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Research Article

Adaptive Reuse of Industrial Heritage for Cultural Spaces: Cases from Turkey and Europe

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Abstract: This study offers a comparative examination of transforming industrial heritage into cultural spaces through cases from Turkey and Europe. The scope is limited to three cases from Istanbul (Müze Gazhane, Santralistanbul, Bomontiada) and three from Europe (Tate Modern, Westergasfabriek, Matadero Madrid). A multiple-case comparative design is adopted; the cases were selected using data-rich and diversity-oriented criteria. Data collection relies on document review and visual analysis; evaluation focuses on spatial–architectural transformation, urban integration, public-space use, social impacts, and the legal–institutional framework. The findings show that, in both contexts, industrial heritage functions not merely as an object of physical preservation but as a vehicle for cultural production and social revitalisation. However, while Istanbul's examples are largely single-building oriented, the European projects develop holistic, complex-scale scenarios supported by robust legislation and incentives. The results underscore the need in Turkey for a comprehensive inventory, dedicated regulations, and long-term cultural policies.

Keywords: *Industrial heritage, Adaptive reuse, Interior architecture, Cultural transformation, Sustainable conservation, Multiple case study*

I. INTRODUCTION

Industrial heritage refers to the ensemble of buildings, facilities, machinery, infrastructure, and landscapes associated with production, energy, transportation, and storage processes since the Industrial Revolution, which today possess cultural value. The International Council on Monuments and Sites (ICOMOS) and The International Committee for the Conservation of the Industrial Heritage (TICCIH) define industrial heritage as the material remains of industry that reflect the economic, technological, and social history of societies (ICOMOS & TICCIH, 2011; TICCIH, 2003). This heritage not only documents technological development but also provides insight into the living conditions of the working class, production relations, and the formation processes of modern cities (Douet, 2012).

Industrial structures, which became widespread in Europe from the eighteenth century onwards, largely lost their original functions by the mid-twentieth century. Since the 1960s, the adaptive reuse of obsolete industrial sites has emerged within the context of post-industrial transformation processes (Kayın & Şimşek, 2009). During this period, significant developments occurred in the fields of industrial archaeology and industrial heritage conservation in Western Europe, and the contributions of organisations such as UNESCO, ICOMOS, and TICCIH helped establish an international framework for this field (Falser, 2001). While industrial archaeology developed as an academic discipline in the United Kingdom (Palmer & Neaverson, 1998), former coal and steel production areas in Germany's Ruhr Region were inscribed on the UNESCO World Heritage List (Hospers, 2002). In the Netherlands and Spain, large-scale industrial complexes such as Westergasfabriek and Matadero Madrid have become emblematic examples of culture-oriented transformations.

The transformation of industrial heritage into cultural spaces plays a critical role not only in preserving the physical fabric of buildings but also in sustaining collective memory, reinforcing urban identity, and supporting sustainable urban regeneration (Evans, 2005). Projects such as Tate Modern, Westergasfabriek, and Matadero Madrid are widely recognised in the international literature as reference examples of such transformations (Miles, 2005).

In Turkey, interest in industrial heritage emerged relatively later and gained momentum particularly after the 1990s. The transformation of Hasanpaşa Gasworks into Müze Gazhane, Silahtarağa Power Plant into Santralistanbul, and Bomonti Brewery into Bomontiada represent pioneering examples of this process (Ahunbay, 2009; Kaşlı, 2009). However, compared to the international literature, studies on the documentation, conservation, and adaptive reuse of industrial heritage in Turkey remain relatively limited (Özçakır, 2023).

Despite the extensive body of literature on adaptive reuse, it is important to emphasise that many existing studies primarily evaluate reuse processes at structural, economic, or urban scales. In contrast, spatial transformation strategies at the interior scale, their impact on the production of cultural spaces, and their variation across different contexts remain

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insufficiently explored. This situation has led to the marginalisation of design-oriented dimensions such as spatial organisation, user experience, and spatial continuity within the literature.

Furthermore, a considerable portion of the existing studies focuses on single case analyses, while research that systematically examines adaptive reuse practices in Turkey within a comparative framework alongside European examples remains limited. This gap makes it difficult to evaluate the spatial, social, and institutional dimensions of adaptive reuse approaches developed in different geographical, cultural, and governance contexts in an integrated manner. Therefore, the primary gap in the literature lies not merely in the limited number of studies, but in the lack of comprehensive, comparative, and multi-dimensional analytical approaches.

Adaptive reuse is widely recognised as a fundamental conservation strategy aimed at adapting obsolete industrial structures to contemporary social and cultural needs. In the literature, this approach is defined not only as a means of ensuring physical continuity through the preservation of the building envelope, but also as a process that supports the continuity of collective memory and urban identity by introducing new social, cultural, and public functions (Bullen & Love, 2011; Plevoets & Van Cleempoel, 2011). According to Evans, the transformation of industrial buildings can be classified into typologies such as musealisation, cultural complexes, and mixed-use developments (Evans, 2005). Today, such transformations constitute an important component of urban regeneration policies in many countries.

The starting point of this study is the lack of systematic research that examines adaptive reuse practices of industrial heritage in Turkey, particularly in terms of spatial transformation strategies and within a comparative analytical framework alongside international examples. In this respect, the study goes beyond merely describing existing practices and aims to address this gap by comparatively analysing transformation approaches developed in different contexts through an analytical framework. Accordingly, the study aims to comparatively examine the adaptive reuse processes of selected industrial heritage sites in Turkey and Europe that have been transformed into cultural spaces.

The primary objective of the study is to identify how these transformations differ in terms of spatial strategies, urban integration, public use, social impacts, and institutional frameworks. In this context, the study addresses the following research question: To what extent do adaptive reuse processes of industrial heritage into cultural spaces in Turkey and Europe demonstrate similarities and differences in terms of spatial, institutional, and conservation approaches?

This comparative approach aims not only to evaluate existing practices but also to identify structural tendencies and key challenges that may contribute to future strategies for the conservation and adaptive reuse of industrial heritage in Turkey.

II. METHODOLOGY

This study adopts a multiple-case comparative research design to examine the adaptive reuse of industrial heritage into cultural spaces. The multiple-case approach enables the systematic comparison of both shared characteristics and divergent features of transformation projects implemented in different geographical and institutional contexts, thereby enhancing the potential for analytical generalisation (Eisenhardt, 1989; Yin, 2018). This methodological framework allows for a holistic evaluation of the spatial, social, and institutional dimensions of adaptive reuse processes in industrial heritage.

Case selection was conducted in accordance with purposive sampling and maximum variation principles recommended in the literature (Patton, 2015). Within this scope, cases representing different industrial typologies, geographical contexts, and adaptive reuse models were selected. As the study relies exclusively on secondary data sources and publicly accessible documentation, ethics committee approval was not required (Bowen, 2009).

The selection criteria and their corresponding analytical parameters are presented in Table 1. These criteria were defined to ensure analytical consistency in the comparative evaluation and to enable the systematic identification of similarities and differences among adaptive reuse practices across different contexts.

Table 1. Case selection criteria and analytical objectives.

Selection Criterion	Definition	Analytical Objective
Industrial heritage qualification.	The original function of the building was industrial production or infrastructure.	Ensuring relevance within the scope of industrial heritage.
Adaptive reuse status	The building has been reused as a cultural space	Enabling the examination of adaptive reuse processes
Functional diversity	Representation of different adaptive reuse typologies such as museums, cultural centres, or mixed-use programmes	Comparing different adaptive reuse models
Geographical diversity	Inclusion of cases from Turkey and Europe	Comparing different conservation and implementation approaches
Data availability	Availability of sufficient documentation and academic data related to the building	Ensuring analytical reliability

The case set consists of Müze Gazhane, Santralistanbul, and Bomontiada in Istanbul, and Tate Modern, Westergasfabriek, and Matadero Madrid in Europe. These cases represent adaptive reuse typologies identified in the literature, including musealisation, cultural complexes, and mixed-use developments (Plevoets & Van Cleempoel, 2011). Evaluating different functional transformation models and geographical contexts together enables a comprehensive comparative examination of adaptive reuse processes (Evans, 2005).

All selected buildings are industrial facilities originally associated with functions such as gas production, electricity generation, and industrial manufacturing. These structures possess spatial characteristics—including large spans, high interior volumes, and durable construction materials—that make them suitable for adaptation to new cultural functions (Bullen & Love, 2011; Douglas, 2006). Furthermore, their location within major urban areas with public accessibility enhances their potential to contribute to urban regeneration and public use through adaptive reuse processes (Evans, 2005).

In this context, the selection of Turkish cases was deliberately limited to Istanbul in order to ensure analytical consistency and comparability among cases. Istanbul represents the largest concentration of adaptively reused industrial heritage sites in Turkey, where diverse transformation models—such as musealisation, cultural complexes, and mixed-use developments—can be observed within a shared metropolitan and institutional context. This focus enables a more controlled comparison by reducing regional variations in governance structures, economic conditions, and urban development policies.

Although other significant examples exist in different cities in Turkey, such as AGÜ Sümer Campus Large Warehouse Building and İzmir Historical Gasworks, these cases were not included due to differences in scale, data availability, and comparability within the defined analytical framework. Therefore, the selection strategy prioritises analytical depth and consistency over geographical coverage, in line with purposive sampling principles in qualitative multiple-case research.

Within the analytical process, each case was evaluated according to five analytical criteria derived from the literature. These criteria include: functional transformation (Plevoets & Van Cleempoel, 2011); spatial and morphological transformation, including building envelope conservation, structural interventions, and spatial continuity (Douglas, 2006; ICOMOS, 1964); social and cultural impacts (Evans, 2005; Miles, 2005); governance and management model (Evans, 2005); and conservation and sustainability performance (Bullen & Love, 2011; ICOMOS & UNESCO, 1994). These criteria were selected to enable a comprehensive evaluation of the physical, spatial, social, and institutional dimensions of adaptive reuse processes in industrial heritage.

The data collection process was based on systematic document analysis (Bowen, 2009). Data sources included academic publications, project reports, archival documents, architectural drawings, photographs, and institutional records. Within the scope of visual analysis, plans and photographs were examined to evaluate spatial organisation, structural interventions, and spatial relationships (Rose, 2016).

Directed content analysis was applied during the analytical process, and the obtained data were transferred into comparative analysis tables (Hsieh & Shannon, 2005; Mayring, 2014). Within this process, all cases were examined using the same analytical framework, and the findings were evaluated comparatively. The coded data were transferred to cross-case matrices in order to systematically conduct comparisons across cases. To ensure analytical validity and the reliability of the findings, triangulation was employed by integrating academic sources, institutional documents, and visual materials. In addition, an audit trail was established to ensure the transparency and traceability of methodological decisions taken throughout the analysis process. This approach is consistent with standard methodological procedures recommended for strengthening analytical consistency and validity in qualitative comparative research (Miles et al., 2014). The stages of the research process—case selection, data collection, analysis, and comparison—are systematically illustrated in the research flow diagram presented in Figure 1. This diagram clearly demonstrates how the methodological framework relates to the research findings and outlines the sequential stages of the analytical process.

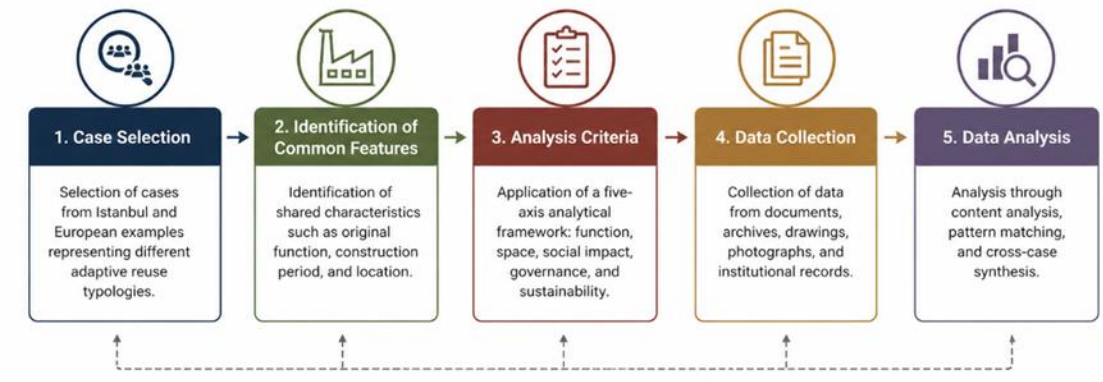


Figure 1. Research process and methodological framework.

Figure 1 illustrates the research process and methodological framework of the study. It includes case selection (Istanbul and European cases), identification of shared attributes (original function, period, location), definition of five analytical criteria (function, space, social impact, governance, sustainability), systematic data collection (documents, archives, and visual materials), and qualitative data analysis (directed content analysis, pattern matching, and cross-case synthesis). The arrows indicate a sequential yet iterative process consistent with a multiple-case comparative research design.

III. CONSERVATION AND ADAPTIVE REUSE OF INDUSTRIAL HERITAGE: PROBLEMS AND CONCEPTUAL FRAMEWORK

The conservation of industrial heritage represents a distinct field within heritage studies, as it possesses physical, functional, and perceptual characteristics that differ from other types of historic buildings. Industrial heritage refers to the cultural accumulation formed by structures, infrastructures, and technological systems associated with production processes, and it carries significance not only in architectural terms but also in relation to technological, social, and economic history (ICOMOS & TICCIH, 2011; TICCIH, 2003). These structures embody the spatial traces of modern industrialisation and have played a crucial role in the historical development of cities (Edwards & Llurdés, 1996).

However, since the second half of the twentieth century, the process of deindustrialisation has led to the loss of function and abandonment of many industrial buildings. Changes in production technologies, economic restructuring, and the relocation of industry from city centres have resulted in extensive industrial building stocks becoming obsolete (Loures, 2008; Stratton, 2000). This situation has brought forward the necessity of conserving and re-evaluating large-scale industrial structures.

One of the fundamental challenges in the conservation of industrial buildings lies in their large-scale and technically specialised spatial characteristics, which are directly related to their original functions. Wide spans, high interior volumes, and spatial configurations tailored to specific production systems make adaptation to new uses technically complex (Douglas, 2006; Plevoets & Van Cleempoel, 2011). Moreover, industrial buildings were long perceived merely as functional production facilities, and their architectural values were insufficiently recognised. As a result, they were often regarded by society as aesthetically inferior or unworthy of preservation (Storm, 2014). Today, however, industrial heritage is widely acknowledged as embodying not only physical but also social, cultural, and technological values, and its conservation is considered an integral component of cultural heritage policies (ICOMOS & TICCIH, 2011; TICCIH, 2003).

In this context, adaptive reuse has emerged as one of the primary strategies for the conservation of industrial heritage. Adaptive reuse aims to reintegrate disused structures into contemporary life while preserving their original architectural and spatial characteristics (Bullen & Love, 2011; Douglas, 2006). This approach does not merely ensure the physical survival of the structure through building envelope conservation and the careful management of structural interventions; it also enables the building to become part of contemporary urban life through the introduction of new social and cultural functions (Plevoets & Van Cleempoel, 2011).

Cultural functions, in particular, are frequently preferred in the adaptive reuse of industrial buildings. Functions such as museums, exhibition spaces, cultural centres, and cultural spaces increase public accessibility and contribute to the preservation of collective memory (Evans, 2005). Such transformations are also regarded as significant components of urban regeneration processes. The reuse of industrial heritage sites for cultural purposes contributes to the revitalisation of abandoned urban areas, the expansion of public use, and the strengthening of urban identity (Langston, 2012; Loures, 2008).

Nevertheless, the adaptive reuse of industrial heritage requires a balanced approach between conservation and transformation. International conservation principles emphasise the protection of original spatial characteristics, material integrity, and historical authenticity (ICOMOS & TICCIH, 2011). Accordingly, interventions undertaken during adaptive reuse should be implemented in a manner that safeguards the building and structure envelope conservation, preserves material character, and maintains spatial continuity without compromising the architectural integrity of the original structure (Douglas, 2006).

Although efforts toward the conservation of industrial heritage in Turkey have increased in recent years, conservation policies and systematic inventory studies in this field remain limited. Furthermore, studies that comparatively evaluate the spatial, social, and institutional dimensions of adaptive reuse projects in relation to international examples are still scarce. This situation highlights the necessity of conducting comparative analyses of adaptive reuse practices implemented in different contexts. Therefore, examining diverse approaches to the transformation of industrial heritage into cultural spaces contributes to a more comprehensive understanding of conservation and adaptive reuse processes.

This conceptual framework enables a systematic evaluation of the spatial, social, and institutional transformations emerging in the adaptive reuse of industrial heritage. In line with the conservation and adaptive reuse principles

emphasised in the literature, the comparative examination of practices implemented in different geographical and institutional contexts is essential for identifying similarities and differences in approaches to industrial heritage transformation. Accordingly, the following section analyses selected industrial heritage cases from Turkey and Europe within the defined analytical criteria, examining their transformation into cultural spaces in terms of spatial characteristics, adaptive reuse strategies, and conservation approaches. In doing so, the study demonstrates how theoretically defined conservation and adaptive reuse principles are manifested in concrete applications.

IV. CASE STUDIES: ADAPTIVE REUSE PROCESSES IN ISTANBUL AND EUROPE

In this section, the selected cases concerning the adaptive reuse of industrial heritage into cultural spaces are examined in accordance with the analytical framework defined in the methodology section of the study. The case analyses are systematically addressed on the basis of the buildings' original functions, historical development processes, adaptive reuse strategies, and the spatial interventions implemented. This evaluation aims to reveal not only the physical transformation of the structures but also how they have been repositioned within their urban and social contexts through new functions.

Moreover, all cases are analysed using a consistent evaluative framework based on the analytical criteria defined in the methodology section—namely functional transformation, spatial interventions, social impacts, governance model, and conservation approach. This approach provides a methodological foundation for the comparative assessment of adaptive reuse practices implemented in different geographical contexts.

A. Adaptive Reuse Practices in Istanbul

The process of industrialisation extending from the late Ottoman period into the Republican era, together with the accelerated urban transformation dynamics particularly since the second half of the twentieth century, has resulted in a significant stock of industrial buildings in Istanbul. With the onset of deindustrialisation, a substantial portion of these structures lost their original functions and became part of broader urban transformation processes. In this context, the adaptive reuse of industrial heritage buildings in Istanbul constitutes an important field of practice in terms of both cultural heritage conservation and the revitalisation of urban areas.

This subsection examines the cases of Müze Gazhane, Santralistanbul, and Bomontiada. These cases were selected because they represent different industrial typologies, have been repurposed for cultural functions, and are located within diverse urban contexts in Istanbul. Each case is analysed with respect to the building's historical development, original function, adaptive reuse process, and the spatial interventions implemented. Furthermore, the impacts of the adaptive reuse approach on the spatial character of the building and its urban context are evaluated. This analysis aims to identify the principal spatial and conservation-related characteristics of adaptive reuse approaches applied to industrial heritage in Istanbul.

A.1. Müze Gazhane (Hasanpaşa Gasworks)

Located in the Kadıköy district of Istanbul, Hasanpaşa Gasworks was constructed in 1891 to meet the lighting and energy needs of the city's Asian side (Figure 2). Commissioned by the Ottoman municipal authority (Şehremaneti), the plant produced town gas from coal and played a critical role in Istanbul's energy infrastructure for decades. Although the architect is not known with certainty, the complex displays affinities with German engineering works of the period (Yapı Dergisi, n.d.). With the introduction of natural gas in the last quarter of the twentieth century, the complex became obsolete and was closed in 1993 (Kıraç, 2023).



Figure 2. View of Hasanpaşa Gasworks and Müze Gazhane (Bi-Özet, 2021).

Beginning in the 1990s, the site entered the conservation agenda through the efforts of civil society organizations and professional chambers. Following a comprehensive restoration led by the Istanbul Metropolitan Municipality, the complex was reopened in 2021 under the name "Müze Gazhane" (İstanbul Büyükşehir Belediyesi, 2021). During the

adaptive reuse process, characteristic elements such as brick façades, the chimney, and gasometers were preserved; steel structural systems were reinforced; and roof coverings were renewed in keeping with their original forms. To accommodate contemporary functions, new glass-and-steel additions were introduced in selected parts, and circulation was reorganized with bridges and ramps. The restoration project was prepared by DS Mimarlık (G. Tanyeli, Y. Salman, D. Aslan, S. Aslan); implementation was carried out under the clientship of the Istanbul Metropolitan Municipality; interior design was undertaken by do[x]architecture (DS Mimarlık, 2021).

Today Müze Gazhane operates as a multifunctional cultural complex. The site houses the Climate Museum and the Cartoon Museum, as well as exhibition halls, theater and concert venues, a library, workshops, and event spaces (Figure 3).



Figure 3. Theatre hall (left) and Climate museum (right) (Bi-Özet, 2021; Kavut & Selçuk, 2022).

Open-air areas host summer cinema screenings, concerts, talks, and children's workshops, positioning the venue as a hub of contemporary cultural production in addition to conserving industrial heritage (Figure 4). In particular, the gasometer structures were adapted with minimal interior interventions to retain flexible use potential and ensure the legibility of the original structure. The chimneys and several storage buildings were preserved substantially in their authentic state, thereby establishing a balanced relationship between the site's industrial past and present cultural needs.

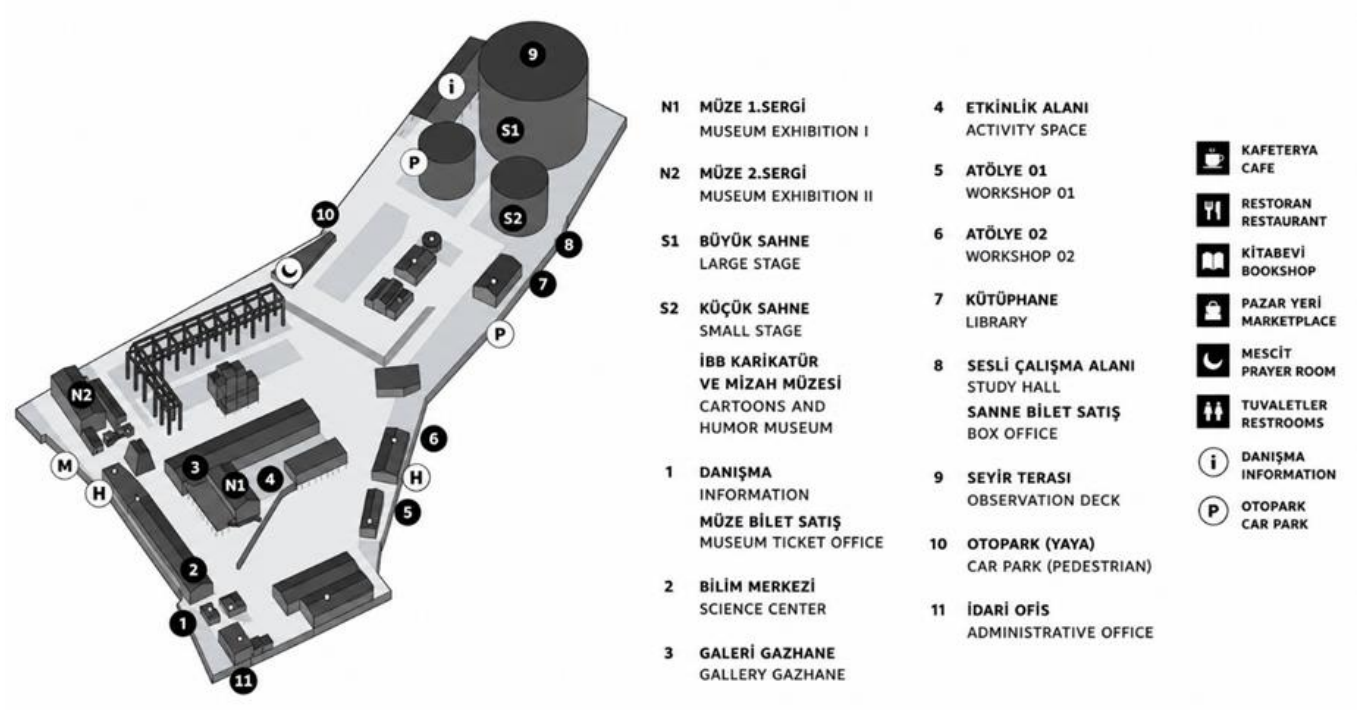


Figure 4. Spatial organization of Müze Gazhane (Bi-Özet, 2021).

Since its opening, Müze Gazhane has also gained recognition in architecture and conservation circles at both national and international levels. The project received the National Architecture Awards – Building/Conservation Category, and was shortlisted in the 2021 Gubbio Award (European section) in Italy. These distinctions indicate that the project has become a reference not only at the urban scale but also within the discipline of architecture (Bi-Özet, 2021; Kıraç, 2023).

Overall, the transformation offers a robust example of preserving the physical envelope while sustaining collective memory at the urban scale. Through cultural and artistic programming—especially for youth and children—Müze Gazhane has emerged as a major cultural focal point on the city's Asian side (Ahunbay, 2009).

A.2. Santralistanbul (Silahtarağa Power Plant)

The Silahtarağa Power Plant is located on the shore of the Golden Horn, in Istanbul's Eyüpsultan district, and was built between 1910 and 1913 by the Austria-based company Ganz Elektrik. Commissioned in 1914, it was Istanbul's first city-scale power station and supplied electricity for nearly seventy years. Extending from the late Ottoman period into the early Republic, the plant contributed directly to the city's modernization and industrialization (Yapı Dergisi, n.d.). As demand outstripped capacity and new energy technologies emerged, the plant was decommissioned in 1983 and remained derelict for a long period. In the 2000s, through the initiative of Istanbul Bilgi University, the site was incorporated into an adaptive-reuse program. Following comprehensive restoration works carried out between 2004 and 2007, it reopened under the name Santralistanbul (Figure 5).

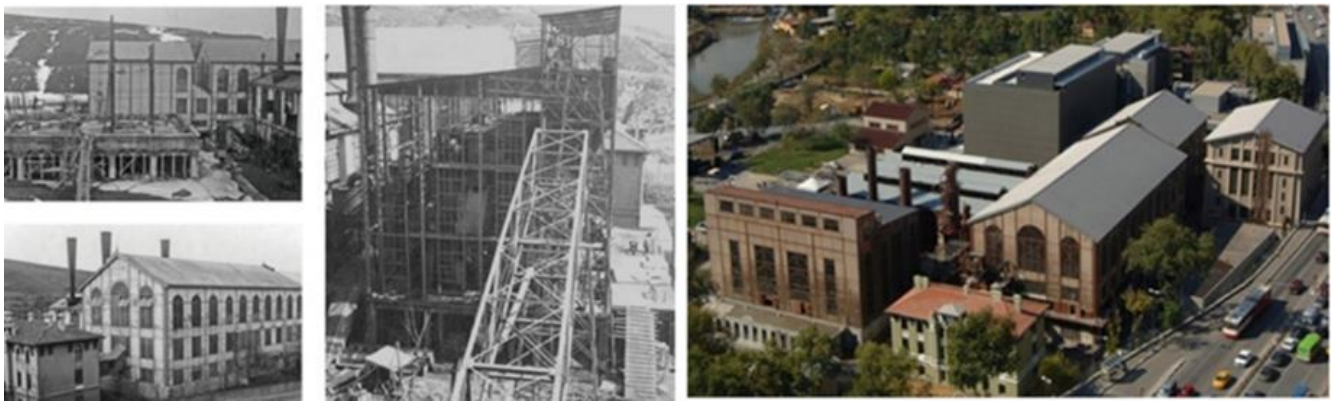


Figure 5. Views of Silahtarağa power plant and Santralistanbul (NSMH, n.d.; Santralistanbul, n.d.).

During restoration, the original brick and stone façades were preserved and repaired; steel roofs and structural systems were reinforced; and the turbine and boiler halls were converted into the Energy Museum and exhibition spaces. Within the university campus, a library, conference halls, student facilities, and workshops were added. Glass-and-steel bridges were introduced to ensure continuity of circulation, thereby achieving visual and functional coherence between the historic envelope and contemporary uses (Kavut & Selçuk, 2022).

Today Santralistanbul functions not only as a university campus but also as a multifunctional complex for culture and education. In the Energy Museum, original turbines, control panels, and machinery are conserved and exhibited, making it a rare example of industrial archaeology (Figure 6). The complex also hosts contemporary art exhibitions, biennial events, conferences, and concerts, contributing significantly to Istanbul's cultural life (Kavut & Selçuk, 2022).

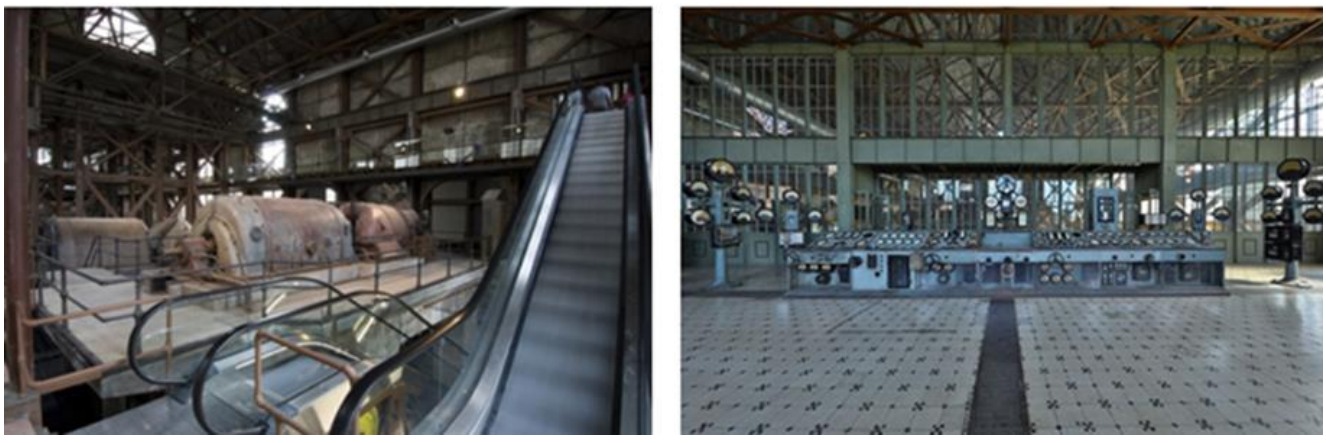


Figure 6. Interior views from Santralistanbul (Santralistanbul, n.d.).

As seen in the site plan, the complex is conceived as a multi-program campus that goes beyond the museum function to include educational buildings, a library, exhibition spaces, artist residences, and food-and-beverage areas (Figure 7).

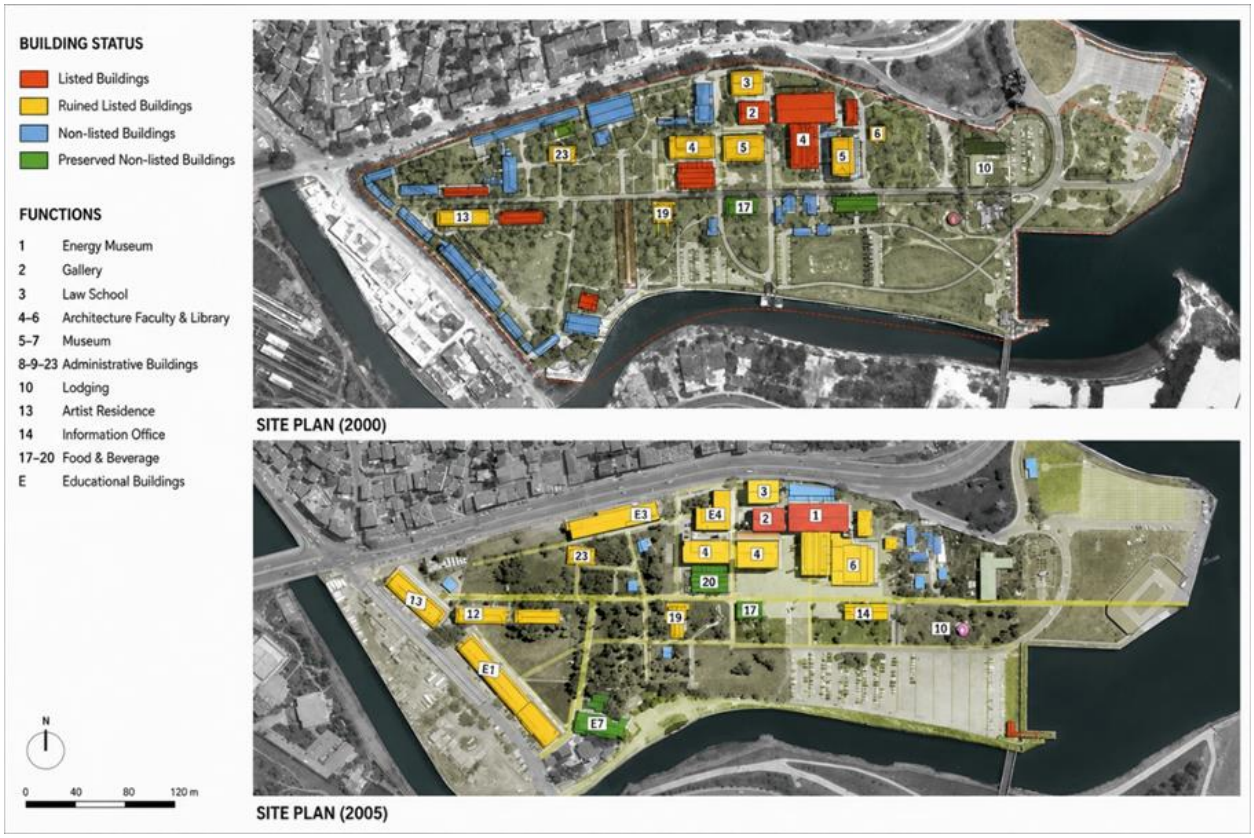


Figure 7. Site plan of Santralistanbul (NSMH, n.d.).

The project forms part of an adaptive reuse process shaped with contributions from prominent architects, including Nevzat Sayın (NSMH, n.d.) and Emre Arolat Architects (EAA, 2007). Throughout the implementation phase, it attracted considerable attention in both academic and professional circles and is widely regarded as a pioneering example of integrating industrial heritage with cultural functions in Turkey (Dervişoğlu Okandan, 2016). In the 2010s, Santralistanbul appeared on the shortlist of the Aga Khan Award for Architecture and was a finalist in several national and international architecture awards.

Overall, the transformation has heightened awareness of adaptive reuse of industrial heritage in Turkey and has become a key urban reference, offering a leading model that integrates education, culture, and the arts.

A.3. Bomontiada (Bomonti Brewery)

Located in Istanbul's Şişli district, the Bomonti Brewery was built in the late 1890s by the Swiss Bomonti brothers. As Turkey's first industrial-scale brewery, it operated for many decades, comprising production halls, warehouses, administrative units, and workers' housing, and played a significant role in the city's industrial modernization (Tanyeli & İkiz, 2009). While production continued throughout much of the twentieth century, the complex lost its function toward the century's end due to the relocation of facilities and urban redevelopment pressures. In the 2010s, a comprehensive private-sector restoration and conversion program was undertaken, and the site reopened under the name Bomontiada (Figure 8).



Figure 8. Bomonti Brewery and, post-conversion, Bomontiada (Arkiv, n.d.; Sevim, 2021).

During adaptive reuse, the brewery's original brick façades were conserved and restored, steel beams and floor slabs were reinforced, and the industrial character of the interiors was intentionally made legible. Interior layouts were reorganized to allow flexible use; production areas were transformed into exhibition spaces, concert venues, restaurants, and workshops (Turhan, 2018). A central open courtyard was established to create a public focal point that enhances social interaction, around which gastronomy and culture-oriented functions were integrated. Contemporary additions—glass façades, mezzanines, and steel bridges—were employed to achieve visual and functional balance between the historic envelope and new uses (Arkiv, n.d.).

Today, Bomontiada is one of Istanbul's prominent culture and entertainment hubs. The complex hosts concerts, festivals, exhibitions, theater performances, and events for the creative industries, while its food-and-beverage venues integrate the site into the city's everyday life (Figure 9). This transformation is regarded as a robust example not only of conserving industrial heritage but also of integrating the creative industries with urban life.



Figure 9. Bomontiada — site layout / use plan (Arkiv, n.d.).

Architecturally, the project has attracted attention at both national and international levels and has been discussed across architectural platforms as a significant example of integrating industrial heritage with culture and the creative industries (Sevim, 2021). As such, Bomontiada has become a notable case from Turkey showcasing adaptive reuse through a mixed-use model.

B. International Adaptive Reuse Practices

The adaptive reuse of industrial heritage has become a topic of international debate, not only within the Turkish context but also through comprehensive conservation and transformation practices developed in European cities. Adaptive reuse projects implemented in Europe provide significant examples for understanding the relationship between industrial heritage conservation, cultural reprogramming, and urban transformation processes.

This section examines the internationally recognised cases of Tate Modern (London), Westergasfabriek (Amsterdam), and Matadero Madrid (Madrid), which are frequently referenced in the literature concerning the transformation of industrial buildings into cultural spaces. These cases were selected because they represent different industrial typologies, have been successfully adapted for cultural functions, and are widely acknowledged in the international conservation literature. Moreover, they exemplify adaptive reuse practices carried out within different urban contexts and under diverse institutional models, thereby enabling a comparative evaluation of industrial heritage conservation and reuse processes.

These examples represent diverse industrial typologies—power plant, gasworks, and slaughterhouse—as well as distinct urban contexts. This diversity allows for the analysis of how spatial strategies, conservation approaches, and functional transformation models in industrial heritage reuse are implemented across varying contexts. Accordingly, each case is examined in line with the analytical criteria defined in the methodology section; the buildings' original functions, adaptive reuse processes, spatial interventions, and their relationships with the urban context are evaluated in order to articulate international approaches to the transformation of industrial heritage into cultural spaces.

B.1. Tate Modern (Londra)

The Bankside Power Station stands on the south bank of the River Thames in London's Southwark district. Designed by the renowned British architect Sir Giles Gilbert Scott, it was constructed between 1947 and 1963, becoming one of the most powerful icons of the city's modern industrial era with its characteristic red-brick façades, symmetrical massing, and 99-metre chimney. Initially coal-fired, the plant both supplied electricity during London's electrification and symbolised post-war industrial reconstruction in the United Kingdom (Giebelhausen, 2003). From the 1970s onward, however, shifts in energy production technologies and the decline of coal rendered the plant economically inefficient, and it was fully decommissioned in 1981 (Şengünalp & Ergin Doğruer, 2017).

Following its closure, the building remained derelict for many years—at once the subject of debates on industrial-heritage conservation and a target for urban-regeneration projects due to its central location. In the 1990s, the site re-emerged when Tate Gallery sought a new venue to house its modern art collection. The international competition launched in 1995 was won by the Swiss architects Herzog & de Meuron (Herzog & de Meuron, n.d.); their project was completed in 2000, when the building was converted into the contemporary art museum Tate Modern (Figure 10).



Figure 10. Bankside power station ve Tate Modern (Archello, 2025; Hwang, 2014).

In the adaptive-reuse process, the architects aimed to make the building's industrial identity legible. The original brick façades were preserved, with only targeted upgrades for energy performance. The most striking space is the plant's monumental Turbine Hall, retained as a 152-metre-long and 35-metre-high void and adapted to host large-scale art installations (Figure 11).

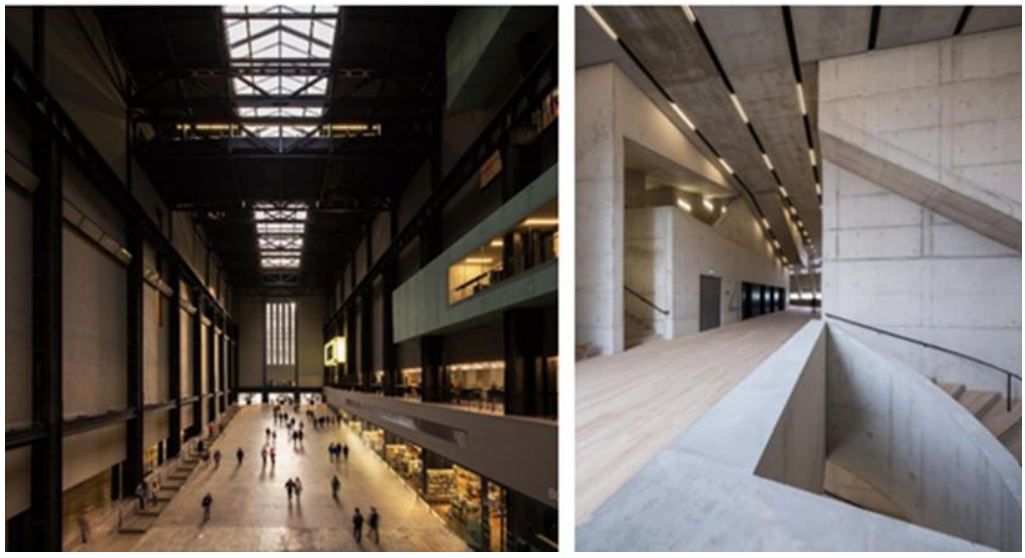


Figure 11. Interior views of Tate Modern (Herzog & de Meuron, 2016).

This approach safeguarded the structural integrity of the building while offering a unique spatial experience for contemporary art. Inside, flexible galleries were created; new galleries, temporary exhibition areas, and public spaces were added using modern materials such as steel, glass, and concrete (Herzog & de Meuron, n.d.; Murray, 2014). From its opening, the museum rapidly became a centre of the international cultural scene. In 2000, its first year, it attracted over five million visitors, becoming one of Europe's most visited museums. The Blavatnik Building (2016) further expanded capacity with new galleries, performance spaces, educational units, and viewing terraces, consolidating Tate Modern's role not only as an exhibition venue but also as a center of cultural production, as shown in Fig. 12 (Murray, 2014).

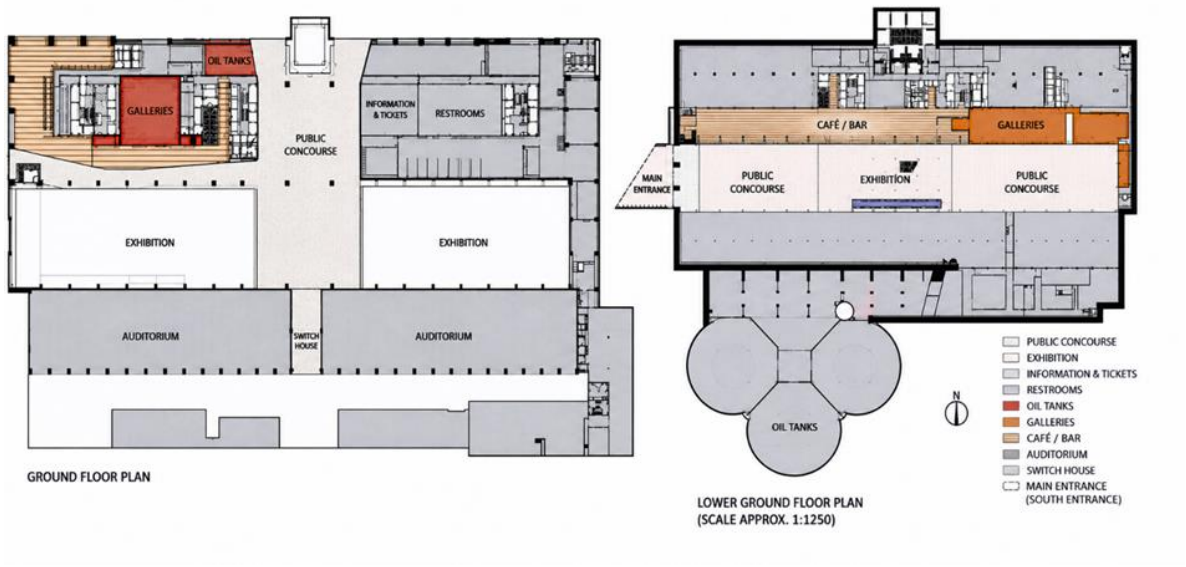


Figure 12. Tate Modern ground floor & lower ground floor plan (Tate Modern Gallery, 2014).

Today, Tate Modern is recognised as one of the most iconic examples of re-valuing industrial heritage through cultural functions. Beyond architectural significance, it plays a critical role for urban identity and collective memory. The museum acted as a catalyst in the transformation of the Bankside area and has become a key agent in the social, economic, and cultural revitalisation of Southwark (Tüfekçi Karagül, 2024). In this respect, Tate Modern is widely regarded as one of the most successful international applications of conserving and adaptively reusing an industrial structure while integrating it into contemporary urban life.

B.2. Westergasfabriek (Amsterdam)

Westergasfabriek was constructed in 1885 on Haarlemmerweg, in the western part of Amsterdam. Playing a significant role in the Netherlands' industrialisation, the plant produced town gas from coal and supplied the city's lighting and energy needs. With its brick-faced industrial buildings and tall chimneys, the complex typifies late-nineteenth-century industrial architecture and long occupied a central place in Amsterdam's energy infrastructure. From the 1960s, however, the spread of natural gas rendered the facility obsolete; production ceased entirely and the site remained derelict for many years (Evans, 2005). Although demolition was considered in the 1970s and 1980s, local residents, NGOs, and artists mounted strong campaigns to reclaim the area for cultural purposes. In response to this civic pressure, the City of Amsterdam placed the site under protection in the 1990s and adopted a culture-led urban regeneration strategy. A master plan prepared in 1992 by landscape architect Kathryn Gustafson proposed conserving the industrial buildings and allocating them to cultural, artistic, and social uses. Restoration works were completed in the 2000s and the complex was reintegrated into the city (Figure 13).



Figure 13. Westergasfabriek before and after conversion (Power Plants Phytoremediation, 2018; Swart, n.d.).

During adaptive reuse, original brick and steel elements on the façades were retained, while glass-and-steel additions were introduced to support new functions. Gas holders and workshop buildings were converted into theatre stages, exhibition halls, cinema spaces, and offices (Figure 14). The complex was further supported with gastronomy venues, design workshops, and incubators for the creative industries.

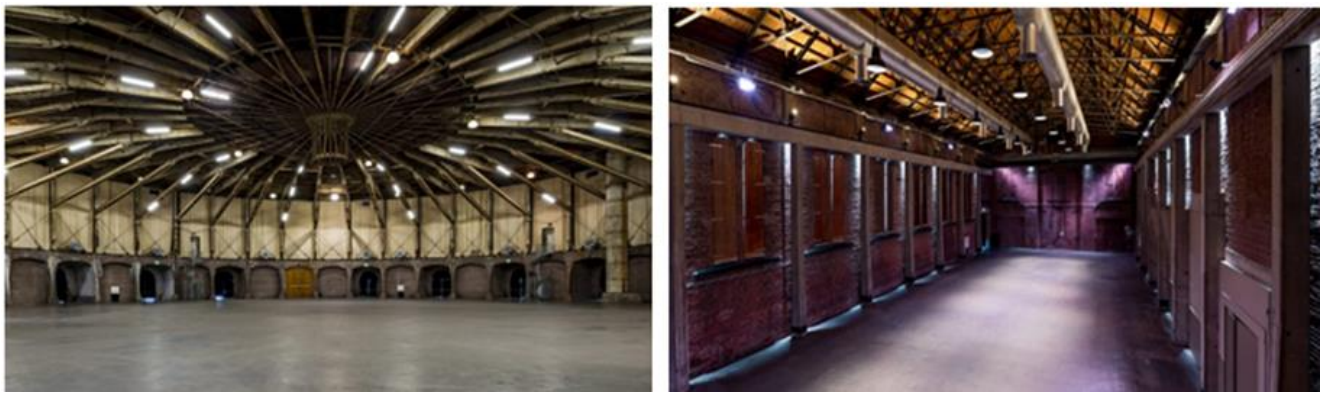


Figure 14. Interior views after conversion (Greater Venues, 2018).

The surrounding open areas were laid out as a park, which -especially in summer- hosts festivals, concerts, and open-air events (Figure 15). This approach has ensured that the site functions not merely as a conservation project but as a culture park integrated into everyday urban life (Evans, 2005). Today, Westergasfabriek is a major node on Amsterdam's cultural map. Under the Westergas brand, it accommodates concerts, film festivals, theatre performances, exhibitions, gastronomy events, and gatherings of the creative industries.

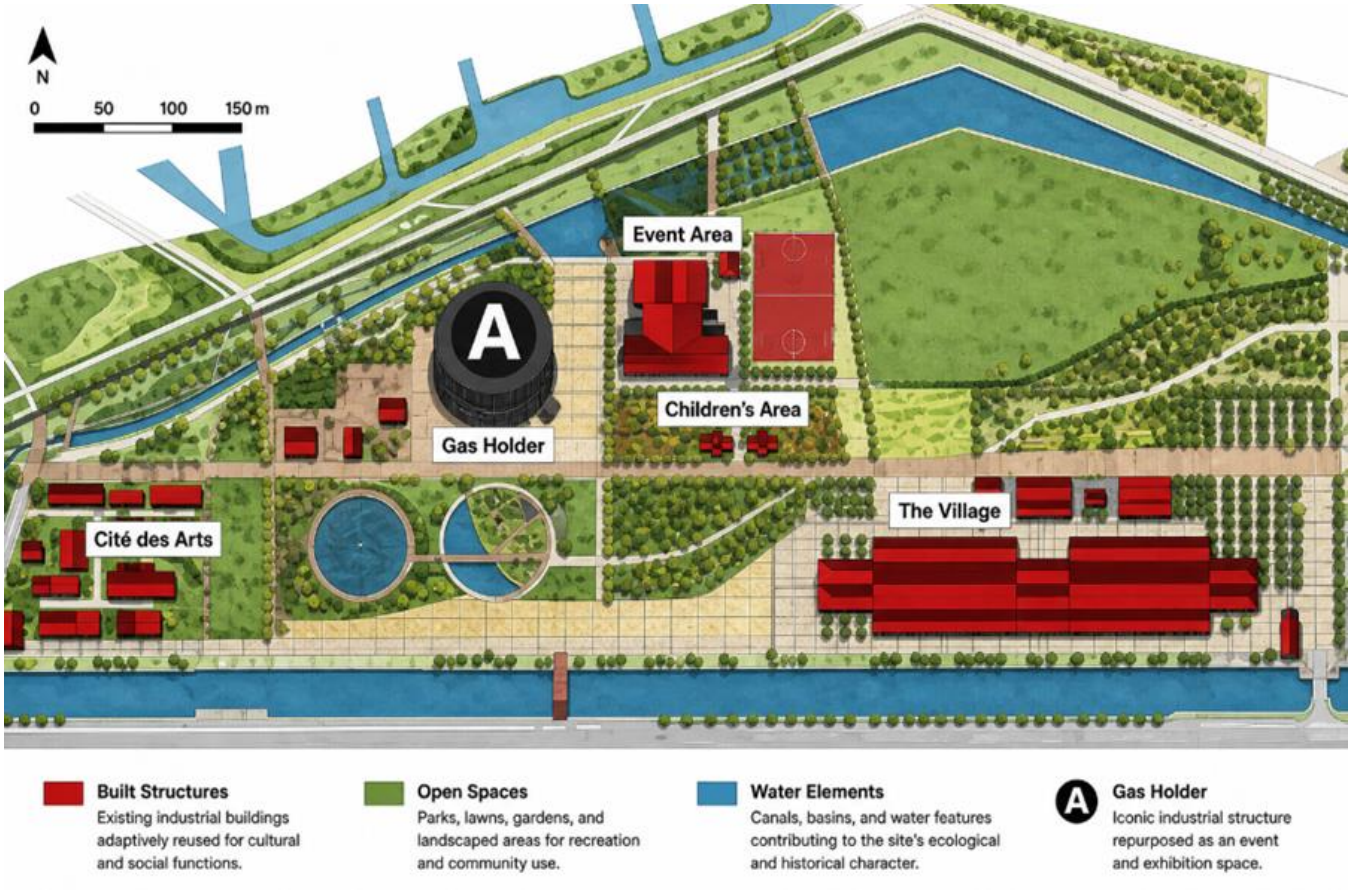


Figure 15. Westergasfabriek - site layout / use plan (Swart, n.d.).

Accordingly, the complex is regarded as an exemplary model for both the preservation of industrial heritage and the support of contemporary cultural production. Moreover, Westergasfabriek has become a Europe-wide success story demonstrating how industrial heritage can play an active role in inner-city social transformation and the creation of public space (Evans, 2005).

B.3. Matadero Madrid

Matadero Madrid is the name of a large industrial complex on the banks of the Manzanares River in the Arganzuela district of Madrid. Designed by architect Luis Bellido and inaugurated in 1911, the ensemble served as the city's main slaughterhouse and meat-processing facility. With its brick façades, structurally expressive industrial modernist order, and expansive production volumes, the complex stands as a significant example of early-twentieth-century industrial architecture. Spanning roughly 48,000 m^2, it originally comprised dozens of pavilions, storage facilities, and processing buildings. Having played a critical role in Madrid's food supply chain throughout the twentieth century, the slaughterhouse ceased operations in 1996 and became disused (Hidalgo-Giralt et. al., 2021). Rather than demolish the site, the Madrid City Council developed a programme to reintegrate it into the city's cultural life. Initiated in the early 2000s, the conversion proceeded as a phased restoration, with each pavilion adapted to a different cultural or social function—an approach that preserved spatial continuity while enabling a flexible distribution of uses responsive to diverse cultural user groups (Figure 16).



Figure 16. Matadero Madrid before and after conversion (La Vanguardia, 2018).

During restoration, the brick envelopes and structural elements were conserved, and the original industrial character was kept visible. Large warehouse and workshop volumes were adapted as flexible exhibition halls and contemporary art spaces (Figure 17).



Figure 17. Interior views after conversion (Matadero Madrid, n.d.).

Former cold-storage buildings were repurposed as theatre and cinema venues; contemporary glass-and-steel additions introduced new circulation and service areas. The complex also incorporates artist studios, a library, design centres, performance spaces, and public gathering areas (Figure 18). With open-space landscaping, the grounds were opened to everyday public use and equipped to host concerts, festivals, and civic events.

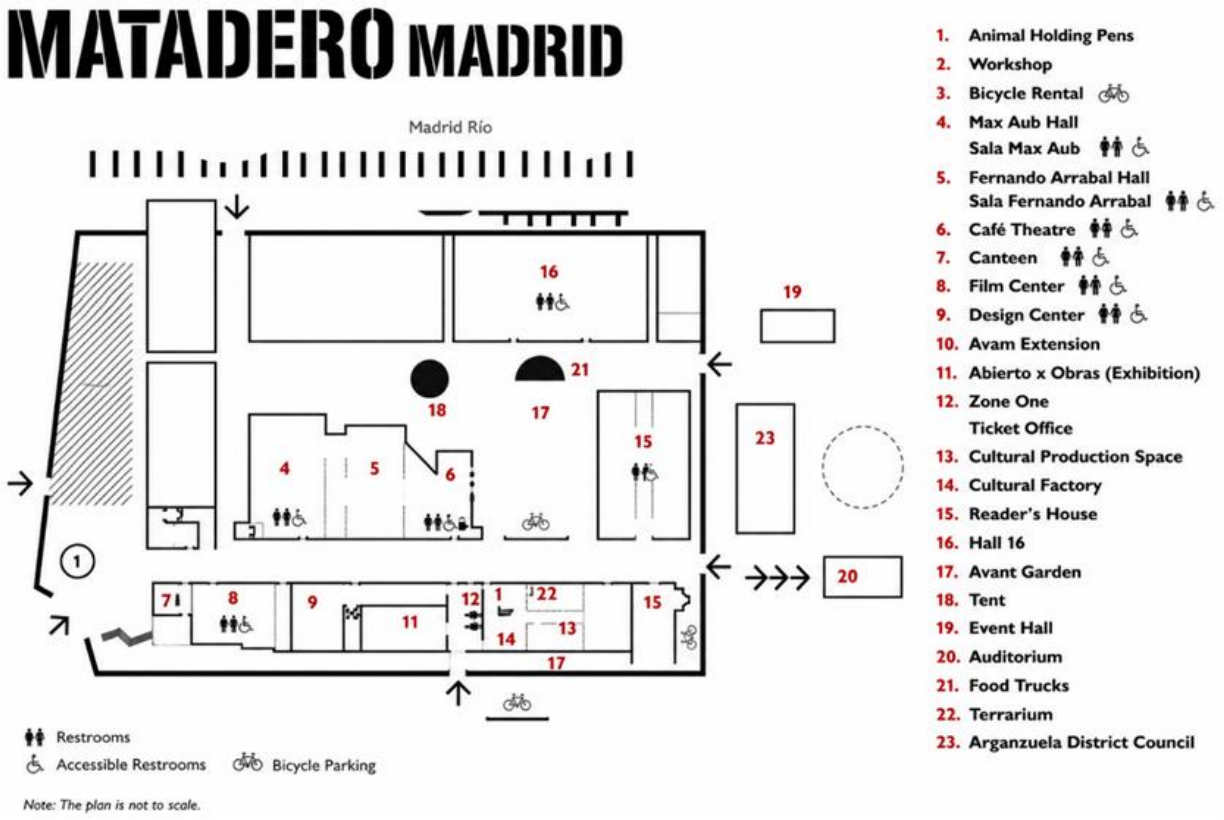


Figure 18. Matadero Madrid — site layout / use plan (Matadero Madrid, n.d.).

Today, Matadero Madrid is regarded as one of Europe's most important cultural centres. It is noteworthy not only for its spatial transformation but also for its strategies of public participation and cultural production. Beyond serving as a meeting place for residents, it hosts international artists and strengthens Madrid's cultural scene. Thanks to its flexible spatial configuration, the complex accommodates both large-scale exhibitions and small-scale experimental projects (Miles, 2005). In this respect, Matadero offers a compelling example of how industrial heritage can be re-signified through a participation-oriented transformation that integrates it into contemporary urban life.

V. COMPARATIVE ANALYSIS OF ADAPTIVE REUSE STRATEGIES

Although adaptive reuse projects of industrial heritage in Istanbul and Europe have been implemented within different geographical, cultural, and institutional contexts, they demonstrate both significant similarities and notable differences. This comparative assessment examines these projects according to the analytical framework defined in the methodology section, based on five principal criteria: spatial–architectural approaches, relationship with the urban context, public use, social and cultural impacts, and the legal–institutional framework. These criteria are grounded in widely recognised evaluation parameters in the international literature on adaptive reuse (Bullen & Love, 2011; Douglas, 2006; Plevoets & Van Cleempoel, 2011), enabling a systematic and comparable analysis of practices developed in different contexts. Accordingly, all cases are examined using the same analytical criteria, and the findings are interpreted comparatively.

From the perspective of spatial intervention approaches, the Istanbul cases primarily focus on the preservation of the existing building envelope and the main structural system. In the cases of Müze Gazhane, Santralistanbul, and Bomontiada, the original building envelope has been preserved, while new functions have been integrated into the existing spatial structure through reversible interventions such as glass-and-steel bridges, mezzanines, and new circulation elements. This approach aligns with the principles of minimum intervention and the preservation of original spatial character as defined in the literature (Douglas, 2006).

In contrast, the European cases demonstrate adaptive reuse processes addressed at broader spatial scales. At Tate

Modern, the Turbine Hall was preserved and reprogrammed as a new public space; Westergasfabriek was transformed not only at the building scale but into an integrated cultural park incorporating extensive open-space and landscape design; and at Matadero Madrid, a holistic site model was implemented in which different buildings were assigned distinct functions. These examples indicate that, in Europe, adaptive reuse interventions extend beyond the single-building scale to encompass building groups and their environmental context.

This difference in spatial intervention scale also influences the projects' relationships with the urban context. In the Istanbul cases, adaptive reuse contributes to the creation of new public focal points within the existing dense urban fabric. Bomontiada's courtyard functions as a public venue hosting diverse cultural and social activities, while the open areas of Müze Gazhane serve as a new cultural node. These projects primarily generate public-use spaces at the scale of the building and its immediate surroundings.

In European cases, however, adaptive reuse is more closely linked to broader urban integration strategies. Westergasfabriek is integrated with a large urban park; Tate Modern, due to its location along the Thames, has become a major public landmark at the urban scale; and Matadero Madrid forms an integrated cultural campus consisting of multiple buildings and open spaces. These examples demonstrate that adaptive reuse in Europe is addressed not only at the building scale but also within the broader framework of urban space production.

These spatial and urban strategies directly influence the scope of social and cultural impacts. In Istanbul, adaptive reuse projects contribute to cultural production and public engagement at the local scale, strengthening collective memory. Public events at Müze Gazhane, creative-industry spaces at Bomontiada, and the educational and cultural functions of Santralistanbul represent key components of this process.

In Europe, adaptive reuse projects tend to generate broader cultural impacts. Tate Modern has become a major international cultural institution; Westergasfabriek functions as a venue for international events; and Matadero Madrid has achieved global recognition through international artistic programmes. These findings suggest a direct relationship between institutional structure, financial support mechanisms, spatial scale, and the breadth of social and cultural impact.

One of the principal reasons for these differences lies in the legal and institutional framework within which adaptive reuse processes take place. In Turkey, industrial heritage sites are primarily protected under Law No. 2863 on the Protection of Cultural and Natural Assets. However, this legislation does not include specific provisions addressing the adaptive reuse of industrial buildings (Ahunbay, 2009; Özçakır, 2023).

In European countries, more comprehensive legal and institutional mechanisms support industrial heritage conservation and reuse. In the United Kingdom, the Planning (Listed Buildings and Conservation Areas) Act 1990 provides a structured legal framework; in Germany, regional conservation programmes are implemented; and in the Netherlands and Spain, financial incentive mechanisms support cultural heritage projects (Evans, 2005; Hospers, 2002). Such institutional frameworks enable adaptive reuse projects to be implemented within broader and long-term strategic perspectives. The findings derived from this comparative assessment have been systematically evaluated according to the analytical criteria defined in the methodology section. The results are summarised in Table 2.

Table 2. Comparative assessment of Istanbul and European industrial heritage cases based on analytical criteria.

Analytical Criterion	Istanbul Cases (Müze Gazhane, Santralistanbul, Bomontiada)	European Cases (Tate Modern, Westergasfabriek, Matadero Madrid)
Original function → new function transformation	Gasworks, power plant, and brewery buildings have been converted into cultural centres, museums, and multifunctional cultural spaces.	Power plant, gasworks, and slaughterhouse buildings have been converted into museums, cultural parks, and multifunctional cultural complexes.
Spatial and architectural intervention approach	The building envelope and structural system have been largely preserved; new functions have been integrated through interior insertions such as mezzanines, bridges, and circulation elements.	While the building envelope has been preserved, comprehensive spatial interventions involving multiple structures and open spaces have been implemented. Landscape design, open-space organisation, and functional distribution across building groups have been applied.
Spatial organisation and site layout model	Adaptive reuse interventions have been primarily building-focused, with interior spatial organisation reconfigured to accommodate new functions, while also incorporating immediate site-level spatial arrangements.	Adaptive reuse has been implemented through an integrated site layout model involving multiple buildings and open spaces.
Relationship with the urban context	Located within dense urban fabric, the projects have created new public focal points. Public use is primarily limited to the building and its immediate surroundings.	Adaptive reuse projects have been integrated with larger urban areas, creating public spaces at the urban scale.

Table 2. (cont.) Comparative assessment of Istanbul and European industrial heritage cases based on analytical criteria.

Public use and accessibility	Courtyards, squares, and open spaces are used for concerts, exhibitions, and cultural events. Public use is predominantly local in scale.	Open spaces, parks, and cultural complexes host international events and serve broader user groups.
Social and cultural function	Cultural and artistic venues have been created for local users, contributing to the preservation of collective memory.	Cultural production, international exhibitions, and artistic programmes have enabled broader cultural engagement at the international scale.
Governance and management model	Projects have been primarily implemented by public institutions and local authorities.	Multi-actor governance models involving public institutions, private sector actors, and cultural organisations have been implemented.
Conservation approach	Conservation interventions have focused on preserving the original architectural character while allowing adaptive reuse through reversible and compatible interventions.	Conservation strategies integrate preservation with large-scale adaptive reuse, supported by comprehensive institutional and financial frameworks.
Scale of spatial intervention	Interventions are primarily building-focused; however, they also include immediate site-level spatial arrangements and open-space organisation.	Interventions implemented at the scale of building complexes and their broader urban and landscape context.

As demonstrated in Table 2, in both contexts the integration of conserved industrial buildings with new contemporary functions constitutes a shared approach. However, significant differences emerge in terms of the spatial scale of interventions, degree of urban integration, and institutional support mechanisms. While adaptive reuse in the Istanbul cases is predominantly implemented at the building scale, European cases are characterised by broader spatial and urban-scale transformation strategies. These findings indicate that approaches to industrial heritage adaptive reuse are shaped not only by architectural considerations but also by urban, institutional, and cultural contexts.

VI. CONCLUSIONS AND RECOMMENDATIONS

This study comparatively examined three cases in Istanbul (Müze Gazhane, Santralistanbul, Bomontiada) and three internationally recognised European cases (Tate Modern, Westergasfabriek, Matadero Madrid), thereby identifying the strategies pursued in different contexts for transforming industrial heritage into cultural spaces. The findings, consistent with the literature, demonstrate that the reintegration of industrial buildings with contemporary functions not only ensures the preservation of the physical fabric but also serves as a significant instrument for social and cultural revitalisation (Bullen & Love, 2011; Plevoets & Van Cleempoel, 2011). This indicates that industrial heritage conservation should be understood not merely as a physical intervention process but as a multidimensional transformation closely linked to social and cultural sustainability.

The comparative analytical framework adopted in this research has revealed how adaptive reuse projects are shaped in different contexts in terms of spatial intervention scale, level of urban integration, social and cultural impact, and institutional and legal infrastructure. The results indicate that while adaptive reuse is embraced as a primary conservation strategy in both Istanbul and European cases, implementation approaches differ with respect to spatial scope, institutional support mechanisms, and degrees of urban integration. This finding underscores that adaptive reuse processes extend beyond architectural interventions at the building scale and are directly associated with urban context, functional programming, and institutional structures (Douglas, 2006; Evans, 2005).

The Istanbul cases demonstrate that significant adaptive reuse practices have been implemented in Turkey. However, rather than indicating the absence of a conservation framework, these findings suggest that adaptive reuse practices in Turkey are generally realised through project-based and context-specific approaches. Industrial heritage sites in Turkey are protected under existing cultural heritage legislation, particularly Law No. 2863, and internationally recognised conservation principles such as the Venice Charter and the Nara Document are also acknowledged within the national context. Nevertheless, the integration of these principles into comprehensive, large-scale spatial and planning strategies remains limited, and adaptive reuse practices are often shaped at the level of individual projects and their immediate surroundings. The literature also emphasises that conservation efforts in Turkey remain limited and that adaptive reuse processes have not yet been institutionalised within a systematic framework (Ahunbay, 2009; Özçakır, 2023). In this respect, it should also be noted that the findings of this study are based on selected cases from Istanbul, and therefore do not aim to generalise all adaptive reuse practices across Turkey, but rather to highlight observable tendencies within a specific metropolitan context. By contrast, European examples illustrate that adaptive reuse processes are more strongly integrated with urban regeneration policies, cultural strategies, and regional development frameworks (Evans, 2005; Hospers, 2002).

In Turkey, industrial heritage sites are generally addressed within the broader cultural heritage protection legislation, which does not contain specific provisions directly addressing the spatial and functional particularities of industrial

buildings. International conservation principles emphasise that the preservation of industrial heritage should not be limited to the protection of physical fabric but should also ensure the sustainable safeguarding of functional and social values (ICOMOS & TICCIH, 2011; TICCIH, 2003). Accordingly, adaptive reuse practices in Turkey should be addressed within more comprehensive conservation and planning strategies.

The comparative findings of this study indicate that approaches to adaptive reuse should not be confined solely to architectural conservation. Particularly in the European cases, planning at the scale of building complexes, the integration of open spaces into public use, and the incorporation of these sites into broader urban life highlight the importance of addressing industrial heritage at the urban scale. This demonstrates that industrial heritage conservation must be considered not only at the building scale but also in relation to urban context and public use (Evans, 2005; Plevoets & Van Cleempoel, 2011).

In this context, the following recommendations are proposed for Turkey:

- Strengthening the legal and institutional framework: Processes concerning the conservation and adaptive reuse of industrial heritage should be addressed more comprehensively in line with international conservation principles (ICOMOS & TICCIH, 2011; TICCIH, 2003).

- Developing comprehensive inventories: Systematic inventory studies are required to document, protect, and assess the adaptive reuse potential of disused industrial buildings (Douet, 2012).

- Advancing urban-scale planning approaches: Adaptive reuse processes should evaluate industrial heritage not only at the single-building scale but also within the broader urban context and in relation to public space production [8].

- Enhancing public use and social integration: Adaptive reuse projects should prioritise opening industrial heritage sites to public use and integrating them into contemporary social life (Hospers, 2002).

The scope of this study is limited to six cases. Future research could examine a larger number of industrial heritage examples across diverse geographical contexts, thereby enabling a more comprehensive evaluation of adaptive reuse processes. Furthermore, integrating quantitative and qualitative data in assessing the social, economic, and spatial impacts of adaptive reuse projects would provide a more holistic understanding of these transformations (Miles et. al., 2014; Yin, 2018).

In conclusion, this study has comparatively examined adaptive reuse practices of industrial heritage in Turkey and Europe, revealing the spatial, urban, and institutional dimensions of approaches developed in different contexts. In doing so, it demonstrates that industrial heritage conservation should not be limited to physical preservation alone but should also involve the reinterpretation of these structures as active components of contemporary urban life.

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