the core identity of Sisak.¹

The factors of the formation of the present urban landscape of Sisak

Trying to annulate the negative effects of a growing and industrialised society, the factories invested in raising the standards of housing and public spaces. This resulted in Sisak becoming a city of numerous parks, sporting and public facilities which were created not only for the workers, but were open to the whole community. Sisak Ironworks (Željezara Sisak), employing at its peak 13,742 workers, was the leading force of both economy and urbanisation. The late fifties saw the founding of Caprag, a modernist workers settlement with 1,500 housing units for the workers of the ironworks planned alongside all the sports and public facilities needed for its almost independent functioning. Located five kilometres from the city centre, on its southern outskirts, both the ironworks and the workers settlement grew within an oak forest incorporating it as a key element of its design. The industrial halls and multiple housing units use the forest as a natural environmental barrier which protects the inhabitants of the settlement from the negative aspects of industry.

Fig. 1. the location of Sisak in the context of other industrial cities of the region, and the displacement of the industrial areas within Sisak

Apart from its natural environment, another fact about this space is to be found crucial – the settlement, together with all its public facilities, was built completely from the extra profits of the Sisak Ironworks. Instead of increasing the wages of its employees, the ironworks invested the profits in development, thus securing quality housing for its workers for a minimal or no fee at all. The settlement was envisioned not only as a home for workers, but as a polygon for creating

a new community. The people were not only workers in the factory, they were also the key creators and consumers of public, sport and cultural events as well as their health being the subject of scientific research. Lunch breaks were also the time for leisure and sport activities, as the workers were encouraged to spend their free time in a healthy outdoor environment. This could be called the workers utopia.

The nineties of the twentieth century brought sudden change in the political and economic systems; the inflation of the previous decade, the transition from planned economy to capitalism, and an ongoing war were the reasons for the whole scale decay of the industry in Sisak. Some thirty years after its hayday the city is facing vast areas of its former industry being transformed into ‘spaces internal to the city yet external to its everyday use’ – the space of ‘terrain vague’ as dubbed by Ignacio de Sola-Morales.

Background

Identifying an industrial landscape and an industrial city

The research of the industrial identity of Sisak offered some insights on specific relations between industrial infrastructure, architecture, the landscape and the city as a whole. These insights based on the research done on the example of Sisak are formed as follows:

1. the industrial landscape – is formed by (a) industrial infrastructure and its bearing structures, (b) technical landscape interventions that make the proper functioning and safety of the infrastructure possible, (c) landscape created by exploitation of excavations or depositing materials used in industry, and (d) landscape elements used or formed as to annul the negative effects of industry on the environment

2. the industrial city – is a form of urban tissue which by its morphogenesis unites (a) the historical urban tissue or cultural landscape in which (b) elements of industrial architecture and (c) elements of industrial infrastructure create a technological conditioned landscape, and which trough social and economic processes affect the growth of the urban tissue by planning (d) workers’ housing units or developments and (e) public facilities.

Classification of the elements of the industrial landscape and the industrial city

As defined above the elements of industrial infrastructure and industrial architecture form not only and identity of a space, but affect the physical formation of landscape and urban patterns. The identification and mapping of these elements in the urban landscape of Sisak shows us the relatively high level of the integration of industrial elements in the city fabric. Consequently methods of urban tissue reparation ought to be found, when such a highly integrated element of the whole becomes dysfunctional.

1. These elements of industrial infrastructure form the industrial landscape of Sisak, and are classified and mapped as:\(^5\)
   1.1. railways
   1.2. cranes
   1.3. docks and harbour equipment
   1.4. waterway signalisation
   1.5. signalisation within industrial areas
   1.6. oil silos
   1.7. pipelines
   1.8. exploitation fields

2. These elements of the industrial architecture of Sisak are classified and mapped as:\(^6\)
   2.1. long span industrial halls
   2.2. short span industrial halls
   2.3. chimneys and vertical structures
   2.4. warehouses and hangars
   2.5. grain silos
   2.6. administrative buildings
   2.7. workers’ housing and settlements
   2.8. public facilities financed by the industry

**Sisak as an industrial city**

Identifying the types of industrial infrastructure and architecture within multiple layers the urban fabric consists of, informs us of how the areas of industrial activity are integrated into the city. The ways the infrastructure corresponds with and penetrates the urban landscape, as well as the industry which affects the growth of the urban tissue, speak of Sisak as a model of an industrial city.

The industrial activity was first implemented on the northern outskirts of the historical eighteenth to nineteenth century city core. Consequently growing, as an effect of the introduction of the railway system in the mid eighteen hundreds, the industry spread across the city’s cultural landscape. Either by interlinking the industrial areas, or linking them with the city space, an urban landscape of interaction was formed. Not only did this infrastructure form an industrial landscape of its own, but it also opened the possibility to activate the space “in between”, the voids which stood in between the areas overtaken by industry, and the space of the historical, slowly evolving urban tissue. The social and economical effects of industrial growth, along with the pre existing infrastructure, allowed the city to fill in the voids by planning workers’ settlements, public facilities and quality urban landscape elements which were to annul the negative effects of the industry. Trough such a process a wholesome identity of a city was formed.

\(^5\) ibidem.
\(^6\) ibidem.
Fig. 2. the elements of industrial infrastructure and architecture mapped in Sisak

The industrial landscape: Sisak Ironworks as a case study

The space of Sisak Ironworks

The complex of the former Sisak Ironworks covers an area of 230 hectares, creating a landscape in which natural elements and heavy industry are set to coexist, yet in different contexts over time. From its formation in 1938, the ironworks was set on the very edge of an oak forest, Velika Lasinja. As an ever-expanding enterprise, the ironworks started to infiltrate the space of forest, clearing it out very rationally, only placing the production halls and infrastructural corridors without overexploitation of the space between them. The result of such a treatment of space is a unique identity of highly modernist era industrial structures superimposed upon a native natural landscape.

In order to understand the demands the infrastructure and architecture of Sisak Ironworks had to meet, one must acknowledge that the ironworks was, in its post-second world war period, conceived as an integral plant. This means that the whole process of production, all of the different stages, from the treatment of raw material to the finishing of the final product, was run in various facilities of the ironworks. The whole production cycle was focused on one type of strategic product – seamless pipes of various diameters.

Such a span of technological activities was a result of an intense twenty-year modernisation and growth that lasted until the nineteen sixties, and of a series of less intense modernisations up until the end of the nineteen eighties. The impact of the modernisation and the technological expanding of the ironworks resulted in building halls for different production stages, whose dimensions culminated in four long-span halls and hall clusters which cover areas from 2 hectares to 6.8 hectares. Accompanying them, numerous smaller halls, warehouses and workshops were constructed in the area. As of 1964 Sisak Ironworks formed its own construction bureau for steel structures.

Following such a large scale of industrial production and architecture, a vast network of infrastructural corridors was installed. One of the preconditions for such an intense industrial activity was its energetic autonomy, thus the ironworks constructed its power plant by the beginning of the sixties, which was later connected to the heating system of the Caprag settlement. A system of above-and-underground pipelines and control vents form an autonomous network of energy supplies.

Various production phases located in different halls, due to technological requirements and standards, called for a fast and efficient network of transportation. Located adjacent to the railway line connecting Sisak to Zagreb on the north, and Bosnia and Herzegovina on the south, most of the transport of raw material and final product was done by railway. Consequently most of the inner communication of the ironworks was also executed by rail, resulting in an existing and still

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functional infrastructure network of 45 km of rail lines. In order to facilitate such a production where constant shipping of heavy material between production halls is necessary, internal and external crane systems were constructed. The largest crane spanning the width of 30 m on a line 450 m long operated on providing iron ore for three blast furnaces.

**The transformation of the industrial infrastructure**

The goal of transforming the industrial infrastructure is to emphasise two of its specific qualities, the first being possibility of using infrastructural corridors as a new mean of communication, id est moving trough space. The second quality is the fact that the infrastructure per se forms it’s surroundings in a specific technological manner named the industrial landscape, as mentioned earlier. Thus the transformed infrastructure can be viewed as the formative element of two layers: a layer of new communication, and a layer of landscape. The transformed combination of these two layers results in their different usage, rendering them a new type of space – the postindustrial landscape.

The transformation of infrastructural corridors into a new communication network encompasses the linear types of ground and overground based corridors. The sole ground component found in the area of the ironworks is the railway network which not only covers the vast area of the ironworks, but connects it with other industrial areas and the rest of the urban tissue. The first step of transformation is identifying a broader network of other linear corridors trough the urban landscape (i.e. embankments, surface pipelines), valorising the probability of their transformation, and defining a unifying mean of their usage. One of the possible means of transformation of such infrastructure is a network of bicycle lanes which would connect the ironworks with the other “terrain vague” areas as well as with the city itself.

The other component of industrial infrastructure to be transformed is a group of structures that consists of overground pipelines and cranes. The initial problem with transforming these structures is their safety and accessibility. In order to undertake a rational transformation, a series of vertical communications has to be introduced. Such a system of newly introduced communication elements has the potential to link different levels of transformed infrastructure. The system of transformed overground infrastructure thus has the possibility to become a new “highline” which connects the transformed ground infrastructure system with the elements of the industrial landscape, such as landfills or water filled exploitation fields, and vertical elements of industrial architecture such as chimneys, silos and the upper layers of industrial halls.

This new interaction between the infrastructure and space, named the postindustrial landscape, has as a result a shift in the perception of the industrial heritage.

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8 ibidem.
The transformation of industrial architecture elements

The most present element of industrial architecture in the space of the ironworks is the industrial hall. Regardless of their dimensions which include structures from short to long span halls, the structural and spatial elements they consist of are of similar nature. The physical elements of the halls can be deduced to vertical structural elements, horizontal structural elements (such as beams or trusses), the envelope of the structure and the infrastructure operating within. The spatial elements can be simply deduced to the floor, the void and the skin. The main quality of industrial architecture is that it allows various spatial formations within itself, for example housing different types of technological processes in the same type of space. This is possible only because of its filigree and almost nonexistent structure footprint. Thus, the structure itself shall not be the object of transformation.

The method of intervention within the halls is focused on the vertical linking of the floor, the overground infrastructure, in this case the cranes and the void between them. Yet again a series of vertical communications may be introduced, not only linking the horizontal layers within the hall, but also linking the void of the hall with the layers of the postindustrial landscape outside. Due to its span the hall interior may be perceived as the extension of the exterior.

The open plans of the halls allow multiple scenarios of urban life to be tested. Depending on the different usages of space within different scenarios, various porosity of the skin may be achieved. The porosity would be directly linked to the amount of natural light needed for a certain scenario spanning from partial porosity to the absolute removal of the skin. The morphology of the openings would be a direct consequence of the architecture formed within the void.

Such methods of introducing various scenarios within a space which has a potential for rapid and simple transformations would be the way to establish criteria for the long term transformations and usages of the industrial heritage. As a result the heritage wouldn’t be perceived as a monument of its time, rather as a living organism initiating change of the urban environment.

Conclusion

The key to a successful transformation of inactive industrial areas within an urban fabric is a systematic and wholesome method of planning such transformations. This method should address all the elements of industrial identity found in the urban tissue with the goal to find a unifying use depending on their location and their physical and structural properties. Interlinking the city with a newly transformed system of infrastructure and architecture is the base for perceiving and using the industrial heritage as the generator of new urbanity.
Fig. 3. Examples of transformation of elements of industrial infrastructure and architecture

Results

Introduction

The first result of the study can be described as a new network of physical communication which interlinks inactive industrial areas and the city itself. The second result of the study is a system of interventions on the physical structure and the spatial concept of the typology of the industrial hall.

The perception of heritage

1. The perception and transformation of industrial infrastructure

The infrastructure forms the base for the functioning of any industrial activity. The decay of industrial infrastructure due to the inactivity of the industry, results in the potential deurbanisation of the city space. As a vital part of the urban landscape within an industrial city, the infrastructure is to be transformed with the goal to induce urban change.

In the case of Sisak Ironworks the studied infrastructure was viewed as a potential network of physical communications which links the Ironworks with other inactive industrial spaces and with the living city. Such a treatment of existing infrastructure shifts the perception of it from a series of technological corridors to an image of a new type of space, the postindustrial landscape.

2. The perception and transformation of industrial architecture

The quality of industrial architecture is its possibility to house different technological processes due to its specific structure. The transformation of such architecture should follow its qualities and preserve the elements which ensure its quality. Any intervention should address the spatial elements of such architecture or such elements that may be easily transformed. Thus the objects of this transformation are the skin, the floor, the void and the infrastructure within. The case study of the transformation of the Sisak Ironworks halls may be applied to any industrial space of such a morphology as the interventions are not the result of specific historical or architectural circumstances, but they are a series of possibilities in which various scenarios are tested with the aim to find the most suitable one for the context of the present. All of these scenarios should be perceived as temporary and adaptable, as such they become a base for a sustainable development of urban space.

Conclusion

The sum of the research

The image of Sisak as a once prosperous industrial centre deteriorated during the economical transition period of the ninety nineties, erasing almost all of the positive aspects of its industrial identity. As the collective knowledge and experiences of the industrialised era faded away, problems concerning inactive and unsafe city areas took over. With no strategic planning or visions for development, the municipal authorities maintain a status quo towards these derelict spaces.