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Human-Centred Adaptive Reuse of Building Heritage: A Comparative Ex-Post and Ex-Ante Evaluation of Abandoned Areas in Maribor, Slovenia

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ABSTRACT

Adaptive reuse has become an important strategy for preserving building heritage while addressing contemporary environmental, social, and cultural challenges. Yet the social dimension of adaptive reuse and users' experiences remain insufficiently explored in evaluation practice. Furthermore, existing evaluation methods are primarily applied to completed projects and rarely support the assessment of projects still under development. This paper develops a Human-Centred Adaptive Reuse Evaluation Framework (HCAREF) for building heritage, investigating whether human-centred design principles can be applied to both retrospective (ex-post) and prospective (ex-ante) evaluations. A literature review on adaptive reuse and human-centred design was conducted to identify the key evaluation dimensions, forming an integrated framework that was then applied to three case studies from Maribor, Slovenia. Two completed projects, the Minorite Monastery Complex and the Judgement Tower, were evaluated ex post through field observations and document analysis, while the Centre Rotovž project was assessed ex ante using project documentation, architectural drawings, and visualisations. The findings indicate that the proposed framework can support the evaluation of adaptive reuse projects at different stages of development, providing a practical decision-support tool for architects, planners, and heritage professionals while advancing the integration of human-centred principles into adaptive reuse practice. The framework provides a structured basis for comparing realised qualities in completed projects with intended qualities in an ongoing project.

Keywords: Human-centred design, Adaptive reuse, Building heritage, Evaluation framework, Ex-post evaluation, Ex-ante evaluation

INTRODUCTION

Adaptive reuse has become a central strategy in heritage-led urban regeneration because it allows historic buildings to remain active parts of contemporary city life while preserving their cultural and architectural significance (Vafaie et al., 2023; Li et al., 2021). In the literature, adaptive reuse is often presented as a balance between conservation, sustainability, and economic viability, yet evaluation frameworks remain uneven and fragmented, with many studies focusing on technical or economic outcomes rather than user-oriented ones

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(Li et al., 2021; Zhang and Zhang, 2023). This leaves a gap in understanding how reused heritage buildings perform as socially meaningful environments (Samavati and Desmet, 2022; Hedayatian and Einifar, 2025). This gap is especially relevant in public heritage buildings, where reuse should support not only preservation but also accessibility, inclusiveness, comfort, and civic life (Gravagnuolo et al., 2024; John et al., 2025). Human-centred design shifts attention from the building as a heritage object to the building as a setting for use, participation, and social interaction (Žegarac Leskovar and Šenk, 2024; Samavati and Desmet, 2022). In adaptive reuse, that means asking not only what has been preserved, but also how the transformed building and the broader regeneration of abandoned areas can support contemporary demands, belonging, and public engagement (Hedayatian and Einifar, 2025; Lestari et al., 2026).

This paper therefore develops and applies a Human-Centred Adaptive Reuse Evaluation Framework (HCAREF) for comparing reused heritage buildings across different project stages. The framework is applied to the completed Minorite Monastery Complex, the completed Judgement Tower, and the ongoing Centre Rotovž project, all three in Maribor, Slovenia. The aim is to see whether one qualitative framework can capture both ex-post performance and ex-ante design intentions while remaining simple enough for practice (Zhang and Zhang, 2023; Vafaie et al., 2023).

METHODOLOGY

The study adopts a qualitative multiple-case study design to examine the applicability of the proposed Human-Centred Adaptive Reuse Evaluation Framework (HCAREF) across different stages of adaptive reuse. The comparative structure of the study allows the analysis of similarities and differences between completed and ongoing interventions, and supports the assessment of whether a single framework can operate across ex-post and ex-ante contexts (Vafaie et al., 2023; Zhang and Zhang, 2023). The workflow of the study is shown in Figure 1.

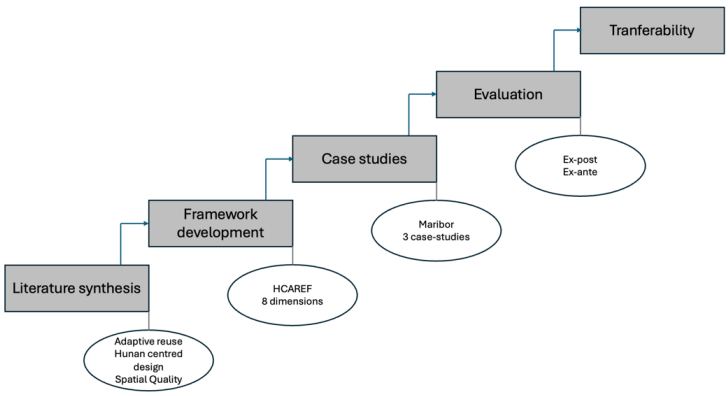


Figure 1: The methodological workflow of the study.

Research Design

The framework was developed through a targeted literature synthesis drawing on human-centred design, spatial quality, and adaptive reuse research. The identified dimensions were then organised into a coherent evaluation structure that could be operationalised across multiple case studies and compared consistently (Li et al., 2021; Vafaie et al., 2023; John et al., 2025). The study uses a qualitative comparative logic in which each case is read through the same evaluation dimensions in order to identify similarities, differences, and stage-specific patterns. The framework is not intended to produce a numerical ranking, but to support structured interpretation of how adaptive reuse projects respond to human-centred qualities of space and use.

Case Selection and Data Sources

Three case studies from Maribor, Slovenia, were selected for comparative analysis. The Minorite Monastery Complex and the Judgement Tower were chosen as completed adaptive reuse projects that allow ex-post evaluation based on direct observation of the built environment, supported by document analysis and publicly available sources. Centre Rotovž was selected as a project currently under development, making it suitable for ex-ante assessment using architectural drawings, project documentation, and visualisations (Minoriti, n.d.-a; Minoriti, n.d-b; Žegarac Leskovar and Šenk, 2024).

The following section provides a brief overview of the selected case studies.

The Minorite Monastery (see Figure 2), constructed in the 13th century, represents the sole surviving monastic complex from the medieval period in the town of Maribor, Slovenia. Following its dissolution in 1784, the complex was repurposed for military need until 1927. Subsequently, the monastery was used as a modest residential building and theatre's warehouses. Since 2004, the building remained uninhabited, resulting in a gradual decline in its condition. However, after a comprehensive renovation project commenced in 2007 and finished by 2010, the site was repurposed to house the Maribor Puppet Theatre (Čelik, 2019; Žegarac Leskovar and Šenk, 2024). Figure 1 illustrates the condition of the building prior to and following the transformation.



Figure 2: The Minorite Monastery Complex before and after transformation (Source: photography by Igor Sapač).

The Judgement Tower (see Figure 3) is a medieval defensive tower dating from the early 14th century, located on the edge of the historic centre of

Maribor and originally forming part of the city's fortification system. Before its most recent renewal, the building had already undergone several changes in function and identity, but it remained one of the most recognisable heritage elements on the Lent riverfront. The 2021 renovation, carried out as part of the broader revitalisation of Minorite Complex and Military square, transformed the tower into a multifunctional cultural venue with two performance spaces, one on the ground floor and one on the first floor, while maintaining its cultural and historical character. Its current use places it within the broader Minoriti cultural quarter and supports a public programme of cultural and social events (Minoriti, n.d.-b; Minoriti Cultural Quarter, n.d.; Open House Slovenia, n.d.-b).



Figure 3: The Judgement Tower (Source: author's own archive).

The Centre Rotovž (see Figure 4) is a major civic redevelopment project in the historic core of Maribor, Slovenia, intended to transform the Rotovž site into a contemporary cultural and public complex. The project is a programmatic upgrade of the 2008 competition solution and combines the reuse of protected historic structures with new construction. In its renewed form, it will accommodate the Maribor Library, the Maribor Art Gallery, and an art cinema, thereby creating a multifunctional cultural centre focused on books, education, culture, and digitalisation (Maribor Municipality, n.d.; Open House Slovenia, n.d.-a; Medprostor, 2008). The project is currently under construction.



Figure 4: The Centre Rotovž during the transformation process and a visualisation of the planned renovation. (Source: author's own archive).

All three projects are situated on formerly abandoned sites whose transformation and regeneration formed part of the comprehensive renewal of Maribor's city centre. This process was executed through a series of open architectural and urban design competitions held under the Chamber of Architecture and Spatial Planning of Slovenia. Similarly, the redevelopment of each individual project examined in this study was preceded by an open architectural competition.

The case material was drawn from field observation, document analysis, publicly available project descriptions, architectural visual material, and official web sources. The selected cases are comparable in that all three involve the transformation of heritage structures in the historic urban context of Maribor, while differing in programme, scale, and stage of implementation. This makes them suitable for examining whether HCAREF can support both retrospective evaluation and early-stage decision-making in a consistent way (Li et al., 2021; Zhang and Zhang, 2023).

Limitations

This study is limited by its qualitative design, the small number of cases, and the absence of interviews, questionnaires, and systematic post-occupancy evaluation. In addition, the ex-ante assessment of Centre Rotovž addresses intended spatial qualities that could not yet be verified through actual use.

Evaluation Framework and Indicators

The HCAREF assesses eight dimensions: accessibility, inclusiveness, environmental comfort, social interaction, flexibility, identity, sense of place, and publicness. Each dimension was translated into a set of concrete interpretive indicators to make the evaluation transparent and comparable across cases.

Accessibility was assessed through entry legibility, internal movement, orientation, and the extent to which the spatial arrangement allows use by a broad range of users. **Inclusiveness** was assessed through the ability of the project to accommodate different user groups, uses, and participation patterns. **Environmental comfort** referred to light, acoustics, thermal conditions, and the general ease of occupancy. **Social interaction** captured the capacity of the project to support gathering, encounter, and shared use. **Flexibility** referred to the ability of the spatial arrangement to support multiple uses or future adjustment. **Identity** concerned the recognisability of the heritage character and the extent to which the intervention preserves or reinforces the building's cultural meaning. **Sense of place** referred to the experiential quality through which the building remains connected to its location, memory, and urban context. **Publicness** indicated the degree to which the project operates as an open and accessible civic space rather than as a restricted or exclusive environment (Samavati and Desmet, 2022; Lestari et al., 2026; Hedayatian and Einifar, 2025).

Each dimension was assessed through qualitative assessment derived from observation, documentation, drawings, and visualisations. To keep the comparison readable and consistent, each dimension was interpreted using a three-level scale: strong, moderate, or weak. The categories strong, moderate, and weak were used as qualitative interpretive categories.

A strong assessment indicates that a dimension was clearly supported by the available evidence; a moderate assessment indicates that it was partially supported or dependent on spatial, programmatic, or heritage-related constraints; and a weak assessment indicates limited support in the available evidence. The categories do not constitute numerical scores or a statistical ranking but provide a transparent basis for cross-case comparison. These assessments are therefore interpretive rather than statistical and are intended to support cross-case comparison rather than measurement in a strict quantitative sense. (Gravagnuolo et al., 2024; Cucco et al., 2023).

Analytical Procedure

The analysis was conducted in three steps. First, the relevant material was collected for each case, including field observations, project documentation, publicly available project descriptions, architectural drawings, visualisations, and photographic material. Second, this material was reviewed according to the eight HCAREF dimensions. Third, the three cases were compared using the same qualitative categories in order to identify similarities, differences, and stage-specific characteristics.

For the completed Minorite Monastery Complex and Judgement Tower, the assessment was based primarily on observable spatial and programmatic conditions, supported by document analysis. For Centre Rotovž, which is still under construction, the assessment was based on qualities expressed in the available design documentation, architectural drawings, and visualisations. The ex-ante assessment therefore addresses intended design qualities rather than qualities verified through actual use.

The categories strong, moderate, and weak were used as qualitative interpretive categories. A strong assessment indicates that a dimension was clearly supported by the available evidence; a moderate assessment indicates that it was partially supported or dependent on spatial, programmatic, or heritage-related constraints; and a weak assessment indicates limited support in the available evidence. The categories do not constitute numerical scores or a statistical ranking, but provide a transparent basis for cross-case comparison.

RESULTS

The results are presented through a cross-case reading of the three projects according to the HCAREF dimensions. Rather than repeating the descriptive material from the methodology, this section focuses on the spatial and experiential qualities that emerged from the comparison of case study sites.

Comparative Matrix of Case Studies

The Minorite Monastery Complex, based on field observation and programme documentation, demonstrates the strongest alignment between heritage continuity and public cultural use. The intervention preserves the monastery's architectural identity while accommodating movement, gathering, and a broad cultural programme that includes theatre, concerts, screenings,

and festivals (Minoriti, n.d.-a; Maribor Puppet Theatre, n.d.). It therefore performs particularly well in identity, sense of place, publicness, accessibility, and social interaction, while flexibility remains partly limited by the inherited monastic structure.

The Judgement Tower is especially strong in identity and sense of place, as indicated by field observation of its preserved historic form and its current cultural role. The tower also contributes to publicness through its role as a cultural venue, but its compact spatial scale means that accessibility, flexibility, and inclusiveness are more dependent on event format and inherited constraints (Culture.si, n.d.; Minoriti, n.d.-b).

The available project documentation indicates strong intended qualities in accessibility, inclusiveness, and flexibility for Centre Rotovž, which is conceived as a shared cultural complex combining the Maribor Public Library, the Maribor Art Gallery, and the Rotovž art cinema. As an ex-ante case, its assessment relies on intended spatial organisation, which suggests a public and adaptable environment with strong potential for social interaction and programmatic overlap (Maribor Municipality, n.d.; Open House Slovenia, n.d.-a; Medprostor, 2008). Since the project is still under construction, these qualities could not yet be confirmed through observation of use.

The comparative matrix of the selected case studies is presented in Table 1.

Table 1: Comparative matrix of the three case studies.

Dimension	Minorite Monastery Complex	Judgement Tower	Centre Rotovž
Accessibility	Strong – clear public entry and legible circulation	Moderate - compact and constrained circulation	Strong – planned multi-level access
Inclusiveness	Strong – broad cultural programme and open interior	Moderate – event-dependent participation	Strong – diverse cultural users and functions
Comfort	Strong – generous interior and clear public use	Moderate – small-scale, constrained interior	Strong – designed for adaptable public use
Social interaction	Strong – theatre, music, gathering, exhibition space	Moderate – event-based interaction	Strong – planned shared and multi-use space
Flexibility	Moderate – partly constrained by monastic structure	Moderate – spatially limited but usable	Strong – multi-programme, reconfigurable
Identity	Strong – monastery character clearly preserved	Strong – historic form remains dominant	Strong - heritage context retained in design
Sense of place	Strong – strong link to monastery and Lent	Strong – landmark role in city memory	Strong – embedded in historic city core
Publicness	Strong – clearly civic and open cultural use	Moderate – public, but scale-limited	Strong – major public cultural centre

DISCUSSION

The comparison indicates that identity and sense of place are the most stable strengths across all three cases, confirming that adaptive reuse in Maribor is closely tied to heritage continuity and urban recognition. The Minorite Monastery Complex and Centre Rotovž appear more expansive in terms of accessibility, social interaction, and publicness, while the Judgement Tower is more spatially constrained but still effective as a symbolic and event-oriented venue.

The results also suggest that the framework is most useful when it does not force all projects into the same type of success. Instead, it helps show how different heritage conditions produce different combinations of qualities. The completed projects demonstrate how reuse can generate strong public value, while the ex-ante case shows that design-stage ambitions can be assessed before completion, even if the final user experience is not yet available for observation (Samavati and Desmet, 2022; Gravagnuolo et al., 2024). The findings should be interpreted in relation to the different stages of the selected projects: the completed cases were assessed through observable conditions, whereas Centre Rotovž was assessed through intended qualities expressed in project documentation.

CONCLUSION

This paper proposed and applied HCAREF as a qualitative framework for assessing adaptive reuse across completed and ongoing heritage projects. Its main contribution lies in translating human-centred qualities of adaptive reuse into a compact interpretive method that can be applied both ex-post and ex-ante, making it useful for evaluating realised projects and for supporting early design reflection.

This context, adaptive reuse should not be understood solely as the transformation of individual heritage buildings, but as part of a broader, integrated regeneration process that addresses the surrounding public realm, urban fabric, and the social and functional reintegration of formerly abandoned areas.

The findings suggest that HCAREF can help structure the interpretation of both realised and projected qualities of adaptive reuse across different spatial types and stages of development. The completed projects demonstrate how heritage reuse can generate strong public value, while the ex-ante case shows how the framework can support design-stage reflection before completion.

The framework is therefore applicable for architects, heritage professionals, planners, and municipal decision-makers who need a practical yet conceptually grounded way to assess reuse projects. For further research, the application of the same approach to a larger set of cases, complemented by post-occupancy evidence and stakeholder perspectives, could help refine the indicators and strengthen the transferability of the framework across different contexts.

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