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Heritage, Memory and Adaptive Reuse: Vienna Gasometer and Istanbul Hasanpaşa Gasworks as Palimpsest Spaces

Muhammed Sefa ADIN [1*], Ayşe SİREL [2]
[1] Department of Architecture, Istanbul Aydın University 34295 Istanbul, Turkey; muhammedsefaadin@aydin.edu.tr
[2] Department of Architecture, Istanbul Aydın University 34295 Istanbul, Turkey; aysesirel@aydin.edu.tr
* Corresponding author

Abstract
A palimpsest is a reused manuscript where the original text has been erased to make room for new writing, but traces of the old text remain visible. Over time, the concept of palimpsest has been used in various fields, including literature, painting, and later architecture. Architectural palimpsest refers to the transformation of a building or space over time, reflecting the accumulation of different architectural layers. This term describes processes such as adding new structures to old ones or adaptively reusing existing buildings while preserving traces of the past. Industrial heritage includes structures and facilities from the Industrial Revolution, such as factories, warehouses, mines, gasometers, and gasworks. These buildings carry the industrial imprints of the past and hold historical, cultural, and economic significance. This study aims to emphasize the importance of the palimpsest concept in architecture through an analysis of adaptively reused industrial heritage. Following a literature review, the methodology involves a comparison of two similar examples of industrial heritage adaptive reuse: Vienna Gasometer and Hasanpaşa Gasworks, located in different countries. The analysis is conducted within the context of the palimpsest concept and adaptive reuse. As a result, the study concludes that industrial heritage buildings, which have lost their original function but hold a place in the collective memory and identity of their cities, should be adaptively reused in a way that reflects the traces of the era they belong to without damaging their heritage value. The study aims to contribute to future research in this field.

Keywords
Palimpsest, Industrial heritage, Adaptive reuse, Spatial transformation, Gasometer, Gasworks.

1. INTRODUCTION

The concept of palimpsest is derived from the Latin word “Palimpsestus” It originates from the Greek words “Palin” meaning “again” and “Psēstos” meaning “scraped”. Initially, this term was used to describe manuscripts written on parchment that had been scraped and reused during times of paper scarcity. Over time, the traces of the scraped-off original writings became visible again, making the old and new layers legible and visually detectable. The application of the concept of palimpsest has expanded over time and is now used in various branches of art, including literature, painting, sculpture, and architecture (Yıldırım, 2009; Yavuz and Aksu, 2019). In the field of architecture, the term is used to describe something that has a new layer or appearance, allowing us to see and perceive fragments of the past.

Historical buildings, which are elements of cultural heritage, possess both socio-cultural and economic values, serving as important documents of the past periods in which they were constructed. However, over time, due to changing societal needs and advancements in production technologies, these historical buildings may lose their original functions. When such buildings lose their original function, they are adaptively reused

to align with contemporary conditions. Adaptive reuse emerges as a strategic intervention approach to preserve the architectural values of historical buildings while revealing their economic potential (Özçakır, 2023). The adaptive reuse or transformation of historical buildings often involves introducing new functions, which may require adding new elements to the structure (Tabak and Sirel, 2022).

In adaptive reuse, also referred to as extending the life cycle, palimpsest (space) refers to the visibility of both old and new layers without damaging the original architecture of the historical buildings. In other words, a palimpsest space describes situations where the traces and layers of historical buildings remain visible within contemporary designs or structures (Mısırlısoy and Günçe, 2016).

One of the groups of structures with different functions within architectural typology is industrial buildings. Technological advancements from the 18th century onwards led to the rapid transformation of societies that previously relied on agricultural activities into industrial societies, resulting in increased construction. The technical innovations brought about by the Industrial Revolution in the early 19th century radically changed ongoing production techniques, marking a historical turning point that resulted in significant economic, social, cultural, and even architectural transformations. Structures such as manufacturing plants, storage facilities, power stations, and chemical plants were designed and used for industrial purposes. In industrial buildings, which prioritize functionality and efficiency according to specific production or logistics processes, materials such as steel, concrete, brick, and glass were used. These buildings often feature architectural elements with large spaces that showcase structural components such as exposed steel beams, large truss beams, and concrete columns (Köksal, 2008).

These structures, reflecting the architectural and technological characteristics of the industrial era, began to become obsolete with the development of new technologies in the latter half of the 20th century. Many of them lost their functions, became abandoned, and faced the risk of disappearing (Yıldırım, 2007; Köksal, 2008). The concept of preserving industrial buildings that had completed their functional life, which gained international recognition after the 1950s, introduced the notion of "Industrial Heritage Buildings." Today, many of these buildings are being preserved and repurposed for new uses such as residential, office, cultural, educational centers, or commercial spaces through adaptive reuse projects (Douet, 2016). Some examples of repurposed industrial heritage buildings include the Tate Modern Museum (UK), German Mining Museum, German Occupational Safety and Health Exhibition, Aquarius Water Museum (Germany), Westergas Factory (Netherlands), Silahtarağa Power Plant, Cibali Tobacco and Cigarette Factory, and Feshane (Turkey).

The aim of the study is to explain the "palimpsest concept" and emphasize the importance of this concept in architecture while bringing historical buildings back to life in a changing and transforming world. From this perspective, two industrial heritage buildings such as a gas station and a gasometer, which attract attention with their characteristic architectural forms, were selected as field studies. The new designs of the re-functionalized Vienna Gasometer and Hasanpaşa Gasworks are evaluated within the framework of palimpsest features.

2. CONCEPTUAL BACKGROUND: PALIMPSEST, PALIMPSEST SPACE AND ITS PROPERTIES

Dictionaries such as Oxford and Britannica generally define the term palimpsest as the addition of a new writing on an erased writing (URL-1; URL-2). Palimpsest, which is based on the Latin word "Palimpsestus", has become a term used in the event that the writings that people scratched on parchment to write something when there was no paper production yet, if another writing is added before the traces are erased, the traces are intertwined, and a new one is added without disappearing. Parchment is a writing tool that was not always available because it was expensive in the past. The parchment, which was not thrown away after being used once, was reused for a new writing each time, and the old writings, which were erased and scratched over time, began to become apparent and readable between the new writings, thus forming a layering (Figure 1). This situation is referred to as palimpsest in colloquial language. The field of use of the concept of palimpsest

has expanded over time and has been used in many branches of art such as literature, painting, sculpture and architecture (Arbabiyazdi and Pisheh, 2012; Yavuz and Aksu, 2019).

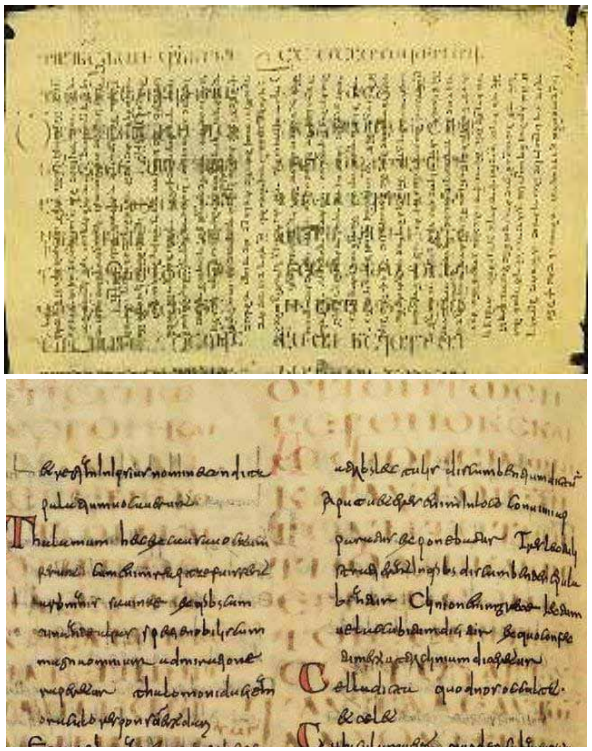


Figure 1. Parchment Paper Palimpsest Examples (URL-3; URL-4)

The biggest representative of the concept of palimpsest in architectural practice is historical buildings. Because these buildings embody all the values of the period, city, geography and history from the moment they are built until they are destroyed and pass them on to future generations. In this context, historical buildings form the memory and identity of cities by leaving traces of their past experiences, heritage value and intended use. Historic buildings that are transformed by re-functioning are directly related to the concept of palimpsest. They carry old and new traces together and with this feature, they provide the emergence of a multi-layered building character (Yavuz and Aksu, 2019).

In many culturally diverse and historically important cities, historical buildings may become unable to meet the expected needs due to technological developments, changes in building standards, social and cultural dynamics, user preferences and environmental factors. These buildings, which have been destroyed, lost their original function or abandoned, are provided to participate in modern life with a new function to improve the building capacity, function or performance to meet today's needs (Dauglas, 2006).

The preservation of historic buildings and their adaptive reuse provide a link between the past and the present (Zeren and Uyar, 2010). In historic cities with limited housing, the reuse of historic buildings that have lost their function by transforming them with a new function is an important and preferred tool to meet the need for space (Kandemir, 2013). Instead of demolishing a building, reuse provides social, environmental and economic benefits for the whole world (Yung and Chan, 2012). In addition, since the demolition of defunct buildings and the construction of new buildings in their place will lead to much more loss in time, energy and economic terms, conversion is more advantageous (Velthuis and Spennemann, 2007).

In international conservation decisions, "'adaptive reuse' is defined as the adaptation of historic buildings to an acceptable standard of living while preserving their authenticity and architectural character". A correct balance must be established between the conservation and reuse of the historic building. The goal of re-functionalization and reuse is to ensure that the interventions to be made inside and outside the building are beneficial to the society without losing the historical, aesthetic and originality values of the building, that is, without disrupting the original spatial quality of the new function. Because historical buildings, which we consider as architectural heritage, have authenticity value if they preserve all the qualities of the period in which they were built, such as building material, technology, culture of life, etc. and the traces of the changes experienced in the historical process. The concept of "authenticity", which is common to international declarations such as the Venice Charter (1964), the Nairobi Declaration (1976) and the Washington Declaration (1987), is expressed in terms of the information contained in the building and the state of being unique to that building (TICCIH, 2003).

Any intervention must be legible and legible in a way that does not damage the authenticity. This situation is reminiscent of a process in which old writings can still be traced when erased and rewritten. With this analogy, the existing historic building can be thought of as a scroll, but the writing on it, i.e. the new addition and function, should be compatible with the originality of the historic building (architectural-social-cultural values) and provide contemporary usage opportunities that overlap with its spatial and structural features. At the same time, it should provide the building with a new identity that will not overshadow its old identity. In this case, the building will meet the requirements of the period with both contemporary materials and new construction techniques developed. With its old and new contrasts, the building corresponds to the concept of palimpsest as a building that has been transformed today (Apaydın, 2019).

As can be seen, in the field of architecture, the concept of palimpsest is used in the sense of something that has a new layer and appearance based on the past and that allows us to see and perceive parts of the past. The concept of palimpsest space expresses a deeper meaning in which the past is carried to the present through layers (of different historical periods and styles) that accumulate the traces of time. This concept helps us understand how the layers of different historical periods contribute to the spatial experience and aesthetics. When the concept of "Palimpsest space" in architecture is considered, the "Palimpsestic Features" that need to be explained are given below.

Historical Traces: Palimpsest spaces bear distinct traces of past uses or structures. These traces can be layers of markings, patterns or structural features on walls, floors, ceilings or other surfaces. According to Eisenman's understanding of architecture, contemporary approaches and technologies can be used to revitalize the past. Even if revitalized, the past can remain as a permanent trace. New uses can exist by integrating with past traces. The perception of a space is realized through the contextual response of each stimulus, trace and experience, not only the physical characteristics of the space, but also the past life of the individual (Eisenman, 1984; Avcıoğlu and Akın, 2017).

Space: Space is defined as a container or receptacle that contains everything in it and has certain physical dimensions (width, length, depth). Space exists as a "void" and over time these void gains meaning by being filled by the entities within it. In other words, space exists with the features or elements placed within it. In this respect, space is a void with boundaries and represents an existential quality. Space can be defined as an area that enables the existence of being. Space is a reflection of abstract and tangible values that come into being through the shaping of the void by being. Space continues its existence by accumulating linearly or cumulatively with the memory of the place. In linear association, the current time in the space is perceived, while in cumulative association, traces of past time are also perceived (Demir, 2014; Sevim, 2023). Cumulative association is important for the perception of layeredness in the context of palimpsest while reading spaces.

Time: The most fundamental factor that enables the interaction of places with palimpsest is time itself. Time is the cornerstone of the dynamic relations between the individual, space and memory. The accumulation of moments, the maturation of memory and the processes of change take place in time. Time is the chronological sequencer of all actions and events in the flow of time. Therefore, grasping the change of a city, a place or a situation over time is more meaningful than placing it in a timeless context. As Calvino emphasizes in "Invisible Cities", it is clear that time plays an important role in addition to the subject (individual or society) in order to fully understand a place or a city. Structures are concrete building blocks that connect a community or an individual to a place. With the permanence they represent, buildings are important symbols of transferring social values to the future. Evolving over time, buildings become carriers of memories for individuals and societies by bearing the traces of the past. Especially historical buildings are important tangible heritages that reflect the past by carrying the spirit, structural and aesthetic features of their period to the present (Calvino, 1990; Aluçlu, 2023).

Memory and Remembrance: Palimpsest spaces offer a platform that can reflect past events, cultural memories,

and collective memory, aiding users or visitors in understanding the space more deeply. Since spaces have a strong evocative effect on societies, the concept of memory can be considered directly related to the field of architecture (Rossi; 2006; Aluçlu, 2023). Spatial memory emerges from the convergence of social, cultural, and historical values within individuals' memories. Traces in memory are often based on symbolic and collective communication, meaning that these traces are products of societal accumulation. This concept is referred to as collective memory. Collective memory includes traces of changes, movements, events, and spaces that shape social identity in fields like history and culture (Avcıoğlu and Akın, 2017). Historical buildings have served their cities for years and have become part of the collective memory. It is important to adaptively reuse buildings that have occupied a place in the memories and recollections of city residents without damaging their traces.

Change and Transformation: The process of change for individuals is shaped by a complex interaction of internal and external factors. External factors range from natural disasters and economic cycles to technological advancements and political changes, while internal factors are related to changes in individual demands, the evolution of social and cultural values, and the development of educational systems (Tunçer, 2013). The concept of palimpsest is closely linked with the notions of change and transformation. Change and transformation reveal the traces of palimpsest in a realm where time, space, development, and alteration coexist. Palimpsest carries traces of temporal change within a single object. These changes also manifest in social structures; the continually evolving social structure is in a constant state of renewal, adapting to new formations, diverse cultures, and changing conditions. This process is also reflected in architectural practice, influencing building standards and spatial arrangements (Apaydın, 2019).

Layering: It refers to situations where different historical periods and styles come together in a layered manner within a space, demonstrating the historical continuity and evolution of the space. Layering in a physical space is a phenomenon that is visibly, perceptibly, and readably apparent. However, layering may not always be explicitly readable in a changing and evolving physical space. During the process of change and transformation, spaces may lose their layers or have new layers added to the existing ones. This results in a multilayered structure within the space. Multilayeredness arises from the presence of multiple sets of layers within the same space, presenting an inseparable reality in the context of culture-identity-existence (Sevim, 2023; Erdoğan and Yıldız, 2018). In palimpsest spaces, different historical layers enhance the textural and aesthetic diversity of the space. The combination of materials, colors, or patterns from different periods creates visual and textural richness.

Identity: The fundamental reason why layering is understandable through both concrete and abstract features over time is identity. Identity particularly defines the relationship between the city and its inhabitants with regard to the space. In this context, identity acts as a social construct influencing the space. According to Lynch, identity is defined not through similarities between space and people but through differences. Manley and Guise discuss the significance of natural elements such as contour lines and geological structures. These natural factors play a critical role in shaping the identity of the space by affecting its morphology (Manley and Guise,1998; Lynch, 2015) Bauman's exploration of "Homelessness and Rootlessness" in his work on identity parallels individual experiences of belonging within the space. Rootlessness and belonging represent a condition within the temporal interface beyond mere nostalgia for the past. Paul Ricoeur's concept of 'La mêmeté' emphasizes the continuous shaping and consistency of identity over time (Ocakçı and Türk, 2012; Bauman, 2020). In the context of palimpsest, the abstract and concrete unique values presented by the concept of identity need to be related to the crucial discussion of the continuity of the space.

Restoration and Adaptive Reuse: This refers to the process involving functional changes of historic buildings over time. By avoiding demolition, structures

are adapted to meet current needs through renovations and updates. Such projects are frequently employed in the context of preserving and reusing historic structures. During restoration efforts, past layers are carefully preserved. For example, if a historical warehouse, which carries traces of past industrial use with its large open spaces, is converted into a contemporary office or gallery space, it may serve as an example of architectural palimpsest. Such design allows for the reuse of the space while preserving the historical heritage. Adaptive reuse encompasses not only physical restoration but also the adaptation of buildings to social and cultural needs. This process bridges the past and the future, ensuring the usability and multidimensional functionality of spaces while also maintaining historical and cultural heritage (Burden, 2004). Restoration and adaptive reuse practices that preserve historical traces and collective memory are defined as palimpsest spaces.

Spatial Transformation: Historical cities housing diverse cultures often have significant stocks of historic buildings in important areas. If these buildings have lost their function due to their location or heritage value and the development of technology, they need to undergo spatial transformation to be reintegrated into the city. As a result of spatial transformation, protected structures with the required functions are revitalized in areas where they are needed. In this transformation process, what changes are not just the texts, but the spaces themselves; old traces remain evident and readable, and historic buildings continue to remind and emphasize old writings (Yıldırım, 2009). In other words, as a result of spatial transformation, a palimpsest is created not on parchment paper, but on structures through the interplay of time, space, individuals, and memory.

In architecture, palimpsest spaces provide an abstract and concrete connection to the past while meeting contemporary needs with the features mentioned above. They materialize the ongoing dialogue between history and modernity, offering rich and multifaceted environments that reflect the complexities of cultural and architectural evolution. In this context, these features have been used as “Design Criteria” in the study to analyze the palimpsest qualities of selected examples of industrial heritage structures that have been repurposed.

3. INDUSTRIAL HERITAGE BUILDINGS AND ADAPTIVE REUSE

Since the second half of the 20th century, industrial buildings have frequently been closed or demolished worldwide due to technological obsolescence, inefficiency in operation, and environmental pollution. The increase in discussions regarding the preservation of outdated industrial structures led various institutions and organizations to initiate extensive efforts. Following the 1950s, the concept of “Industrial Heritage Buildings” emerged with the international emphasis on preserving these structures. The “International Committee for the Conservation of the Industrial Heritage” (TICCIH) established the “Nizhny Tagil” Charter in 2003, which identifies structures and sites with historical, technological, architectural, and scientific value as industrial heritage (TICCIH, 2003)

Factory buildings, workshops, mineral processing and refining sites, warehouses, gasworks and energy production facilities and building remains, as traces of the industrial past, have started to be reused for the benefit of the city and the public. The primary objective in “re-functioning projects” and applications for the reuse of industrial heritage buildings is to preserve the unique qualities of industrial buildings (TICCIH, 2003; Yalaz and Yaldız, 2020).

Industrial heritage buildings are relatively easier to reuse by giving them a new function than other types of buildings. It is important to focus on the original qualities of these buildings, which are often characterized by simplicity and simplicity, rather than seeing them as an empty shell. The choice of the new function and the preservation of the technical equipment are directly related to the quality of the method to be applied. The aim of reuse of industrial heritage buildings is to extend their physical life by integrating them back into urban life. The reuse of demolished and abandoned heritage buildings by making necessary interventions with a sustainable approach is a method that has been practiced for many years. In these circumstances, the right intervention decisions must first be taken. Looking

at the examples of buildings used with new functions around the world, it is seen that uses that accommodate public culture and art activities are preferred (Blockey, 1999; TICCIH, 2003; Köksal, 2005)

After the new function preference to be made to the historical building, the changes made according to the new requirements should be provided with the least intervention to the original plan scheme and spatial features. Interventions in adaptive reuse can be as follows (Öztürk et al, 2022);

Interventions to the Spatial Organization: It covers the interventions in the existing plan scheme of the historic building depending on the new function. It includes the creation of passages that provide transitions between spaces, the addition of intermediate floors or the construction of new dividing walls, the removal of walls independent of the load-bearing system, the addition of new circulation elements or the creation of additional structures for spaces that cannot be integrated into the building (Selçuk, 2006).

Interventions to the Structural System: In the re-functionalization of the historic building, if it is necessary to make the building structurally durable and if it is requested to comply with the current conditions for its use, the structural elements can be intervened. During the intervention to the load-bearing system, the intervention should be carried out in such a way that the historical building is not damaged. In this framework, mezzanine floors and similar additions that move independently inside the building, which should not damage the walls, can be made Kocabıyık, 2014).

Interventions to Technical Equipment: All installation systems needed by the building should be overhauled and renewed, and a new system should be added if necessary. During this renovation, care should be taken not to damage the original qualities of the building and not to reach points of historical value (İnan, 2013).

Interventions to the Facade: In the process of reflecting the new function of the building on the façade, the façade of the historical building should not be changed too much and should not be damaged.

Interventions to the Built Environment: It covers the interaction of historical buildings not only within themselves but also with their surroundings and the holistic evaluation of the buildings. The building that is brought to life through interventions should be accessible and inviting to people. For this reason, examples of interventions for the immediate surroundings can be listed as parking lots, green areas, urban furniture (Selçuk, 2006).

4. METHOD

This is a qualitative case study that focuses on palimpsest characteristics in architectural space production and discusses the palimpsest spaces of two historical buildings that have been transformed within the scope of adaptive reuse/refunctioning. The study identifies two industrial heritage buildings: the Vienna Gasometer in Vienna and the Hasanpaşa Gasworks in Istanbul. The new spaces created through the adaptive reuse project of these buildings have been evaluated in the context of the components of the palimpsest concept, including “Historical Traces, Space, Time, Memory and Remembrance, Change and transformation, Layering Identity, Restoration and Adaptive Reuse, Spatial Transformation.” Visual analysis has been used as the evaluation method.

The selection criteria for the chosen industrial heritage buildings are as follows:

- Having been transformed within the scope of adaptive reuse,
- Being located in different countries,
- Accessibility to both interior and exterior visuals.

In the first phase of the study, which was carried out in four stages, a literature review was conducted through various academic databases on the internet. Scientific studies related to the research topic, architecture journals, and opinions from different authors on architectural websites and blogs (such as ArchDaily, Arkitera, etc.) were examined using the “textual analysis method,” and the concept of “palimpsest space” was established.

In the second phase, based on the “textual analyses”

conducted in the first phase, nine design characteristics were identified, which form the essence of the palimpsest space. These characteristics can be expressed as "trace-space-time-memory and recollection-change and transformation-layering-identity-adaptive reuse-spatial transformation." These features were accepted as "design criteria" for analyzing the palimpsest spaces of buildings transformed within the scope of adaptive reuse.

In the third phase, the selected sample buildings were analyzed comparatively using the 3-point Likert scale based on the design criteria for palimpsest space. In this phase, which provided an understanding of the palimpsest spatial features and differences of the Vienna Gasometers and Hasanpaşa Gasworks buildings, selected from two different countries, analysis was conducted through plans, sections, elevations, two- and three-dimensional drawings, photographs, and on-site observations. An example of the analysis data is presented in Table 1. Accordingly, the palimpsest spatial features of the adaptive reuse buildings were rated as "appropriate, partially appropriate, or not appropriate."

4.1. Vienna Gasometers

The Vienna Gasometers, representing the industrial heritage of Vienna, are located in the Simmering industrial district. In 1894, a competition was launched by the Vienna Municipality to meet the city's lighting and gas storage needs. Constructed between 1896 and 1899 based on Theodor Herrmann's design, the four cylindrical structures became the largest gas production facility in Europe at the time. The red brick structures, each featuring three-part telescopic steel containers for gas storage, have an inner diameter of approximately 62 meters and a height of around 72 meters. Designated as industrial monuments in 1981, the gasometers

Table 1. Palimpsest Space Design Criteria and 3-point Likert Analysis

No	Palimpsest Space Design Criteria	Vienna Gasometers	3-point Likert			Hasanpaşa Gasworks	3-point Likert		
			appropriate	partially appropriate	not appropriate		appropriate	partially appropriate	not appropriate
1	Historical Traces								
2	Space								
3	Time								
4	Memory and Remembrance								
5	Change and Transformation								
6	Layering								
7	Identity								
8	Restoration and Adaptive Reuse								
9	Spatial Transformation								

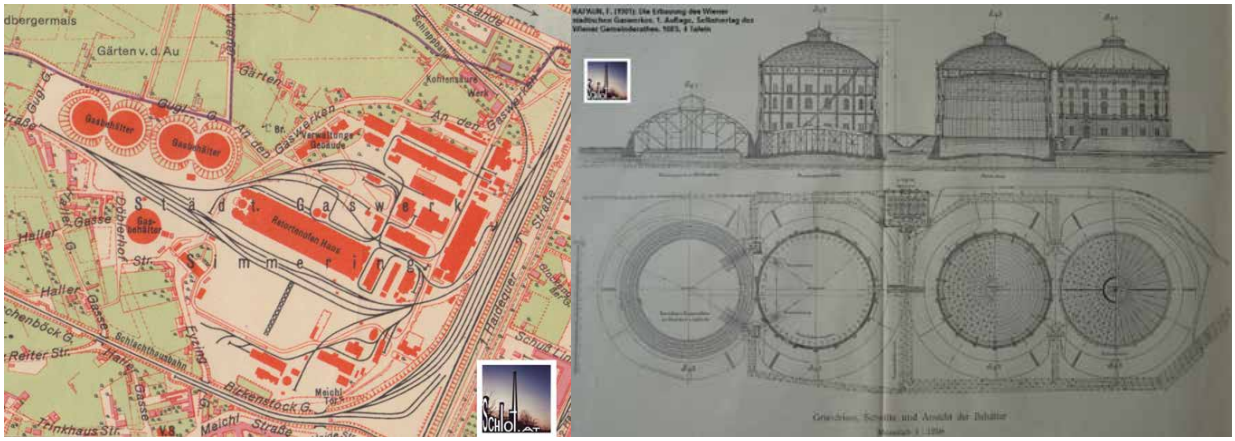


Figure 2. Vienna Gasometers in the Industrial Area (URL-6)

were closed in 1985 due to the replacement of coal gas by natural gas. Despite being under the patronage of the Austrian Ministry of Fine Arts due to their high architectural value, the gasometers remained neglected until architect and preservation expert Wedhorn Manfred proposed a transformation idea (URL-5) (Figure 2).

In 1996, an architectural design competition was held to adaptively reuse the Vienna Gasometers as offices, shopping centers, entertainment venues, and student housing. Renowned architects such as Jean Nouvel (Gasometer A), Coop Himmelblau (Gasometer B), Manfred Wehdorn (Gasometer C), and Wilhelm Holzbauer (Gasometer D) contributed to the design of the different gasometers. According to the adaptive reuse project carried out between 1999 and 2001, the circular red brick facades and domed roofs of the four gasometer buildings were preserved, while the interiors were rebuilt with modern materials (glass, steel, concrete, reflective mirrors, etc.) and high-tech standards. The gasometers, designed for different functions, provided housing in the upper floors, partially addressing the housing shortage in historic Vienna during the 1990s. The middle floors house offices, while the ground floors serve as spaces for entertainment, shopping, and cultural activities. A newly constructed multi-story student residence is connected to Gasometer B via bridges at different levels (URL-7). Additionally, all gasometers are interconnected by bridges at their original entry level (Figure 3).

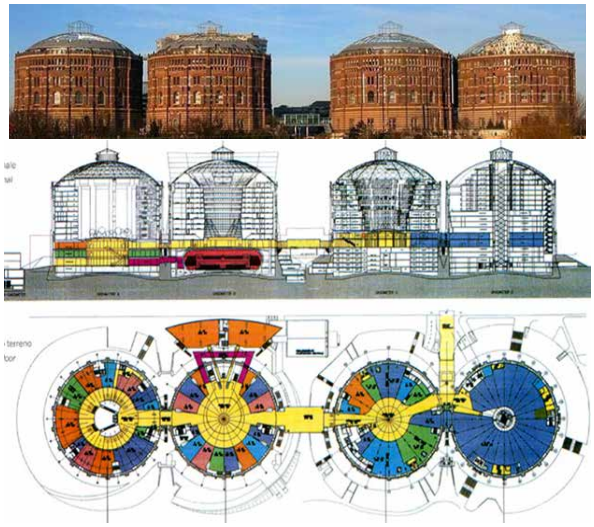
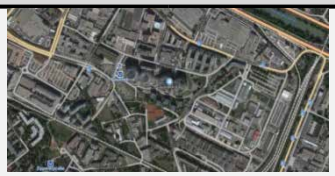
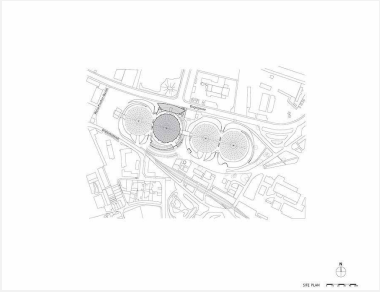
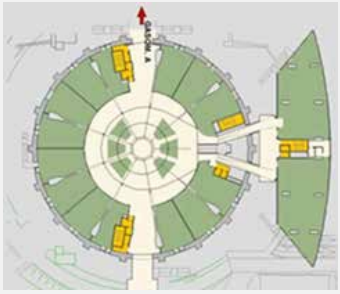
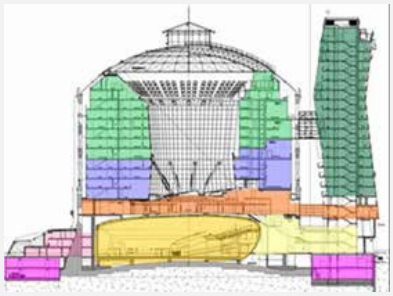


Figure 3. Vienna Gazometers Adaptive Reuse Project (URL-7; URL-8)

The Vienna Gasometers, transformed by the Vienna Municipality, represent a remarkable fusion of past and future. Through the creation of new housing, recreational, cultural, and commercial spaces, the project has revitalized the industrial area, turning it into an alternative urban center for Vienna. The Gasometers have contributed to the city's socio-cultural and economic landscape, demonstrating how industrial heritage buildings can be creatively and sustainably adapted and integrated into modern urban contexts. They serve as an important example of how such structures can contribute to a city's architectural palimpsest and cultural vibrancy. Architectural features of the Vienna Gasometers are detailed in Table 2.

Table 2. Vienna Gasometers Visual Features (URL-5; URL-9; URL-10; URL-11; URL-12), (Author, 2012).

Architectural Features	Location	Visual
Location: Austria, Vienna		
Construction Year: 1896-1899		
Renovation Year: 1999-2001		
Old Function: Gasometer		
New Function: Housing, office, shopping mall	**Coordinates:** 48.18513038750939, 16.420144104496224	
Old and New View		
		
Site Plan, Plan and Section		
		
Outdoor Visuals		
		
Indoor Visuals		
		

4.2. Hasanpaşa Gasworks

Hasanpaşa Gasworks is one of Istanbul's significant industrial heritage building complexes (Figure 4). It was established in 1892 through a contract made between Anatoli Barcil, an engineer representing French industrialist Charles George, and the mayor of Istanbul, to provide lighting for the Anatolian side of the city. The gasworks' concession rights were granted to the Parisian industrialist for 50 years. It played a crucial role in Istanbul's transition to a modern urban infrastructure in terms of energy/heating and lighting (URL-13; URL-14).

Figure 4. First Site Plan of Hasanpaşa Gasworks (1930) (URL-15)

The gas storage tanks (three gasometers), coal furnaces related to gas production, and various large brick chimney buildings provided uninterrupted service until 1915. Operations were halted during World War I and for a time afterward. In 1939, the gasworks was transferred to the Istanbul Metropolitan Municipality and then to the General Directorate of Istanbul Electric Tramway and Tunnel Enterprises (IETT) in 1945. In 1948, two new furnaces were added to increase its capacity, and in 1957, the complex was expanded with new furnace batteries and gas purification devices. The introduction of natural gas to the city in 1993 resulted in a reduced role for the gasworks in Istanbul's energy infrastructure, leading to its closure (Arda Büyüktaşkın, Türkel, 2019).

The Hasanpaşa Gasworks complex, one of Turkey's most significant industrial heritage sites, was left to its fate as the last of its kind in Istanbul after production ceased. The facility, consisting of 25 historical industrial buildings, had its gasometers dismantled and was used at different times as a coal depot, bus depot, and garage. In 1994, plans for its demolition were proposed, but thanks to the efforts of civil society organizations, professional chambers, and local residents (Hasanpaşa Environmental Volunteers), it was registered as part of Istanbul's industrial heritage in the national inventory and was protected (URL-16; Tanyeli and Aslan, 2001).

For the gasworks complex, which covers an area of approximately 32,000 m², Istanbul Technical University prepared a "Reuse and Environmental Arrangement Project" between 2010 and 2018. According to the project, the Hasanpaşa Gasworks was transformed into a cultural center under the name "Museum Gasworks" (Özçakır, 2023) (Figure 5).

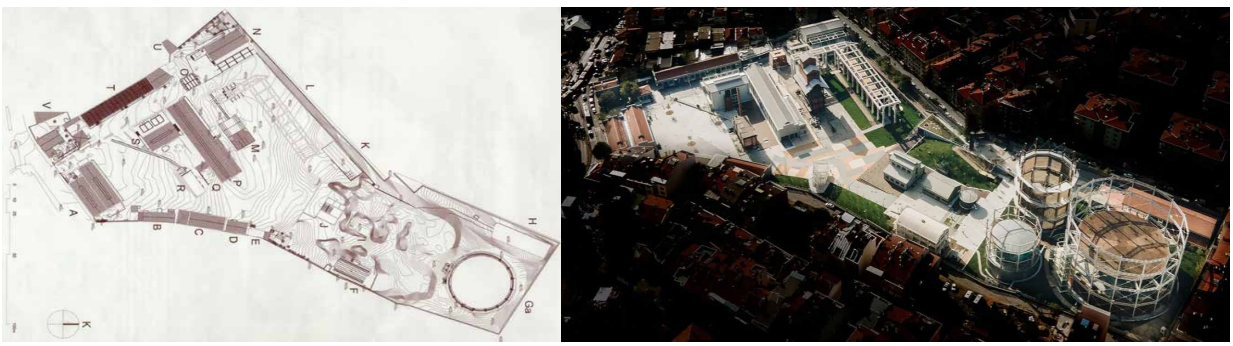
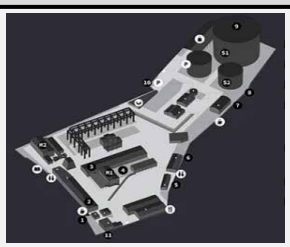
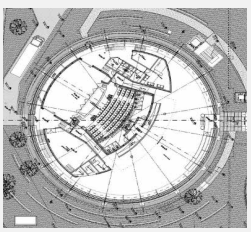
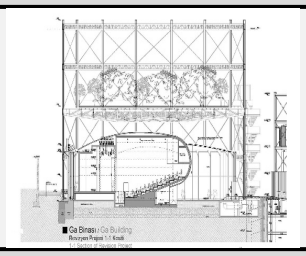
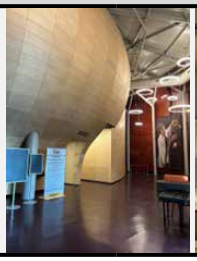


Figure 5. Hasanpaşa Gasworks Adaptive Reuse Project (URL-16; URL-17)

The gasworks facility, which was transformed by the Istanbul Metropolitan Municipality in accordance with the project, began being used with its new functions in 2021. Within the Museum Gasworks complex, reinforcement and stabilization work was carried out on the original walls, flooring, and foundations, while unqualified additions were removed, and damaged sections were repaired and renovated. Structures that no longer exist on site have been rebuilt to match their original forms. Due to the “symbolic” nature of the gasometers that had been dismantled or demolished over the years, contemporary materials were used to maintain the visual integrity of the complex (Kıraç, 2023).

The structures that make up the Museum Gasworks have become “memory spaces” that carry valuable information about Istanbul’s industrial history (the industrialization process in the 19th-century Ottoman Empire, changing forms of production, increasing energy needs, urbanization, etc.), as well as the city’s history, architecture, and social participation. Some of the buildings are displayed as large objects of “artistic value,” while others serve practical purposes as exhibition/ museum halls, theater/concert venues, performance studios, libraries, bookstores, dining areas, workshops, co-working spaces, and indoor parking (URL-18). The architectural features of the Hasanpaşa Gasworks are presented in Table 3.

Table 3. Hasanpaşa Gasworks Visual Features (URL-14; URL-19), (Authors, 2024).

Architectural Features	Location	Visual
Location: Turkey, Istanbul		
Construction Year: 1887-1891		
Renovation Year: 2014-2021		
Old Function: Gasworks Facility		
New Function: Cultural Center	**Coordinates:** 40.99627960199066, 29.04263712874061	
Old and New View		
 		 
Site Plan, Plan and Section		
		
Outdoor Visuals		
		
Indoor Visuals		
   		

4.3. Vienna Gasometers and Hasanpaşa Gasworks Palimpsestic Features Analysis

For the two industrial heritage buildings such as the Vienna Gasometer/Vienna and Hasanpaşa Gasworks/ Istanbul, which were determined as the field study of the article; readings were made on the 9 components described in the "Palimpsestic Features" section of the study, and the features of each component are briefly explained in Table 4. The 9 components that make up the concept of palimpsest were analyzed qualitatively with the 3-point Likert technique, visuals and on-site surveys.

Table 4. Vienna Gasometers and Hasanpasa Gasworks Palimpsestic Features Analysis (Created By Authors)

		Vienna Gasometers	3-point Likert			Hasanpaşa Gasworks	3-point Likert		
Palimpsest Space Design Criteria			appropriate	partially appropriate	not appropriate		appropriate	partially appropriate	not appropriate
Palimpsestic Features	Historical Traces	From an external perspective, the traces of the gasometer are visible through its original brick façade cladding and roof. However, within the interior, the traces have been erased by the spaces constructed for new functions, and it is perceived as a new building.	○	●	○	From an external perspective, despite undergoing renovation, the original industrial buildings and their traces remain visible. Within the interior, the traces can be perceived in the newly constructed structures that have been built in accordance with the original design.	●	○	○
	Space	The space is in a linear relationship with the memory of the place.	○	●	○	The space is in a cumulative relationship with the memory of the place.	●	○	○
	Time	The gasometers were in use for 86 years, remained abandoned for 15 years, and have continued their existence as a mixed-use building for the past 25 years.	●	○	○	The gasworks were in use for 102 years, remained abandoned for 28 years, and have continued their existence as a cultural center for the past 3 years.	●	○	○
	Memory and Remembrance	Both before and after its transformation, it has been an integral part of Vienna's collective memory and a site of remembrance.	●	○	○	Before its transformation, it did not generate awareness, but after being transformed, it has become an integral part of Istanbul's collective memory and a site of remembrance.	●	○	○
	Change and Transformation	Technology and social structures have changed, and the building has been transformed in response to these changes.	●	○	○	Technology and social structures have changed, and the building has been transformed in response to these changes.	●	○	○
	Layering	From an external perspective, different historical layers are perceived alongside the newly added dormitory building. However, within the interior, the layered quality is not perceived as the structure is used solely as a shell.	○	●	○	From an external perspective, the traces of the building complex are perceived because the transformation occurred without erasing them. Within the interiors of the reconstructed buildings, the layered quality is partially discernible.	○	●	○
	Identity	They are seen as identity structures that define a sense of belonging to the city, both physically and culturally, for Vienna.	●	○	○	Post-transformation, they are perceived as identity structures that define a sense of belonging to the city, both physically and culturally, for Istanbul.	○	●	○
	Restoration and Adaptive Reuse	They have been reused with functions that meet contemporary needs, accepted by the public, and ensure the continuity of industrial heritage.	●	○	○	They have been reused with functions that meet contemporary needs, accepted by the public, and ensure the continuity of industrial heritage.	●	○	○
	Spatial Transformation	The original functions, such as lighting and gas storage, have changed, transforming it into a mixed-use building.	●	○	○	The original functions, such as lighting and gas storage, have changed, transforming it into a mixed-use building.	●	○	○

5. FINDINGS

Efficient and sustainable conservation for industrial heritage is possible through the transformation of dysfunctional facilities by re-functioning them in accordance with today's needs. The transformation process should be carried out by analyzing not only the physical but also the spirit of the place. The transformation of two industrial heritage building groups such as the Vienna Gasometer and Hasanpaşa Gas House, which were determined as the field study of the article, were analyzed with the "palimpsest space design criteria" determined as a result of the literature research and the following findings were reached.

The Vienna Gazometers retain historical traces as the outer shell has been preserved. However, it has been observed that the interiors have been reconstructed as offices, shopping malls, entertainment centers and dormitories with modern materials and high technology, which does not fully meet the concept of historical traces. Although the industrial traces are not sufficiently preserved in the interior in terms of palimpsest, it is seen that the industrial building group is still a place of memory with its new identity formed as a result of functional and spatial transformation. Having existed for 125 years and witnessed the important periods of the city and its inhabitants, the building group has created a new layer with its reconstructed spaces like rewriting on papyrus, and thus the buildings have not been erased from the memory of the city. In general, it is a positive building example in terms of palimpsestic features.

The Hasanpaşa Gasworks complex has been completely renovated, but the architectural forms of the post-renovation buildings have been preserved and the traces are partially visible. The buildings have been rebuilt with new functions such as museum, theater/ concert hall, performance studios, library, bookstore, food/drinking areas and workshops, and the historical traces are partially visible in both interior and exterior appearance by preserving or strengthening the structure of the existing buildings. Since the industrial building group has been transformed with its historical traces, layering is partially perceived and the memory of the place continues. Participation of non-governmental organizations, professional chambers and the neighborhood community in the conservation and planning processes has been observed. After 102 years of existence, the building group, which has witnessed important periods of the city and its inhabitants, has been reconstructed with modern technology and materials, like rewriting on papyrus, and a new layer has been created, so that the buildings have not been erased from the memory of the city. In general, it is a positive example in terms of palimpsestic features.

6. CONCLUSION

The concept of palimpsest refers to a situation in which the original writing is partially or completely erased in order to write new text on it, but traces of the old writing are still visible. In urbanism, it refers to the layers that contain the changes a city or a building has undergone over time and the traces left by these layers. The biggest representative of the concept of palimpsest in architectural practice is historical buildings. Because these buildings embody all the values of the period, city, geography and history from the moment they are built until they are destroyed and pass them on to future generations. In this context, historical buildings form the memory and identity of cities by leaving traces of their past experiences, heritage value and intended use. Historic buildings that have survived despite the effects of time and change may be insufficient to functionally meet the changing needs of today's society. Historic buildings that have lost their validity can be transformed into a new building with different functions to meet contemporary needs while preserving their original character and history. Historic buildings that are transformed with new functions show palimpsest characteristics by preserving the original plan scheme as much as possible and carrying the old and new layers and their traces together.

Industrial heritage buildings have a great importance with their historical, cultural and economic values as buildings bearing the traces of the industrial revolution. While these buildings shed light on the past of cities, they respond to today's needs by being re-functionalized and contribute to the preservation of urban identity. When the adaptive reuse of two industrial heritage building groups such as the Vienna Gasometer and

Hasanpaşa Gasworks, which are the field studies of the article, are analyzed in terms of "Palimpsest Space Design Components", it is seen that both buildings are not only physical spaces, but also living representatives of cultural memory. In this context, they are important examples of palimpsest buildings in terms of carrying the layers of the past to the present.

The Vienna Gasometers, which were re-functionalized as a result of the project prepared by the Municipality of Vienna in 1996 as a result of a competition opened in 1996, have been transformed thanks to meticulous work, partially preserving their historical features and adapting them to modern needs. With the preservation of the original red brick cladding of the circular exterior of the four separate gasometers and the modernized transparent roof form, it has become an integral part of the city of Vienna in the collective memory while carrying traces of the past. Despite the preservation of its general architectural form, it is perceived as a new building with the spaces built for new functions in the interior, but this is seen as a new layer. The fact that the traces of the past and new layers (form, material) are visible together, in other words, that it gains a new identity in a way that does not overshadow its old identity, shows that the Vienna Gasometers are largely palimpsest features.

Hasanpaşa Gasworks has been the product of a long period of conservation and use with the encouragement of non-governmental organizations and the local community. The complex was re-functionalized and adapted to modern needs through a comprehensive transformation project (2010-2018) commissioned by the Istanbul Municipality. The traces of the past have been maintained by rebuilding the traces of the original buildings that have survived to the present day, strengthening the original walls, floors and foundations and removing unqualified additions. The Hasanpaşa Gasworks complex (Museum Gasworks), which has gained a new identity with its new structures in accordance with the original, has palimpsest features and constitutes an important symbol of the city of Istanbul in the collective memory.

As a result, this study has shown that the use of historically important industrial heritage buildings as palimpsest spaces is critical for preserving the historical and cultural identity of cities, as well as ensuring their integration with modern life. The examples of the Vienna Gasometer and Hasanpaşa Gasworks are successful transformation projects that bring together the past and the future. These projects will inspire similar studies to be carried out in the future with different aspects and emphasize the importance of the palimpsest approach in the adaptive reuse of industrial heritage. The preservation and adaptive reuse of industrial heritage buildings will continue to support economic and social development by strengthening urban identity.

References

Aluçlu, F. (2023). *Palimpsest Bağlamında Binalardaki Yapısal Müdahalelerin İncelenmesi*. Master's Thesis. Department of Architecture, Building Information Program, Mimar Sinan Fine Arts University, Istanbul, Turkey.

Apaydın, B. (2019). Palimpsest Kavrami ve Mekansal Dönüşüm. *Turkish Online Journal of Design Art and Communication*, *9*(2), 2019, pp. 90-103.

Arbabiyazdi, A. and Pisheh, M.Z. (2012). Context as Palimpsest. *Journal of Basic and Applied, Scientific Research, J. Basic. Appl. Sci. Res.*, 2(2), pp. 1632-1638.

Arda Büyüktaşkın, H.A. and Türkel, E. (2019). Geçmişten Günümüze Gazometre Yapıları ve Dolmabahçe Gazometresi İçin Olası İşlevlendirme Önerileri. *TÜBA-KED Türkiye Bilimler Akademisi Kültür Envanteri Dergisi* (*19*), pp. 55-74. https://doi.org/10.22520/tubaked.2019.19.004

Avcıoğlu, S.S. and Akın, O. (2017). Kolektif Bellek ve Kentsel Mekan Algısı Bağlamında İstanbul Tuzla Köyiçi Koruma Bölgesi'nin Mekansal Değişiminin İrdelenmesi. *İDEALKENT*, 8(22), 2017, pp. 423–450.

Bauman, Z. (2020). *Kimlik (Identitiy)*. Çeviri: Mesut Hazır. Ankara: Heretik Basın Yayın, 125 pp.

Blockley, M. (1999). *Preservation, Restoration and Presentation of the Industrial Heritage, a Case Study of the Ironbridge Gorge' in Baker, D. and Chitty, G. (eds) 1999 Managing Historic Sites and Buildings*, London: Routledge, pp.141-156.

Burden, E. (2004). *Illustrated Dictionary of Architectural Preservation: Restoration, Renovation, Rehabilitation, Reuse*. New York: McGraw-Hill Press, 280 pp.

Calvino, I. (1990). *Görünmez Kentler*. Yapı Kredi Yayınları. 20. Baskı. Istanbul: Remzi Kitabevi. 208 pp.

H. Demir. (2014). *Zaman, Mekân Varoluş*. Istanbul: Fikir Teknesi Yayınları, 42 pp.

Douet, J. (2016). *Industrial heritage re-tooled: The TICCIH guide to industrial heritage conservation*. London: Routledge, 256 pp.

Douglas, J. (2006). *Building Adaptation (2nd ed.).* London: Routledge, 680 pp.

Eisenman, P. (1984). The end of the classical: the end of the beginning, the end of the End. *JSTOR*, 21(6), pp. 154–173. https://doi.org/10.1111/j.1467-2995.2005.00277.x

Erdoğan, E. and Yıldız, Z. (2018). Zaman ve Mekân Kavramları Arasındaki Paradoksal İlişkinin "Bulut Atlası" Filmi Üzerinden Okunması. *ODTÜ Mimarlık Fakültesi Dergisi*, *35*(1), pp. 1–25. http://jfa.arch.metu.edu.tr/archive/0258-5316/articles/metujfa2018101.pdf

İnan, Z. (2013). *İşlevini Yitirmiş Tarihi Yapıların Büro Yapılarına Dönüştürülmesindeki Mekânsal Sorunlar.* Unpublished Master's Thesis. Institute of Science and Technology, Haliç University, Istanbul, Turkey.

Kandemir, Ö. (2013). *Kültürel Miras Kapsamındaki Yapıların, Çağdaş Yaklaşımlarla Müze İşlevine Adaptasyonları: "Yeni" Mekânsal Deneyimler.* Unpublished Art Proficiency Thesis. Institute of Fine Arts, Anadolu University, Eskişehir, Turkey.

Kıraç, A. B. (2023). Hasanpaşa'da Öncü Koruma Mücadelesi: Müze Gazhane. *Mimarlık*, 430, pp. 56-64.

Kocabıyık, Y. (2014). *Yeniden İşlevlendirme Kavramı ve Bu Kapsamda İtü Taşkışla Binasının İncelenmesi.* Unpublished Master's Thesis. Institute of Science and Technology, Maltepe University, Istanbul, Türkiye.

Köksal, G. (2005). *İstanbul'daki Endüstri Mirası İçin Yeniden Kullanım Önerileri.* PhD Thesis. Institute of Science and Technology, Istanbul Technical University, Istanbul, Türkiye.

Köksal, G. (2008). Gül Köksal ile Osmanlıdan Bugüne Endüstriyel Mirasın İzleri. *Mimarizm*, Mimarlık ve Tasarım Yayın Platformu.

Lynch, K. (2015). *Kent İmgesi*. Çeviri: İrem Başaran, Istanbul: Türkiye İş Bankası Yayınları, 215 pp.

Manley, S. and Guise, R. (1998). Conservation in the Built Environment. *Introducing Urban Design: Interventions and Responses*, Longman Ltd, London, pp. 65-86.

Mısırlısoy, D. and Günçe, K. (2016). Adaptive reuse strategies for heritage buildings: A holistic approach. *Sustainable cities and society*, 26, pp. 91-98.

Ocakçı, M. and Türk, Y.A. (2012). *Kentsel Kimlik*. Istanbul: Ninova Yayıncılık, 226 pp.

Özçakır, Ö. (2023). Tarıhı Yapıların Yenıden İşlevlendırme Sürecını Ulusal Mımarlık Ödüllü Endüstrı Mırası Üzerınden Tartışmak. *TÜBA-KED Türkiye Bilimler Akademisi Kültür Envanteri Dergisi*, (28), pp. 87-103. https://doi.org/10.22520/tubaked.1351030

Öztürk, G.B., Onaran, B.S. and Hersek, C.M. (2012). Yeniden İşlevlendirme Kapsamında Tarihi Merinos İstasyonu. *Sanat ve Tasarım Dergisi*, (29), pp. 247-263.

Rossi, A. (2006). *Şehrin Mimarisi*. 1. Baskı. İstanbul: Kanat Kitap, 244 pp.

Selçuk, M. (2006). *Binaların Yeniden İşlevlendirilmesinde Mekansal Kurgunun Değerlendirilmesi.* Unpublished Master's Thesis. Institute of Science and Technology, Selcuk University, Konya, Türkiye.

Sevim, A. (2023). *Zaman, Mekân ve Varlık'ın Kolektif Belleğinde Palimpsest Kavramı.* Master's Thesis. Department of City and Regional Planning, Urban Space Organization and Design Program, Yıldız Technical University, Istanbul, Türkiye.

Tabak, P. and Sirel, A. (2022). Adaptive Reuse as a Tool for Sustainability: Tate Modern and Bilgi University Cases, *5th International Conference of Contemporary Affairs in Architecture and Urbanism*, (ICCAUA2022) 11-113 May 2022, Alanya HEP University, Turkey.

Tanyeli, G. and Aslan, D. (2001). Kadıköy-Hasanpaşa Gazhanesi. *Arredamento*. Mimarlık, Sayı: 2001/9, İstanbul, pp. 105–115.

The International Committee for the Conservation of the Industrial Heritage (TICCIH). *The Nizhny Tagil Charter for the Industrial Heritage.* 17 July, 2003, 6 pp.

Tunçer, P. (2013). Değişim Yönetimi. *The Journal of Academic Social Science Studies International*, 6(2), pp. 891–915.

Velthuis, K. and Spennemann, D.H.R. (2007). The future of defunct religious buildings: Dutch approaches to their adaptive re-use. *Cultural Trends*, 16(1), pp. 43–66.

Yalaz, E.T. and Yaldız, E. (2020). Yeniden Kullanım Sonrası Yapısal Müdahalelerin Değerlendirilmesi. Tantavi Ambarı Örneği. *Artium*, 8(2), pp. 105-117.

Yavuz, Z. and Aksu, A. (2019). Tarihi Yapılara Yapılan Çağdaş Ek/Yapının Palimpsest Kavramı Özelinde Değerlendirilmesi: Daniel Libeskind Berlin Yahudi Müzesi. *Ata Planlama ve Tasarım Dergisi*, 3(1), pp. 31-37.

Yıldırım, N. (2007). Endüstri Arkeolojisi Kavramı ve Tire'de Bulunan Endüstri Yapılarının Endüstri Arkeolojisi Kapsamında İncelenmesi, Yeni 'İşlev' Önerileri, Master's Thesis. Yıldız Technical University, Istanbul, Türkiye.

Yıldırım, G. (20099. Mekanların Dönüşüm Potansiyeli ve Mimarlıkta Palimpsest Kavramı. Master's Thesis. Institute of Science and Technology, Istanbul Technical University, Istanbul, Türkiye.

Yung, E.H.K. and Chan E.H.W. (2012). Implementation challenges to the adaptive reuse of heritage buildings: Towards the goals of sustainable, low carbon cities. *Habitat International*, 36, pp. 352-361.

Zeren, M.T. and Uyar, O. (2010). Arkeolojik Alanlarda Koruma Çatıları Ve Gezi Platformlarının Düzenlenmesi Kriterleri. *Dokuz Eylül Üniversitesi Mühendislik Fakültesi Fen ve Mühendislik Dergisi*, 12(2), pp. 55-64.

URL-1. https://www.britannica.com/topic/palimpsest-manuscript Access Date: 15.09.2024.

URL-2. https://oxfordre.com/classics/display/10.1093/acrefore/9780199381135.001.0001/acrefore-9780199381135-e-4668#:~:text=Palimpsest%20(%CF%80 %CE%B1 %CE%BB% CE%AF%C E%BC%CF%88%CE%B7%CF%83% CF%84%CE%BF%CF%82%E2%80%8E)%2C%20a,be%20inscribed%20in%20its%20place. Access Date: 15.09.2024.

URL-3. https://www.ceviriblog.com/2017/11/02/tarih-ustune-tarih-palimpsest/ Access Date: 23.04.2024.

URL-4. https://typelish.com/b/palimpsest-incelemesi-107151 Access Date: 05.05.2024.

URL-5. https://twistedsifter.com/2009/10/gasometers-of-vienna/ Access Date: 08.09.2024.

URL-6. https://www.schlot.at/2012/08/10/at-1030-wien-gaswerk-simmering-1901-1933/ Access Date: 08.09.2024.

URL-7. https://www.wehdorn.at/projects/gasometer/ Access Date: 08.09.2024.

URL-8. http://www.polyucee.hk/cecspoon/lwbt/Case_Studies/Gasometer_City/pic01_plan.jpg Access Date: 08.09.2024.

URL-9. https://www.shutterstock.com/tr/search/vienna-gasometers Access Date: 08.09.2024.

URL-10. https://www.atlasobscura.com/places/gasometer-town Access Date: 08.09.2024.

URL-11. https://www.wienenergie.at/ueber-uns/meilensteine/1899-inbetriebnahme-gaswerk-in-simmering/ Access Date: 10.09.2024.

URL-12. https://en.wikiarquitectura.com/building/gasometer/# Access Date: 10.09.2024.

URL-13. https://istanbultarihi.ist/685-the-gasworks-of-istanbul Access Date: 12.09.2024.

URL-14. https://muzegazhane.istanbul/hasanpasa-gazhanesi/ Access Date: 12.09.2024.

URL-15. https://upload.wikimedia.org/wikipedia/commons/3/34/2_Haydar_Paşa_-_Acıbadem-Gazhane_-_Index_général_-_Jacq._Pervititch_-_btv1b10100727j.jpg Access Date: 12.09.2024.

URL-16. https://kulturenvanteri.com/tr/yer/hasanpasa-gazhanesi/#16/40.997139/29.0434 Access Date: 12.09.2024.

URL-17. https://globaldesignnews.com/ds-architecture-and-itu-faculty-of-architecture-transform-the-former-industrial-complex-of-hasanpasa-gasworks-into-a-public-park-and-museum-complex/ Access Date: 15.09.2024.

URL-18. https://medium.com/@aycabayrakulug/hasanpaşa-gazhanesini-anlatmayan-müze-müze-gazhane-a28bffd0657f Access Date: 15.09.2024.

URL-19. http://www.mimarlikdergisi.com/index.cfm?sayfa=mimarlik&DergiSayi=384&RecID=3105 Access Date: 15.09.2024.