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Research Article

Adaptive Reuse of Industrial Heritage: The Case of Kütüphane Troleybüs

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Abstract

The loss of function of industrial heritage buildings makes their preservation and adaptive reuse an important issue. This study examines the adaptive reuse of the Trolleybus Power Center in Beyazıt, Istanbul, as a Kütüphane Troleybüs and evaluates the effects of the interventions on the original building. A qualitative research method was adopted. The study included a literature review on the conservation and adaptive reuse of industrial heritage, an examination of plans, photographs, and archival data, and on-site observations of the building. The collected data were evaluated in terms of the preservation of the building's original architectural, structural, and technical features; the level of intervention; the distinguishability of new and existing elements; compatibility with the existing building; and spatial organization. The findings show that the building's high-volume interior space, structural system organization, and traces of its technical infrastructure have been largely preserved. Study areas, mezzanine arrangements, and other functional units introduced for library use were designed in relation to the building's existing spatial characteristics. The visible preservation of technical equipment and infrastructure elements supports the legibility of the building's industrial character within its new use. The spatial organization of the library function also supports preserving the original spatial character while accommodating different functional requirements. Overall, the study demonstrates that adaptive reuse can preserve the original features of industrial heritage while integrating existing buildings with contemporary use requirements.

Keywords: Adaptive Reuse, Industrial Heritage, Library Buildings, Trolleybus Power Centre.

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INTRODUCTION

Since the beginning of human existence, people have continuously engaged in production in order to sustain their vital activities. In the early periods, production was carried out through the use of tools and relied primarily on human labor. Over time, however, this method was replaced by mechanization, and production processes came to be largely conducted through machines. This transformation facilitated the widespread adoption of machine-based production and contributed to the emergence of the concept of industry in its present scope (Özdemir, 2015; Batur & Batur, 1970). The history of industrial and manufacturing activities extends far earlier than the Industrial Revolution. Indeed, one of the earliest known examples of industrial production was the shipyard established in Venice in 1104, which operated through a system resembling serial production (Köksal, 2005). Over time, factors such as increasing needs, resource shortages, technological developments, and competition accelerated production activities. This accumulated development paved the way for the emergence of the Industrial Revolution, which began in the 18th century and continued until the early 20th century (Özdemir, 2015; Hançerlioğlu, 1981). This transformation was not limited to Europe but also influenced different geographical regions. In the Ottoman Empire, industrialization movements intensified particularly during the 19th century, and this process largely developed in Istanbul and its surrounding areas. During this period, the increase in foreign capital, labour force, and the number of factories contributed to the transformation of the city into an industrial centre. Nevertheless, the roots of Istanbul's industrial production tradition date back to earlier periods. The Tershane-i Âmire and Tophane-i Âmire, whose foundations were established in the 15th and 16th centuries, were among the city's prominent industrial structures (Köksal & Ahunbay, 2010).

In the later stages of the Industrial Revolution, not only production facilities but also industrial structures serving urban transportation and infrastructure systems gained importance. Particularly after World War II, the expansion of electric transportation systems, the construction of new roads, and the development of existing transportation networks led to a significant increase in demand for urban transportation. In the early 1950s, this growing demand was met through minibuses, shared taxis, public buses, and trams. However, following the removal of tram systems toward the end of the 1950s, the primary burden of urban transportation was transferred to bus and trolleybus systems (Arısal, 2025). During this process, the power centres supplying the energy required by these systems became important components of the urban fabric. Constructed to provide electricity for trolleybus systems, these structures reflected the industrial approach of their period not only through their technical functions but also through their architectural characteristics.

The production structures that emerged with the Industrial Revolution gradually lost their functions as a result of technological developments and changing production conditions, and some subsequently became abandoned. Today, structures such as factories, workshops, warehouses, and transportation infrastructure are considered part of industrial heritage (TICCIH, 2003). The abandonment of these structures as a result of technological developments and changing production conditions has increased the importance of their conservation and adaptive reuse (Ayvaz & Halaç, 2023).

At this point, the conservation of cultural heritage becomes particularly important. Cultural heritage is defined as the entirety of assets that provide information about the past experiences of a society and have survived to the present through continuity (İstanbul Valiliği, İstanbul İl Afet ve Acil Durum

Müdürlüğü, & İstanbul Proje Koordinasyon Birimi, 2014). In this respect, it establishes a connection between the past and the present, contributes to shaping the future, and provides direction for conservation practices (Kurtar & Somuncu, 2013). Historic buildings, as tangible components of this heritage, carry architectural, cultural, religious, and economic traces of the periods in which they were constructed and thus provide significant information about the past. Therefore, the conservation of such structures and their transmission to future generations are of great importance (Tunçer & Can, 2022). However, as these buildings may not always meet the needs arising from contemporary socio-economic conditions, they can gradually become underutilized or abandoned (Göçer, 2003). This situation has made the adaptation of functionally obsolete buildings to contemporary use an important conservation approach (Büyükarslan & Güney, 2013).

Adaptive reuse refers to adapting functionally obsolete buildings to contemporary usage requirements and is defined by Ernest Burden as "the modification of a building to meet new needs" (Burden, 2004, p. 215). This approach aims to bring buildings back into use while preserving their identity and prioritizing the sustainability of their original fabric. In this context, adaptive reuse is not merely a process of physical intervention but also a conservation approach that aims to ensure cultural continuity.

The institutionalization of the conservation approach at the international level was significantly shaped by the 1964 Venice Charter and organizations such as UNESCO, ICOMOS, and ICOM. Within this process, which also includes Türkiye, the concept of conservation has evolved from an approach focused solely on preserving the physical integrity of buildings to one that also encompasses adaptive reuse strategies aimed at ensuring their sustainable survival (Özdemir, 2015). Article 5 of the Venice Charter states that the use of monuments for a socially useful purpose facilitates their conservation; however, it emphasizes that such new use should not alter the layout or decoration of the building and that interventions should be limited (ICOMOS, 1964). Within this framework, interventions are expected to be compatible with the original character while remaining distinguishable from the existing building (Büyükarslan & Güney, 2013). Similarly, Tunalı and Güneş (2024) state that new interventions should establish an integrated relationship with the existing building without allowing the original character of the structure to be overshadowed. At the same time, the adoption of the new function by users and its ability to be sustained over time are also important. In this context, the acceptance of the resulting new identity by society plays a decisive role in ensuring the continuity of the building's use (Tunçer & Can, 2022).

In the adaptive reuse of industrial buildings, it is important to preserve their original architectural character and spatial qualities while configuring the arrangements required by the new function in a manner compatible with the existing building (Yalçın, 2024). This process enables industrial sites to be reintegrated into urban life while also supporting sustainability (Kariptaş, 2010). In addition, the effective utilization of large-scale spaces within these buildings provides economic and spatial contributions to the urban environment (Tunçer & Can, 2022). Accordingly, the conservation and adaptive reuse of industrial heritage constitute an important design approach in terms of ensuring cultural continuity, preserving collective urban memory, and making effective use of the existing building stock (Çeltekligil & Arabacıoğlu, 2025).

Within this framework, one of the fundamental issues in the adaptive reuse of industrial heritage buildings is establishing a relationship between the

spatial arrangements required by the new use and the original architectural character of the building. In particular, evaluating the preservation of the original architectural, structural, and spatial characteristics together with the interventions carried out as part of the new use is important for determining the quality of the transformation.

International studies examining how the relationship between original building characteristics and new-use requirements is established across different buildings and functions provide opportunities for comparison. Within this scope, three examples directly related to the subject and evaluative framework of this study were selected for comparison. The LocHal Library in Tilburg provides a basis for comparison in terms of adapting an industrial building to a library function and relating the requirements of the new use to the existing space. Tate Modern in London offers a comparative example regarding the transformation of a large-scale energy infrastructure structure into a cultural facility and the adaptation of its existing spatial character to a new function. The Large Machine Factory in China, on the other hand, provides a basis for comparison in terms of authenticity, minimal intervention, and the recognizability of new interventions in the adaptive reuse of industrial heritage (Sedes & Mumcuoğlu, 2023; Shin, 2025; Xiong et al., 2023). These three examples enable the preservation of original characteristics, the level of intervention, and the relationship between the new use and the existing building to be discussed through different applications.

Within the scope of this study, the adaptive reuse of the former Trolleybus Power Centre in Beyazıt, Istanbul, as Kütüphane Troleybüs is examined. The aim of the study is to examine the interventions carried out during the transformation process and to evaluate their effects on the original building. Accordingly, the historical development of the building, its original architectural characteristics, industrial heritage values, and the modifications made in accordance with its library function are examined. In addition, the relationship between the preserved original elements and the interventions carried out as part of the new use is evaluated in terms of the conservation approach, functional requirements, and spatial organization. The study aims to contribute to the existing body of knowledge on the adaptive reuse of transportation-related industrial heritage buildings and to provide insights for similar transformation projects.

In line with this aim, the study seeks to answer the following research questions:
RQ1. How have the original architectural, structural, and technical characteristics of Kütüphane Troleybüs been preserved during the adaptive reuse process?
RQ2. How can the adaptive reuse of Kütüphane Troleybüs be evaluated in terms of minimal intervention, the distinguishability of new and old elements, and compatibility with the existing building?
RQ3. How can the new function of Kütüphane Troleybüs be evaluated in terms of spatial organization, preservation of the original spatial character, and the ability to accommodate different use scenarios?

METHOD

Research Design and Data Collection

This study was designed as a qualitative case study examining the adaptive reuse process of the Trolleybus Power Centre in Beyazıt, Istanbul, as Kütüphane Troleybüs, focusing on the relationship between the building's original industrial character and the requirements of its new use. The primary aim of the research is to identify the interventions carried out within the scope of adaptive reuse and to evaluate their effects on the preservation of the building's original features, the relationship between the new use and the existing structure, and spatial organization.

The data collection process involved on-site observation, photographic documentation, examination of historical and contemporary visual documents, and analysis of architectural plans. On-site observations were conducted during two field visits on April 2, 2026, and May 15, 2026. During these visits, the ground floor and mezzanine floor of the building were examined; original architectural and structural elements, technical equipment, the existing spatial organization, circulation relationships, and interventions carried out as part of the new use were observed and documented photographically. As part of the document analysis, accessible architectural plans and drawings, project information, and historical and contemporary visual documents concerning the historical and current condition of the building were examined. The ground floor and mezzanine floor plans were used to evaluate the current spatial organization; historical and contemporary visual documents were used to assess the historical continuity and original features of the building; and on-site observations, photographs, and current plans were used to identify the interventions carried out.

The data obtained were qualitatively evaluated according to the criteria and indicators defined in Table 1. Under the criterion of preservation of original features, the preservation status of original architectural and technical elements, such as the facade, windows and doors, wall surfaces, steel load-bearing system, technical equipment, and rail system, was examined. Under the criterion of level of intervention/minimum intervention, the relationship of new additions, such as the mezzanine, spiral staircase, side projections, new partitions, and service areas, with the existing building was evaluated. Under the criterion of distinguishability between new interventions and original building elements the ways in which interventions such as new shelves, furniture, railings, glass surfaces, and service areas were physically and visually differentiated from the original building elements were examined. Under the criterion of compatibility between the new use and the existing building, the relationship of the entrance, reading, study, seminar, and service areas with the existing spatial configuration was evaluated. Under the criterion of preservation of the original spatial character, the continuity of the high interior volume, wide spans, gallery void, steel load-bearing system, open-plan layout, and circulation relationships was examined. Under the criterion of spatial and functional flexibility, the ways in which different forms of use, such as individual study, reading, computer use, group work, and seminars, could be accommodated within the existing spatial configuration were evaluated.

Within this scope, no surveys, interviews, or systematic behavioural observations were conducted to directly evaluate user experience, satisfaction, or physical comfort levels. The evaluations were limited to the observable architectural, spatial, and intervention characteristics of the building.

Analytical Evaluation Framework

To ensure that the assessments of the building's adaptive reuse was not based solely on researcher's subjective observations, the analysis process utilized international principles concerning the conservation and adaptive reuse of industrial heritage, as well as evaluation approaches in the current literature. The ICOMOS–TICCIH Dublin Principles (2011) emphasize the preservation of original materials, building components, technical equipment, and spatial relationships in industrial heritage, and highlight that the new use should be integrated in harmony with the values of the building. Furthermore, topics such as originality, minimum intervention, distinguishability of new and old elements, functional compatibility, and spatial flexibility are prominent in the literature on adaptive reuse (Vafaie, Remøy & Gruis, 2023; Nocca & Remøy, 2026; Xiong et al., 2023).

In this study, three fundamental criteria were considered in the selection of the evaluation criteria. First, the criteria should relate directly to the research aim and research questions; second, they should have counterparts in the literature on the conservation of industrial heritage and adaptive reuse; and third, they should be observable and evaluable through on-site observations, photographic documentation, historical and contemporary visual comparisons, and architectural plans obtained in the study. Accordingly, various evaluation headings in the literature were examined alongside the research questions and the obtained data set; headings that fell outside the scope of the research or could not be directly evaluated using the existing data set were excluded. Interrelated evaluation topics were separated according to the analytical scope of the research, creating a framework that would allow for the examination of the preservation of the case study's original features, the nature of new interventions, and the relationship between the new use and the existing structure.

As a result of this selection, the evaluation framework was formed by six criteria: preservation of original features, level of intervention/minimum intervention, distinguishability of new and old elements, compatibility between the new use and the existing structure, preservation of the original spatial character, and spatial and functional flexibility. The preservation of original features, along with the compatibility of the new use with the existing structure, is framed according to the Dublin Principles and approaches in the literature on adaptive reuse; minimum intervention and the distinguishability of new and old elements are aligned with the approaches highlighted in the works of Vafaie, Remøy, and Gruis (2023) and Xiong et al. (2023); and spatial and functional flexibility is examined in

Table 1. Analytical Evaluation Framework for the Adaptive Reuse Process

Evaluation Criterion	Key Evaluation Indicators	Data Examined in the Case Study
1. Preservation of Original Features	Preservation of original architectural, structural, and technical elements; continuity of original materials, components, and traces of the building (Dublin Principles, 2011; Vafaie et al., 2023; Xiong et al., 2023; Nocca & Remøy, 2026)	The preservation status of the facades, windows and doors, wall surfaces, steel load-bearing system, transformer, rail system, and mechanical equipment, and their continuity as original elements of the building.
2. Level of Intervention / Minimum Intervention	Scope of new interventions in the existing building and their relationship with the original building elements; limiting the impact of interventions on the existing spatial and structural organization (Vafaie et al., 2023; Xiong et al., 2023; Nocca & Remøy, 2026)	The location, scope, and physical impact of the mezzanine, spiral staircase, wet areas, new partitions, side extensions, and other spatial additions on the original building elements.
3. Distinguishability of New and Old Elements	New additions and interventions being distinguishable from the original building in terms of form, material, and construction language (Vafaie et al., 2023; Xiong et al., 2023; Nocca & Remøy, 2026)	The degree to which the spiral staircase, new shelves and furniture, mezzanine railings, glass surfaces, and new service areas are distinguishable from the original building elements in terms of form, material, and construction language.
4. Compatibility Between the New Use and the Existing Structure	Relating the new function to the existing building, spatial organization, and circulation patterns; integrating the new use respectfully with the significant features of the building (Dublin Principles, 2011; Vafaie et al., 2023; Nocca & Remøy, 2026)	The compatibility of the reading and study areas, seminar area, service areas, entrance and consultation area with the existing spatial configuration, high-volume space, open-plan character, and circulation relationships.
5. Preservation of the Original Spatial Character	Preservation of the original volumetric characteristics, openings, structural system organization, open-plan character, and fundamental spatial relationships (Dublin Principles, 2011; Vafaie et al., 2023; Nocca & Remøy, 2026)	The degree to which the high interior volume, wide openings, gallery void, steel load-bearing system, open-plan character, and circulation relationships are preserved and maintained following the new use.
6. Spatial and Functional Flexibility	The ability to accommodate different forms of use within the same spatial configuration; the potential of the existing spatial organization to support different use scenarios (Vafaie et al., 2023; Nocca & Remøy, 2026)	The ability to accommodate different forms of use, such as individual study, reading, computer use, group work, seminars, and shared-use areas, within the existing spatial configuration, and the contribution of the mezzanine to these uses.

line with the evaluation topics particularly addressed by Nocca & Remøy (2026). Table 1 shows through which indicators each criterion is evaluated and which specific data from the building are used in the assessment.

RESEARCH FINDINGS

Study Area: Kütüphane Troleybüs

The former Trolleybus Power Centre, now known as Kütüphane Troleybüs is located in the Fatih district of Istanbul, around Beyazıt Square and the Süleymaniye area (Figure 1). The building, constructed between 1910 and 1912, was initially used as a stable for horse-drawn trams; in 1914, with the introduction of electric trams, it was expanded and converted into a power station to meet the period's needs. Trolleybus Power Centre building served as the Beyazıt Power Station until 1961, and after the termination of tram services, it continued to operate as a power centre for the trolleybus system. After trolleybuses were removed from Istanbul's transportation system in 1984, the building remained unused for many years (Cansız, 2024). This structure is one of the most important examples of industrial heritage related to Istanbul's transportation history, bearing witness to the development of the city's electric public transportation systems through its original function and technical infrastructure. Thus, the building is not only a physical example of industrial heritage but also an important memory space relating to Istanbul's transportation history. In 2020, the Istanbul Metropolitan Municipality decided to repurpose the building in line with the needs analysis of the Süleymaniye–Beyazıt region (Cansız, 2024). Accordingly, the Trolleybus Power Centre building was adapted for use as a library through interventions carried out by İBB Miras in 2022 and was reopened to the public as Kütüphane Troleybüs (İstanbul Büyükşehir Belediyesi, n.d.).

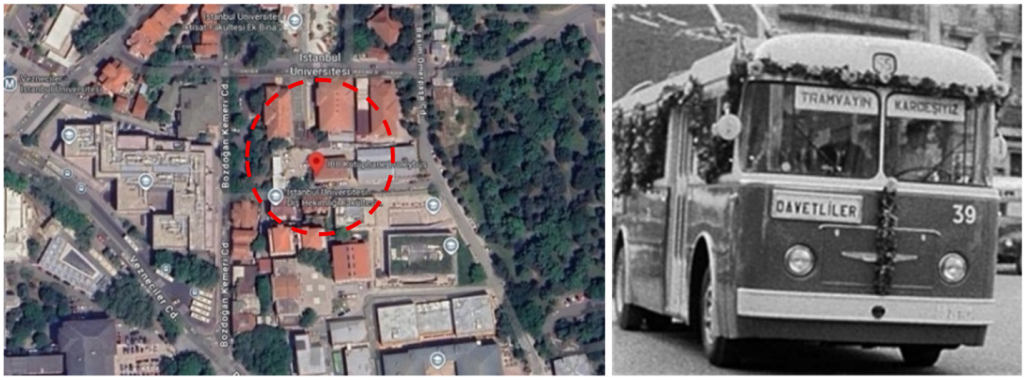


Figure 1. Location of Kütüphane Troleybüs and Image of Trolleybus (Google Maps, n.d.; İstanbul Elektrik Tramvay ve Tünel İşletmeleri, n.d.)

Historical Development of the Trolleybus System

The trolleybus is a rubber-tired public transport vehicle powered by overhead electric wires that run along a designated route. In this aspect, it is similar to buses but differs in its energy source (Arısal, 2025, p. 4). The historical origins of trolleybus technology date back to the 19th century, with the first application carried out in Berlin in 1882 by Werner von Siemens under the name "Electromote." This development is considered the beginning of electric rubber-tired public transport systems (Álvarez, 2023). Trolleybus systems expanded rapidly in Europe and North America during the first half of the 20th century. Although their use declined in some regions during the latter half of the century, Rodrigues et al. (2024) report that approximately 300 cities worldwide continue to operate trolleybus systems, with networks across Europe, Asia, and Latin America. (Rodrigues et al., 2024).

Trolleybus systems, which became widespread worldwide, were first introduced in Turkey in 1947 in Ankara, followed by Izmir in 1954. In Istanbul, trolleybuses began operating in June 1961 and served the city's urban transportation system

for approximately 24 years. However, due to operational problems such as frequent power outages that disrupted service and stranded vehicles on the road, leading to increased traffic congestion, the system was discontinued in 1984 (Arısal, 2025).

History and Architectural Features of the Kütüphane Troleybüs

Today, the Trolleybus Power Centre now known as the "Kütüphane Troleybüs," is located in the Süleymaniye neighborhood of Istanbul's Fatih district. After serving Istanbul's transportation infrastructure for many years, the Kütüphane Troleybüs building was reopened for use as a library following restoration work. The building has an area of approximately 520 m² and now includes study areas, bookshelves, multi-purpose spaces, and wet areas; on the mezzanine floor, there are individual study and computer-supported workspaces. Some technical equipment from the building's previous use has also been preserved and is exhibited in the interior (Bozkurt, 2024).

From an architectural perspective, the building reflects the functional design approach seen in early industrial structures. It is built on a skeletal structure that forms the load-bearing system, with brick masonry used for the main walls and stone cladding applied on the exterior façades (Bozkurt, 2024). The main load-bearing system consists of a frame that supports both the roof and the walls. This structural system allows for the creation of large spans required by the building's technical function. The original spatial layout of the building was shaped according to its role in serving energy and transportation infrastructure. The wide and high-volume interior space offers an open-plan layout suitable for the placement of technical equipment. Thanks to the large window openings, the building benefits from natural lighting and reflects the characteristic features of industrial architecture, where functional requirements are prioritized. These features are important spatial advantages that have facilitated the adaptive reuse of the Kütüphane Troleybüs building for different function.

The arched openings at the top of the windows are among the important architectural elements that strengthen the building's facade character. The stone cladding on the facade was cleaned and preserved during the restoration, thereby maintaining the visibility of the original details that define the building's historical identity. In addition, maintenance and preservation work were carried out on the wooden doors and window frames on the facade to preserve the building's character (Bozkurt, 2024).

Inside, the wide and high-volume spatial character typical of the industrial use period has been preserved. The building's steel roof system, visible load-bearing elements, and exposed technical components support the readability of its industrial identity. New load-bearing elements added during the restoration were implemented in different colours to distinguish them from the existing system, enabling users to perceive the relationship between the original structure and later interventions. The mezzanine floor added to the Kütüphane Troleybüs building was also constructed using this secondary structural system and was designed to meet the spatial requirements of the new use (Bozkurt, 2024).

Overall, the Trolleybus Power Centre stands out as an important example of industrial heritage related to Istanbul's transportation infrastructure, with its structural features, material use, and original spatial organization. The fact that the building's original architectural character has been largely preserved during its adaptive reuse has enabled it to sustain its historical identity alongside current use requirements (Bozkurt, 2024).

Adaptive Reuse of the Kütüphane Troleybüs
Transformation process of the building

To reveal the spatial organization of the building in its current library use, the ground floor and mezzanine floor plans were examined (Figure 2). The plan analysis includes the distribution of areas created within the framework of the library function, circulation relationships, vertical connections, and spatial arrangements.

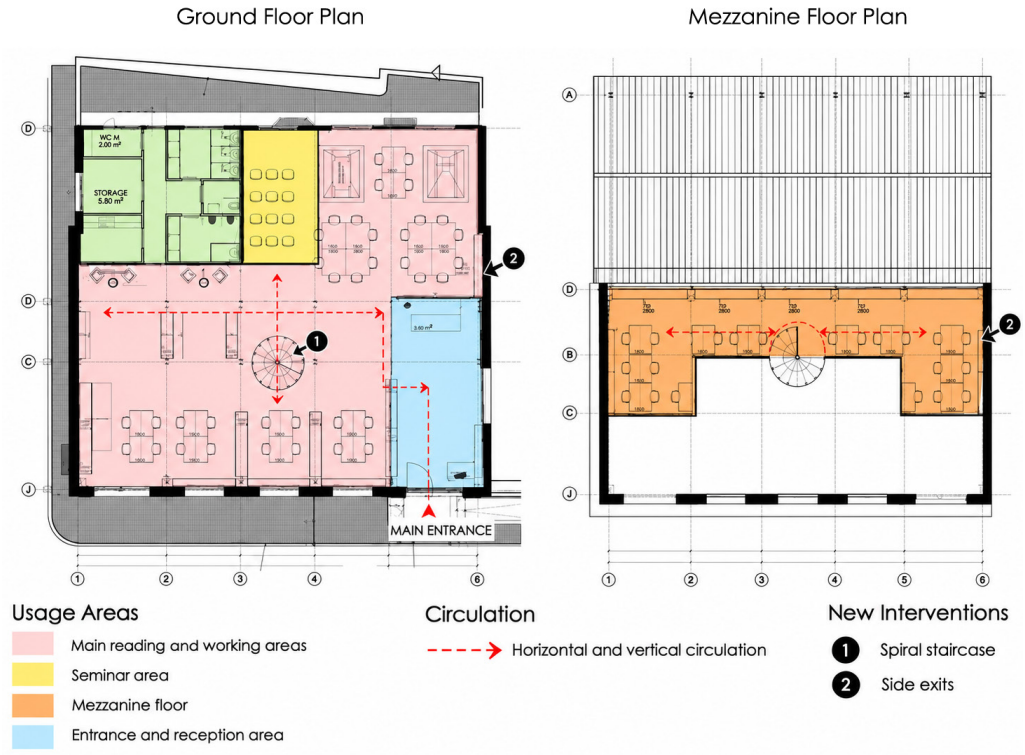


Figure 2. Kütüphane Troleybüs Floor Plans (Adapted by the author from Cansız, 2024.)

When the plans are examined, it is observed that the entrance floor includes entry and reception, main reading and study areas, a seminar area, and service areas, while the mezzanine includes areas for individual study and computer use. The reception area includes an information and consultation desk and directional functions and is organized as the section providing access to the main use volume.

The main use area, located at the centre of the building, is designed as a large space where the main activities of the library function take place. This area accommodates individual study, reading, research, and computer use. Shelving systems and work tables are used to create different study and reading areas within the main use volume.

The seminar area, organized in connection with the main use area, is designated for group work, discussions, and activities requiring verbal communication. Wet areas and service areas are located at the rear of the building to serve different functions.

On the upper level, the mezzanine includes areas for individual study and computer use. The visual relationship between the mezzanine and the main use area is established through the spatial arrangement around the gallery void, creating both vertical and visual connections between the entrance floor and the mezzanine.

Conservation and intervention approaches to the building's surroundings and façade

As shown in the comparative visuals presented in Figure 3, the building was historically located in an area predominantly consisting of green space, whereas today it is surrounded by an urban fabric characterized by hard-surface arrangements, pedestrian paths, urban furniture, and landscaping elements. This change reveals the transformation of the building's environmental context over time.



Figure 3. Comparison of the Kütüphane Troleybüs Past and Present Surroundings and Facade Condition (Karay, 2022; Author's Archive, 2026).

The informational panels located around the building are new arrangements that facilitate the communication of information about the building's historical background and industrial character to users. Industrial heritage includes not only physical components but also values related to past use, technical knowledge, and collective memory, and making these values visible constitutes part of the conservation approach (ICOMOS–TICCIH, 2011). From this perspective, the informational panels can be considered interpretive elements that convey information about the building's past use within the new public function.

The comparison of the past and present facade visuals in Figure 3 shows that the fundamental architectural elements constituting the facade have largely been preserved. The semi-circular arched window openings, window arrangements, and window frames have been maintained, while the decorative tile motifs above the arches have also been preserved. Similarly, the existing door openings and door leaves have been addressed through cleaning and maintenance interventions while preserving their original features. The preservation of these elements ensures the continuity of the building's original architectural character and the historical traces associated with the facade. The preservation of materials, structural components, and physical traces in industrial heritage buildings is considered fundamental to sustaining the cultural values of the building (ICOMOS–TICCIH, 2011; Nocca & Remøy, 2026).

In addition, new arrangements have been made around the entrance and facade in response to the accessibility and identification requirements of the new use. A ramp has been added to support accessibility to the entrance area, and new signage and informational elements related to the new use have been placed on the building's facade. These interventions can be evaluated as physical additions made during the adaptation of the existing structure to the requirements of the new use. In the adaptive reuse literature, it is emphasized that

the impact of interventions required by the new use on the original components of the existing building should be limited and that interventions should be kept to a minimum extent possible. (Vafaie, Remøy, and Gruis, 2023; Nocca & Remøy, 2026).

The differentiation of new elements added to the facade and entrance area from the existing original elements is also significant for the readability of the interventions. New additions being distinguishable from the original structure in terms of form, material, or construction language supports the differentiation of past and contemporary interventions and contributes to the preservation of the historical layers of the building (Vafaie et al., 2023; Xiong et al., 2023). In this regard, the ramp, signage, and informational elements added to the facade are perceived as contemporary interventions that differ from the original facade components.

Overall, the comparative visuals in Figure 3 demonstrate that changes have occurred in the spatial arrangement of the building over time; however, the fundamental architectural elements forming the facade have largely been preserved while modifications required by the new use have been added to the structure. These findings indicate that the facade interventions can be examined through the preservation of original features, limitation of the level of intervention, and distinguishability of new additions from the original structure.

Spatial and structural interventions on the building

It can be observed that the spatial arrangements required by the new use have been implemented largely while preserving the existing steel load-bearing system of the building. The preservation of the existing load-bearing system is important for the continuity of the building's original structural character.

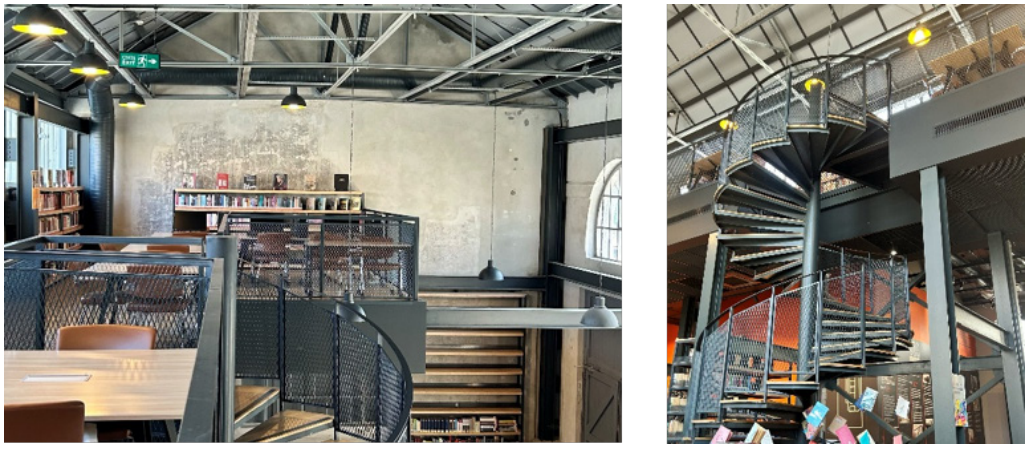


Figure 4. Steel Spiral Staircase of the Building: 1 – Metal Railing System; 2 – Spiral Staircase (Author's Archive, 2026)

In industrial heritage buildings, the preservation of original structural components and technical characteristics is considered fundamental to sustaining the historical and industrial values of the structure (ICOMOS–TICCIH, 2011; Nocca & Remøy, 2026). In this regard, the preservation of the existing steel load-bearing system stands out as an approach emphasizing interventions based on the existing structural character.

One of the notable additions associated with the new use is the steel spiral staircase located at the centre of the building (Figure 4). The material and geometric form of the staircase distinguish it from the existing structural elements, making the new intervention distinguishable.

The distinguishability of new additions from the original structure in terms of form, material, or construction language is important for enabling the legibility of past and current interventions and for understanding the historical development of the building (ICOMOS, 1964; Vafaie, Remøy, & Gruis, 2023; Xiong et al., 2023). In this respect, the spiral staircase functions as a contemporary intervention, making the relationship between the original structure and the new use visible. However, the absence of an elevator in the building and reliance on stairs for access to the mezzanine constitute a limitation that needs to be considered in terms of vertical access in the current use of the building.

Other spatial interventions associated with the building's new function include the mezzanine created by taking advantage of the existing floor height and side projections. The positioning of the mezzanine in relation to the window openings at the upper level demonstrates that the new arrangement has been integrated with the existing facade openings. Together with the side projections, this arrangement enables the building's large volume to be used for different functional areas. The section analysis (Figure 5) reveals that the original high interior volume and steel load-bearing system have been preserved while a new mezzanine and vertical circulation elements have been established using the existing volume.

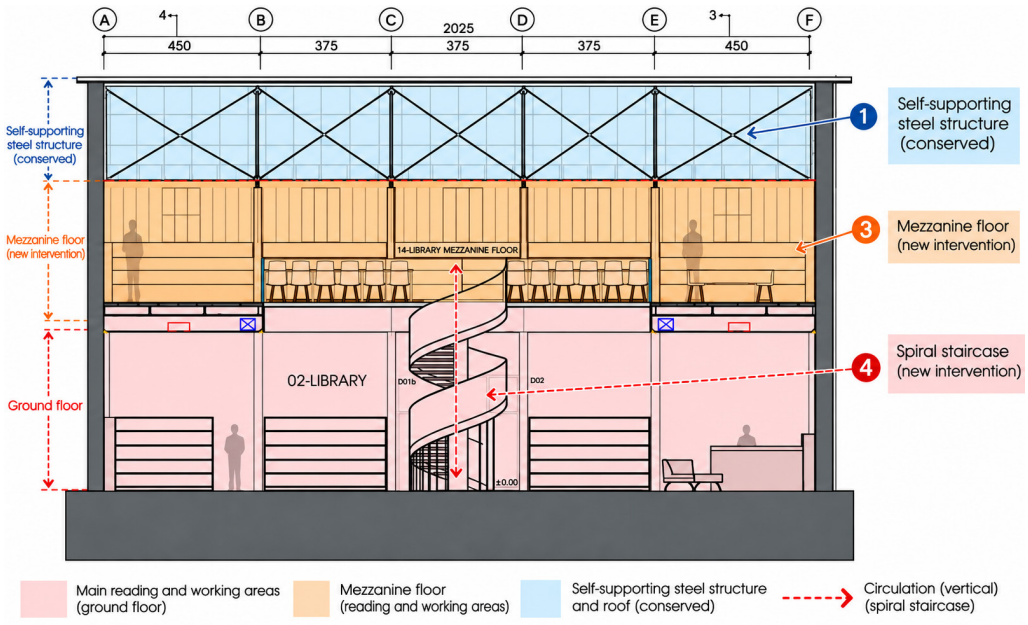


Figure 5. Representation of the Preservation of the Original Load-Bearing System and New Spatial Interventions through the Existing Section of the Building (Adapted by the author from Cansız, 2024.)

The position of the mezzanine and side projections within the main space and their relationship with the existing structure can be comparatively observed in the visuals presented in Figure 6 before and after adaptive reuse.



Figure 6. Spatial Interventions to the Mezzanine Before and After the Adaptive Reuse of the Building (Image displayed on the information panel at the entrance of Kütüphane Troleybüs; photographed by the author, 2026. Author's Archive, 2026).

In line with the library function, work tables, shelving systems, and different functional units have been placed in the main use area (Figure 7). Thus, areas for various activities such as reading, research, individual study, and shared use have been created within the same main volume. The work areas located at the rear of the building have been organized as a distinct use zone separate from the main use area. Additionally, areas for work and research activities have been created on the mezzanine, distributing use areas between the entrance floor and the upper level.

The open gallery void that maintains the visual connection between the mezzanine and the main space ensures the continuity of the spatial relationship between the upper and lower levels. Similarly, the positioning of areas for seminars and group use in a different part of the main work volume demonstrates an arrangement that accommodates different types of use within the same structure. The coordination of different functional areas within the same building is significant in terms of the spatial and functional flexibility discussed in the literature on adaptive reuse (Nocca & Remøy, 2026).



Figure 7. Spatial Interventions Related to the Main Use Area of the Building: 1–Work Area; 2–Entrance Floor; 3–Wet Area Corridor (Author's archive, 2026)

The added wet areas are also part of the new spatial arrangements required by the library function. As shown in Figure 7, these areas are positioned at the rear of the building, differentiating them from the main use areas. The concentration of wet areas in a specific section creates an arrangement aimed at separating service functions from the main reading and work areas. The resolution of the service functions required by the new use within a specific area of the existing structure can be evaluated in terms of the relationship established by the intervention with the existing organization. In adaptive reuse projects, it is emphasized that the new use should be addressed in a manner that respects the significant spatial features and circulation relationships of the existing structure (ICOMOS–TICCIH, 2011; Vafaie, Remøy, and Gruis, 2023).

In general, the preservation of the existing steel load-bearing system in the spatial and structural interventions of the building, the contemporary addition of a new vertical circulation element, the creation of a mezzanine utilizing the high volume, and the distribution of different use areas suitable for the library function within the structure stand out. These interventions demonstrate that the existing structural and spatial features are preserved while the requirements of the new use are addressed simultaneously.

Entrance, circulation, and spatial organization of the building

The entrance area of the building serves as a starting space where original architectural elements are combined with the necessary adjustments for the new library function. The original form of the entrance door has been preserved, and it has been restored for reuse through cleaning and maintenance interventions (Figure 8). The reception desk located at the entrance serves to welcome and inform visitors in line with the library function. The partially permeable shelving system positioned between the entrance and the main use area creates a physical division between the two spaces. The permeable structure of the shelving system allows usage boundaries to be defined without completely separating the entrance area from the main space.

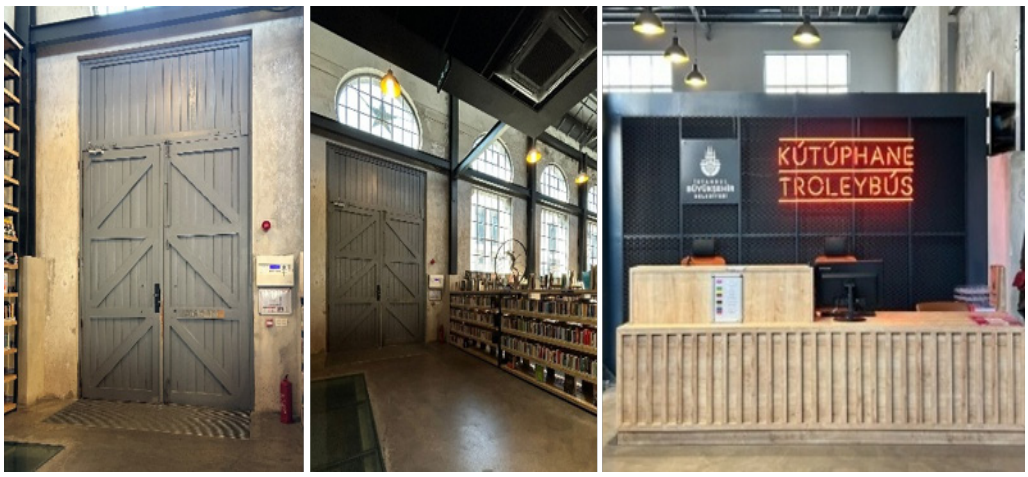


Figure 8. The Kütüphane Troleybüs Entrance and Reception Area; Entrance Door and Information Desk (Author's Archive, 2026).

One of the arrangements in the entrance area is the glass surfaces created in the floor, which reveal traces of the building's previous uses (Figure 9). By preserving the floor voids housing original infrastructure systems and covering them with walkable glass panels, these elements can be read alongside the existing space rather than being hidden within the new use. Thus, the technical traces of the building's past uses persist not only as exhibited objects but also as spatial components encountered within the circulation area. In the evaluation of industrial heritage, the preservation of technical components, machinery, equipment, and their associated physical traces is considered part of maintaining the building's value (ICOMOS–TICCIH, 2011).

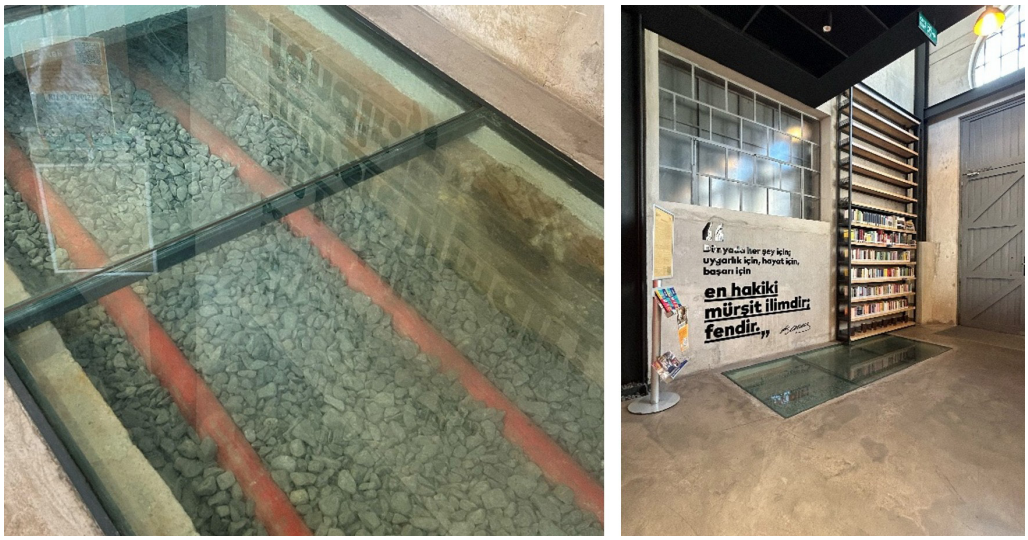


Figure 9. Glass Surfaces Used in the Kütüphane Troleybüs Entrance Area (Author's Archive, 2026)

The lighting and furnishing elements used in the entrance and main use areas are contemporary spatial components created within the framework of the new function. Pendant lights have been used at the reception desk and along the entrance axis, while surface-mounted spotlights have been installed under the mezzanine. Additionally, exposed ventilation ducts and mechanical installation elements are visible alongside the existing load-bearing system. The use of steel, wood, and glass materials in the new furnishing elements, together with the preserved concrete, wall, and steel surfaces, allows architectural and furnishing components from different periods to be read within the same spatial integrity.
The main spatial organization of the building develops around a high-volume central area (Figure 10). Large window openings, the visible load-bearing system, and preserved wall surfaces constitute the fundamental spatial characteristics of this area, while shelving systems designed for the library function are used to define use zones within the existing open plan.



Figure 10. The Main Space of the Kütüphane Troleybüs; Shelving Systems and Preserved Wall Surfaces (Author's Archive, 2026).

Shelves located along the window sills and on the central axis separate different use areas without completely dividing the space. In particular, the accessibility of the shelves on the central axis from two directions indicates that these elements are used not only for storing books but also for defining spatial organization and circulation.

In this arrangement, circulation is shaped not by closed partitions but by the existing openings and the locations of the shelving systems. Keeping the main use area open allows different working and reading zones to establish relationships within the same volume, while the specific positioning of the shelves delineates the boundaries of the use areas. Thus, the spatial distinctions required by the library function are created through furnishing elements rather than by completely dividing the existing space. The consideration of the existing spatial relationships and circulation patterns in the new use is also significant in the conservation approach to the adaptive reuse of industrial heritage structures (ICOMOS–TICCIH, 2011). The second large door located within the main space, although not actively used today, has been preserved (Figure 11).

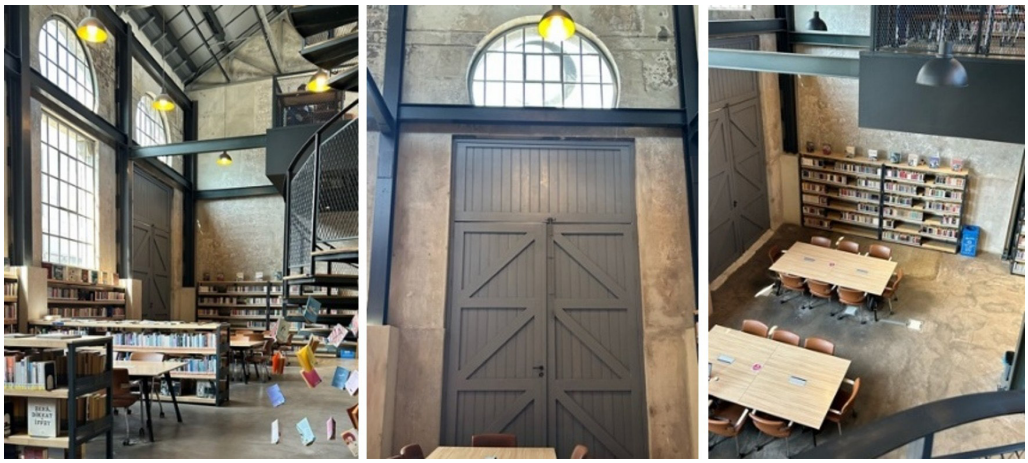


Figure 11. The Second Door of the Kütüphane Troleybüs (Author's Archive, 2026).

The current non-functional status of the door, together with its preservation, indicates that elements from the previous period of use continue to exist within the new organization. The preservation of such elements shows that existing structural components not required by the new use are maintained within the space as part of historical continuity. In the rear section of the main use area, various arrangements for individual and collective use coexist (Figure 12). While desks and seating elements are organized for individual work and computer use, the section with screens and seating arrangements is designated for seminars, presentations, and group work.

Thus, different modes of use are accommodated not in completely separate spaces but within different sections of the same overall organization. This situation illustrates that various use scenarios are addressed within the same spatial system during the adaptation of the existing structure to its new library function.



Figure 12. Spatial Organization in the Rear Section of the Kütüphane Troleybüs; Study Area, Collective Study Area, and Preserved Transformer Power Source (Author's Archive, 2026).

Technical traces related to the building's industrial past continue to exist in the main use area through the preserved transformer power source, original rail transport system, and mechanical equipment (Figure 13). The preservation of the original rail transport arrangement of the transformer system allows the equipment to be read not merely as an individual object but as a component related to the building's previous technical operation. Mechanical equipment parts and ventilation elements left on the wall surfaces also maintain traces of the building's technical infrastructure. Keeping these elements visible in the new use indicates that the physical layers related to the building's industrial past are not entirely relegated to the background in the current spatial organization. The preservation of original machines, equipment, and technical components of industrial heritage is crucial for sustaining the historical and technological values of the structure (ICOMOS–TICCIH, 2011).

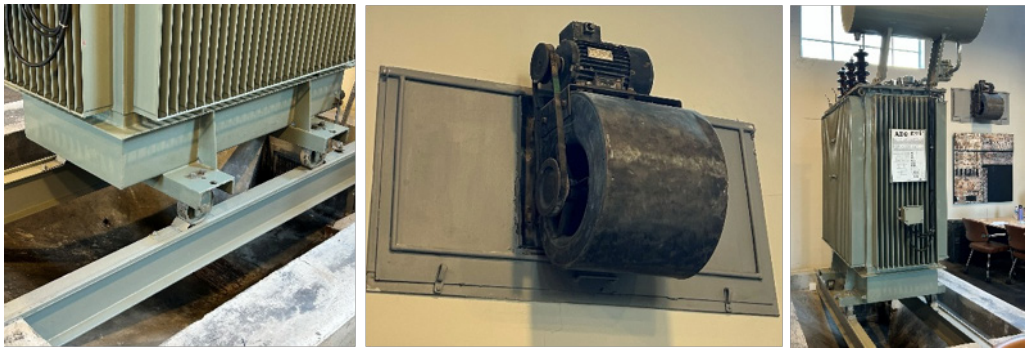


Figure 13. Preserved Mechanical Equipment in the Kütüphane Troleybüs; Original Rail Transport Arrangement, Siemens Electric Motor, and Transformer Belonging to AEG-ETİ Company (Author's Archive, 2026).

Overall, in the entrance, circulation, and spatial organization of the building, the preservation of existing openings and the definition of use areas required by the library function within those openings stand out. The preservation of the original door at the entrance, the use of shelving systems to define spatial boundaries instead of closed partitions, and the visibility of technical equipment indicate that the physical traces related to the building's past continue to exist within the new use. Conversely, the reception desk, shelves, work furnishings, and lighting elements constitute the current spatial components required by the new function. This integration shows that instead of completely transforming the existing spatial character of the building, the new use is organized through the existing spatial and technical features.

DISCUSSION

The findings obtained within the scope of the study were discussed in accordance with the evaluation criteria defined in the methodology section and compared with relevant international adaptive reuse examples. Table 2 presents the relationship between the findings concerning Kütüphane Troleybüs and the specified evaluation criteria. This evaluation focuses on the relationship between the preservation of the building's original features and the interventions

required by its new use. Subsequently, the findings for Kütüphane Troleybüs were compared with LocHal Library, Tate Modern, and the Large Machine Factory, which represent different approaches to adaptive reuse. LocHal Library provides a basis for comparison in terms of relating existing industrial spaces to new library and cultural functions and incorporating contemporary additions; Tate Modern offers a basis for evaluating the spatial potential of an existing building within a new cultural function; and the Large Machine Factory provides a basis for examining authenticity, minimum intervention, and the distinguishability of new interventions (Sedes & Mumcuoğlu, 2023; Shin, 2025; Xiong et al., 2023). These comparisons are summarized in Table 3 according to the evaluation dimensions, while the findings concerning Kütüphane Troleybüs are discussed in detail in relation to these examples in the following subsections.

Preservation of original features

The assessment of originality in industrial heritage structures is not limited to the preservation of architectural elements belonging to the building's initial design. Technical equipment, traces related to production or operational processes, the building system, and the relationships among these elements also constitute parts of originality. The ICOMOS–TICCIH Dublin Principles define the value of industrial heritage not only through the building itself but also through its material texture, components, machines, and the relationships established with its surrounding environment. Therefore, the continuity of originality after adaptive reuse can be evaluated not only through the preservation of individual elements but also through the ability to read different layers representing the building's past use together.

Table 2. Analysis of Kütüphane Troleybüs According to the Evaluation Criteria

Evaluation Criterion	Case Findings	Assessment
1. Preservation of Original Features	Preservation of the steel load-bearing system, facade and door elements, wall surfaces, as well as the transformer, rail transport system, and mechanical equipment	The preservation of architectural, structural, and technical components together supports the continuity of different physical layers related to the building's industrial past.
2. Level of Intervention / Minimum Intervention	Addition of the mezzanine, spiral staircase, side projections, and new service areas while preserving the existing load-bearing system	Despite the addition of a mezzanine, spiral staircase, side projections, and service areas required for the new use, the main load-bearing system and fundamental spatial features have been preserved. Although this indicates that the interventions were developed through the existing building, it does not in itself demonstrate that the principle of minimum intervention has been fulfilled. Therefore, minimum intervention was evaluated based on the observable physical relationship between the location and scope of the new additions and the original building elements.
3. Distinguishability of New and Old Elements	Differentiation of the spiral staircase, new furnishing elements, and glass surfaces from the original building elements	The differentiation of new elements from the original elements through their formal and material characteristics supports the readability of interventions from different periods within the space.
4. Compatibility Between the New Use and the Existing Structure	Organization of the library function within the existing high volume, wide openings, and open spatial organization	The use of the existing spatial and structural features by the new function indicates that a compatible relationship has been established between the function and the building.
5. Preservation of the Original Spatial Character	Preservation of the high volume, wide openings, visible steel load-bearing system, and open plan	Despite the arrangements required by the new use, the building's distinctive volumetric and spatial features continue to exist.
6. Spatial and Functional Flexibility	Creation of different areas for individual study, reading, computer use, seminars, and group work	The ability to accommodate different forms of use within the same overall spatial configuration indicates the potential of the existing spatial organization to support different use scenarios. However, this does not in itself demonstrate the building's convertibility to different functions or its capacity for future adaptation; rather, it indicates that diversity of use can be accommodated within the same spatial framework under the existing library function.

Table 3. Comparative Analysis of Kütüphane Troleybüs and International Adaptive Reuse Examples

Evaluation Criterion	Kütüphane Troleybüs	LocHal Library	Tate Modern	The Large Machine Factory
Preservation of the Original Building and Its Values	Preservation of architectural, structural, and technical components together; continuation of physical traces of the industrial past	Relating original industrial spaces to new library and cultural functions	Evaluation of the industrial spatial characteristics of the existing building within its new use	Preservation of original architectural and structural features together with materials and building elements reflecting the historical character
Intervention Approach	Addition of interventions required by the new function while preserving the existing load-bearing system and fundamental spatial features	Use of contemporary additions related to the existing building	Strengthening the spatial potential of the existing building with new architectural components	A light intervention approach; limiting the impact on the original structural and mechanical systems and implementing new reinforcements as independent systems
Relationship Between New and Existing Elements	New interventions are differentiated from the original building elements in terms of form and material	Relating contemporary additions to the existing building and emphasizing their character	An approach that establishes unity between old and new elements	New or altered elements are distinguishable from the original building
Intervention Approach	Addition of interventions required by the new function while preserving the existing load-bearing system and fundamental spatial features	Use of contemporary additions related to the existing building	Strengthening the spatial potential of the existing building with new architectural components	A light intervention approach; limiting the impact on the original structural and mechanical systems and implementing new reinforcements as independent systems
Relationship Between New and Existing Elements	New interventions are differentiated from the original building elements in terms of form and material	Relating contemporary additions to the existing building and emphasizing their character	An approach that establishes unity between old and new elements	New or altered elements are distinguishable from the original building
Relationship Between New Use and Existing Building	Resolving the library function within the existing spatial configuration	Relating existing industrial spaces to library and cultural uses	Evaluating the spatial potential of the existing building in a way that supports its new artistic use	Arranging new functions to benefit from the characteristics of the existing large-scale space
Spatial Character	Preservation of the high-volume space, wide spans, exposed steel structural system, and open-plan layout	Wide spans enabling flexible and diverse uses	The building's large-scale, raw spatial character and robust structure creating potential for new use	Preserving the large and open industrial space and making the original interior structure legible in the new use
Diversity of Use / Flexibility	The ability to accommodate different forms of use, such as individual study, reading, computer use, seminars, and group work, within the same overall spatial configuration	Creation of spaces that accommodate conferences, public events, and various activities in addition to the library function	Evaluation of the large-scale existing space for different art events and uses	Preservation of the large industrial space, allowing for future adaptive reuse

This approach is in a similar direction to the evaluation framework proposed for the preservation of authenticity in the Large Machine Factory case. Xiong et al. (2023) relate the preservation of authenticity in the adaptive reuse process to understanding the functional, structural, and façade characteristics of the

building, preserving its significant features, and implementing interventions in ways that do not undermine these values. The study also considers minimal intervention and interpretability among the key principles for maintaining authenticity (Table 3).

For Kütüphane Troleybüs, this comparison demonstrates that originality cannot be explained solely through the preservation of the building's exterior appearance. The continuation of architectural features together with technical and structural layers suggests that the industrial past of the building has not been completely erased within the new use. Thus, originality in the Kütüphane Troleybüs gains meaning through the preservation of the readability of physical traces related to its past use within the current function.

Level of intervention and minimum intervention

The principle of minimum intervention should not be reduced to a one-dimensional criterion defined as intervening in the building as little as possible during the adaptive reuse process. Completely eliminating the interventions required by the new use is often not possible, and the amount of intervention alone is not sufficient to explain the level of preservation of the building. What is more important here is the nature of the relationship established between the interventions and the values carried by the building. While the Dublin Principles recognize adaptive use as an important tool for the conservation of industrial heritage, they emphasize that the new use should respect significant materials, components, and existing circulation relationships.

In the Large Machine Factory example, minimum intervention is considered together with the preservation of originality and the relationship of new interventions to the fundamental character of the building (Xiong et al., 2023). In the Tate Modern example, utilizing the potential of the existing building and evaluating its possibilities are important rather than creating an unnecessary spatial transformation for the new use (Shin, 2025). When these two approaches are considered together, minimum intervention can be understood not simply as "less intervention," but as an approach that keeps new interventions at the necessary level by making use of the possibilities of the existing building as much as possible (Table 3).

The findings from the Kütüphane Troleybüs indicate that the adaptive reuse interventions were shaped in accordance with the characteristics and values of the existing building. Despite the additions required by the new use, the preservation of the building's fundamental structural and spatial features demonstrates that the transformation was carried out by utilizing the possibilities of the existing building rather than reconstructing it entirely. However, this finding alone does not demonstrate that the principle of minimum intervention has been fulfilled. In Kütüphane Troleybüs, minimum intervention was evaluated not through the quantitative measurement of interventions or engineering assessments of their structural performance, but through the observable spatial and physical relationships between the location and scope of new additions and the original building elements.

Distinguishability of new and old elements

The distinguishability of new and old elements after adaptive reuse is important for enabling the different historical layers of a building to be read without becoming mixed together. This approach allows new interventions to express their own period rather than imitate the original building. Thus, the building can be read not only as a single period belonging to the past but also through the transformations it has undergone over time.

In the Large Machine Factory study, the preservation of originality is associated with the distinguishability of new interventions from the existing characteristics of the building and with the interpretability of these interventions (Xiong et al., 2023). In this context, what is important is not the complete separation of new additions from the historical building, but the ability to understand which elements are original and which are later interventions (Table 3).

When the new interventions in Kütüphane Troleybüs are evaluated within this framework, the fact that contemporary additions have formal and material characteristics that do not imitate the original elements contributes to the reading of different periods of the building together. Thus, the new use is expressed as a contemporary layer of the building rather than being concealed as part of the historical structure. This can be interpreted as a design approach that enhances the legibility of the relationship between the original building elements and new interventions without compromising the building's originality.

Compatibility between the new use and the existing structure

The compatibility between the new use and the existing structure refers to a more comprehensive relationship than simply placing the spaces required by the new function within the building. What is decisive is how the new use makes use of the spatial and structural possibilities of the existing building and to what extent it transforms these possibilities. The Dublin Principles state that adaptive use is an important conservation tool for industrial heritage structures and that new uses should respect significant materials, components, and circulation patterns.

The LocHal, which was converted to a library, provides a direct basis for comparison in this regard. Sedes and Mumcuoğlu (2023) examine the relationship between the original spaces of the industrial building and the requirements of the new cultural function, as well as the role of contemporary additions within this relationship. The evaluation of the existing industrial spaces for the new function emerges as a fundamental approach in the study (Table 3).
The main commonality between Kütüphane Troleybüs and LocHal is that the library function is developed through the possibilities of the existing industrial volume rather than by creating a new building configuration. However, the forms of use in the two examples are not the same. While the large industrial volume of LocHal is transformed into a multi-purpose program that also supports different activities and public uses, the Kütüphane Troleybüs emphasizes the resolution of the library program within the existing spatial organization (Sedes & Mumcuoğlu, 2023). This comparison shows that compatibility can be established not simply by directly transferring a specific function into a building, but by relating the new use to the possibilities offered by the existing building (Table 3).

Preservation of the original spatial character

Preservation of the original spatial character refers to the continuity of the building's scale, volumetric integrity, and fundamental spatial relationships, rather than merely the preservation of individual building elements. Therefore, even when the materials or facade elements of a building are preserved, an adaptive reuse process may completely eliminate its original spatial character. The preservation of spatial character therefore enables originality to be evaluated at a more holistic level.

Tate Modern provides an important comparison in this regard. The study concerning the conversion of Bankside Power Station for cultural use indicates that the large-scale spatial quality of the existing building constitutes an important potential for the new use and that the interventions are related to

this potential (Shin, 2025). Similarly, in Kütüphane Troleybüs, the new use is not based on a spatial division that completely eliminates the existing volumetric characteristics of the building.

When the two examples are considered together, the preservation of spatial character does not mean limiting all changes required by the new function. Rather, it is important that the new use benefits from the characteristic spatial features of the building instead of eliminating them. Thus, the spatial qualities resulting from the building's previous use become not only elements that need to be preserved but also an existing resource used in establishing the new use.

Spatial and functional flexibility

Spatial and functional flexibility is addressed in this study not only in terms of the ability of the adaptively reused building to meet its current use requirements, but also in terms of its capacity to accommodate different forms of use within the same spatial framework. Therefore, the source of flexibility does not always lie in the addition of new spaces. The scale, openings, and spatial organization of the existing building can also create a capacity to support different use scenarios.

In this respect, the LocHal example provides a meaningful basis for comparison with the Kütüphane Troleybüs. In the study by Sedes and Mumcuoğlu (2023), the large industrial space of LocHal is associated not only with its library function but also with uses that accommodate different events and public activities. This indicates that the large and open spatial characteristics of industrial buildings can create the potential to accommodate different activities following adaptive reuse (Table 3).

For Kütüphane Troleybüs, however, the main source of flexibility lies not in the continuous addition of new spaces but in the ability of the existing spatial configuration to accommodate different forms of use. Therefore, the flexibility referred to here does not necessarily mean that the building can be converted to a different function in the future. Rather, it is evaluated in a more limited and measurable manner as the ability to accommodate different use scenarios within the existing library program and the same spatial framework.

CONCLUSION

This study examined the adaptive reuse process of the Trolleybus Power Centre, located in Beyazıt, Istanbul and currently used as the Kütüphane Troleybüs, through the relationship between the building's original architectural, structural, and technical features and the spatial arrangements required by the new library function. The evaluations demonstrated that the fundamental features constituting the building's industrial identity have been preserved during the adaptive reuse process, while the interventions required by the new use have been implemented in relation to the existing spatial configuration. In this respect, Kütüphane Troleybüs presents a distinctive example of bringing a disused transportation infrastructure building into contemporary public use through conservation and adaptive reuse.

In the adaptive reuse of the building, the conservation approach should not be limited to the facade and architectural elements. The continued presence of the load-bearing system and technical elements related to the building's industrial operation supports the legibility of physical traces associated with the building's past within its current use. In addition, the differentiation of new interventions from the original building elements through their formal and material characteristics allows the different periods of the building to be distinguished from one another.

Thus, in Kütüphane Troleybüs, a relationship has been established between the past and contemporary use by balancing the preservation of existing values with the accommodation of new requirements, rather than either fixing the building's originality entirely or reconstructing the building according to its new function.

Resolving the library function within the existing high-volume space, wide spans, and open spatial organization indicates that the building's original spatial character has been considered an opportunity rather than a constraint for the new use. The ability to accommodate different forms of use, such as working, reading, computer use, seminars, and group work, within the same overall spatial configuration indicates the potential of the existing spatial organization to support different use scenarios. However, this does not in itself demonstrate the building's convertibility to different functions or its capacity for future adaptation. Therefore, spatial and functional flexibility in this study was evaluated not in terms of the capacity to convert the building to a different function, but in terms of the ability to accommodate different forms of use within the same spatial framework under the existing library function. This finding indicates that developing new uses for industrial heritage buildings based on their existing spatial capacity may contribute to establishing a balance between the preservation of heritage values and the requirements of contemporary functions.

However, the positive characteristics of the adaptive reuse process in terms of the relationship between conservation and new use do not mean that the building has no limitations with regard to current use requirements. In particular, the absence of an elevator constitutes a significant limitation in terms of accessibility. Providing vertical access only by stairs may restrict users with mobility limitations from accessing different levels and areas of the building. Therefore, in the adaptive reuse of industrial heritage buildings, it is important to consider the preservation of the original spatial character together with current accessibility requirements. Kütüphane Troleybüs example also demonstrates that conservation decisions should be evaluated not only in terms of maintaining existing historical and architectural values, but also in relation to the accessibility conditions required by the building's current public use.

The main contribution of the study is to examine adaptive reuse interventions in an industrial heritage building associated with transportation infrastructure through evaluation criteria highlighted in the literature, thereby demonstrating the relationship between conservation, intervention, and new use through a concrete case. The comparison with the LocHal Library, Tate Modern, and Large Machine Factory examples has enabled the interventions at Kütüphane Troleybüs to be interpreted not only in relation to the specific case, but also within the framework of approaches such as originality, level of intervention, distinguishability, compatibility, and spatial potential that are prominent in the adaptive reuse of industrial heritage. Accordingly, the study provides a case-based evaluation of the relationship between industrial heritage buildings associated particularly with transportation and energy infrastructure and new public functions.

The limitation of the study is that the evaluations are confined to data obtained through literature review, on-site observation, photographs, and comparisons of existing and historical plans and drawings. User interviews, systematic observation of user behaviour, and measurements related to acoustic, lighting, and indoor environmental conditions were not included within the scope of the research. Therefore, the results were interpreted based on the observable architectural, spatial, and intervention characteristics of the building rather

than user experience or its capacity for future functional change. Future studies examining the accessibility experiences of different user groups, user behaviours, and indoor environmental conditions, as well as comparatively addressing similar transportation infrastructure buildings, may enable more comprehensive evaluations of the adaptive reuse of industrial heritage buildings.

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Conflict of Interest

No conflict of interest was declared by the authors.

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Ethics Committee Approval

Ethics committee approval was not required for this article.

Legal Public/Private Permissions

In this research, the necessary permissions were obtained from the relevant participants (individuals, institutions and organizations) during the survey, indepth interview, focus group interview, observation or experiment.

REFERENCES

Álvarez, J. (2023). *Electromote: The Story of the First Trolleybus Invented by the Founder of Siemens.* Labrujulaverde. Retrieved June 07,2026, https://www.labrujulaverde.com/en/2023/12/electromote-the-story-of-the-first-trolleybus-invented-by-the-founder-of-siemens/

Arısal, M. (2025). İkame edilen ulaşım: İstanbul troleybüs deneyiminin ekonomik ve tarihsel bağlamda incelenmesi (1961-1984). *Akademik Yaklaşımlar Dergisi, 16*(2), 857-890. https://doi.org/10.54688/ayd.1738342

Ayvaz, E.,& Halaç, H.H. (2023). Endüstriyel miras örneği olan gazhanelerin yeniden işlevlendirilmesi: Hasanpaşa Gazhanesi. *Fırat Üniversitesi Sosyal Bilimler Dergisi*, 33, (2), 1005-1022. https://doi.org/10.18069/firatsbed.1239006

Batur, A., & Batur, S. (1970). Sanayi, sanayi toplumu ve sanayi yapısının evrimi üzerine bazı düşünceler. *Mimarlık, 80*,26-41.

Bozkurt, G. (2024). *Yeniden işlevlendirilen endüstri mirası yapılarında teknik kalite bağlamında bir değerlendirme* (Master's thesis). YÖK Ulusal Tez Merkezi.

Burden, E. (2004). *Illustrated dictionary of architectural preservation: restoration, renovation, rehabilitation, reuse*. McGraw-Hill.

Büyükarslan, B., & Güney, E. D. (2013). Endüstriyel miras yapıların yeniden işlevlendirilme süreci ve İstanbul Tuz ambarı örneği. *Beykent Üniversitesi Fen ve Mühendislik Bilimleri Dergisi,* 6(2), 31-58. https://izlik.org/JA48LU96CK

Cansız, A.U. (2024). *Kütüphane Troleybüs,* Arkitera. Retrieved June 07,2026 https://www.arkitera.com/proje/kutuphane-troleybus/

Çeltekligil, A., & Arabacıoğlu, F. P. (2025). Adaptive reuse in industrial heritage: A bibliometric review (2004-2024). Proceedings of the International Conference

of Contemporary Affairs in Architecture and Urbanism-ICCAUA 8(1), 850–862. https://doi.org/10.38027/ICCAUA2025EN0108

Google Maps (n.d.), *Kütüphane Troleybüs*, [İstanbul Google Haritası]. Retrieved June 07,2026, https://maps.app.goo.gl/hV4iWhgLcav91rYu8

Göçer, P. Ö. (2003). Devingen toplum esnek mekanlar ister. *Arredemonto Mimarlık Dergisi*, *2*, 9-13.

Hançerlioğlu, O. (1981*). Ekonomi Sözlüğü,* Remzi Kitabevi.

ICOMOS & TICCIH. (2011). *Joint ICOMOS–TICCIH principles for the conservation of industrial heritage sites, structures, areas and landscapes (The Dublin Principles)*. ICOMOS. https://ticcih.org/wp-content/uploads/2013/10/GA2011_ICOMOS_TICCIH_joint_principles_EN_FR_final_20120110.pdf

International Council on Monuments and Sites (ICOMOS). (1964). *International charter for the conservation and restoration of monuments and sites (The Venice Charter)*. ICOMOS.

İstanbul Büyükşehir Belediyesi. (İBB). (n.d.) *İBB Kütüphane Troleybüs. Atatürk Kitaplığı.* Retrieved November 01,2026 https://ataturkkitapligi.ibb.gov.tr/tr/Kitaplik/Kutuphanelerimiz/IBB-Kutuphane-Troleybus/27

İstanbul Elektrik Tramvay ve Tünel İşletmeleri (İETT). (n.d.), *Troleybüs*, Retrieved June 07,2026 https://iett.istanbul/icerik/troleybus

İstanbul Valiliği, İstanbul İl Afet ve Acil Durum Müdürlüğü, & İstanbul Proje Koordinasyon Birimi. (2014). *Kültürel mirasın korunması.* https://www.guvenliyasam.org/wp-content/uploads/2016/02/KULTUREL.pdf

Karay, N. (2022, 12 Mart). *112 yıllık troleybüs merkezi artık okurların buluşma noktası: Kütüphane Troleybüs.* Ajandakolik. https://www.ajandakolik.com/112-yillik-troleybus-merkezi-artik-okurlarin-bulusma-noktasi-kutuphane-troleybus/

Kariptaş, F. (2010). Endüstri mirası kapsamındaki yapıların günümüz şartlarında değerlendirilmesi ve Kasımpaşa tuz ambarı örneği. (Yüksek Lisans Tezi). YÖK Ulusal Tez Merkezi.

Köksal, T. G., & Ahunbay, Z. (2010). İstanbul'daki endüstri mirası için koruma ve yeniden kullanım önerileri. *İTÜ Dergisi/a, 5*(2). 125-136 http://itudergi.itu.edu.tr/index.php/itudergisi_a/article/viewFile/891/811

Köksal, T.G. (2005). İstanbul'daki endüstri mirası için koruma ve yeniden kullanım önerileri, (Doctoral thesis), YÖK Ulusal Tez Merkezi.

Kurtar, C., & Somuncu, M. (2013). Kentsel kültürel mirasın korunması ve sürdürülebilirliği: Ankara Hamamönü örneği *Ankara Araştırmaları Dergisi,* 1(2), 35-47.

Nocca, F., & Remøy, H. (2026). Abandoned industrial heritage: From waste to resource. Which evaluation tools to evaluate this circular process? *Journal of Cultural Heritage*, *77*, 207-222. 10.1016/j.culher.2025.11.013

Özdemir, M. (2015). Endüstri mirasının yeniden işlevlendirilmesi; Beykoz Deri ve Kundura Fabrikası örneği. (Yüksek Lisans Tezi). YÖK Ulusal Tez Merkezi.

Rodrigues, G. S., Reis, J. G. M. D., Orynycz, O., Tucki, K., Matijošius, J., & Machado, S. T. (2024). Environmental impact reduction of a trolleybus system in the city of São Paulo, Brazil. *Energies*, *17*(6), 1377. https://doi.org/10.3390/en17061377

Sedes, F., & Mumcuoğlu, D. E. (2023). Kültürel Amaçla Yeniden İşlevlendirilen Endüstri Yapılarında Çağdaş Ek Tasarımları: LocHal Kütüphanesi Örneği. *Akademik Tarih ve Düşünce Dergisi*, *10*(4), 1038-1056. https://izlik.org/JA42LJ84TW

Shin, Y. J. (2025). The adaptive reuse design strategies–focused on the case of the Tate Modern architectural competition. *Journal of Asian Architecture and Building Engineering, 24(2),* 554-569.https://doi.org/10.1080/13467581.2023.2300387

The International Committee for the Conservation of the Industrial Heritage *(TICCIH)*. (2003). *The Nizhny Tagil charter for the industrial heritage*.

Tunalı, S. K., & Güneş, S. (2024). Sustainability of historical buildings through reuse projects: A case study of the Kadıköy District in İstanbul. *DEPARCH Journal of Design Planning and Aesthetics Research*, *3*(1), 97-121. https://doi.org/10.55755/DepArch.2024.29

Tunçer, İ. B., & Can, S. A. (2022). Endüstri mirası yapıların yeniden işlevlendirilmesi: Üç farklı tütün fabrikasının dönüşümü. *Mimarlık ve Yaşam, 7*(1), 333-357. https://doi.org/10.26835/my.1073617

Vafaie, F., Remøy, H., & Gruis, V. (2023). Adaptive reuse of heritage buildings; a systematic literature review of success factors. *Habitat International, 142,* 102926. 10.1016/j.habitatint.2023.102926

Yalçın, G. (2024). Tarihî yapıların yeniden kullanımı kapsamında işlev değişikliğinin değerlendirilmesi: Tarihî Bitlis Belediye Binası örneği. *IDA: International Design and Art Journal,* 6(1), 26-42.

Xiong, X., Wang, Y., Ma, C., & Chi, Y. (2023). Ensuring the authenticity of the conservation and reuse of modern industrial heritage architecture: A case study of the Large Machine Factory, China. *Buildings*, *13*(2), 534. https://doi.org/10.3390/buildings13020534

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