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Reuse of Industrial Heritage in Urban Regeneration

—A Case Study of Hirosaki Brick Art Museum, Shiroi Koibito Park and Xiaohe Park

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Abstract

This study explores the adaptive reuse of industrial heritage within the context of sustainable urban regeneration. Using the Dublin Principles established by ICOMOS and TICCIH as a theoretical framework, the research evaluates three representative cases: the Hirosaki Brick Art Museum in Hirosaki, the Shiroi Koibito Park in Sapporo and Xiaohe Park in Hangzhou. Through a literature review, case analysis, and field investigation, each site was examined across four key dimensions: comprehensive documentation, legal and institutional protection, adaptive reuse and reversibility and local communication and public engagement.

Keywords

Industrial Heritage, Sustainable Urban Regeneration, Dublin Principles, Case Study

1. Introduction

Urbanization has accelerated the transformation of industrial land use in many cities. Governments are increasingly focused on improving the urban environment and optimizing industrial structures. Factories that once played an important role in the early stages of urban growth have gradually relocated from city centers to suburban or peripheral areas. This process has left many former industrial sites and buildings unused within the center of urban areas.

The direct demolition of these old factory areas often results in the loss of valuable urban heritage and city memory. Such sites carry collective memories and reflect the city's industrial evolution and social history. Recognizing their culture,

many local governments have begun to explore the adaptive reuse of old industrial parks. Through regeneration and transformation, these spaces can be integrated into the sustainable development of cities. They can serve as new public spaces that preserve urban identity while supporting economic, social and environmental goals.

Most existing studies focus on individual case analyses. However, few studies have systematically compared multiple international cases. This study fills this gap by adopting a comparative perspective to examine different examples of industrial site regeneration.

2. Methods

This study employs a qualitative approach, comprising three primary research methods: a literature review, case study analysis and field investigation.

2.1. Literature Review

The International Council on Monuments and Sites (ICOMOS) and the International Committee for the Conservation of Industrial Heritage (TICCIH) jointly issued the Dublin Principles, which outline four key principles for the conservation of industrial heritage sites. These principles provide a theoretical foundation for this study and serve as a standard for evaluating practical cases (ICOMOS & TICCIH, 2011).

2.2. Case Study Analysis

We selected Hirosaki Brick Art Museum, Shiroi Koibito Park, and Xiaohe Park as an analytically diverse yet manageable set that typifies three recurrent industrial-heritage reuse models in East Asian cities: culture-led museum conversion (Hirosaki), tourism/brand-led complex (Shiroi Koibito), and community-integrated riverside park (Xiaohe). All three were originally industrial, underwent major adaptive reuse within the last two decades, and now provide publicly accessible programs. This composition allows a controlled comparison of governance frameworks, conservation strategies and participation mechanisms across distinct operational logics. Limiting the sample to three avoids superficial breadth and enables comparable, evidence-rich analysis grounded in field investigation and documents.

2.3. Field Investigation

The fieldwork focused on observing how space is utilized within each site, identifying both effective design strategies and underlying space challenges. The findings contribute to a deeper understanding of spatial adaptation in the reuse of industrial heritage.

On-site observations were conducted at Hirosaki Brick Art Museum, Shiroi Koibito Park and Xiaohe Park. For each visit we logged weather, crowd level, and any special events to contextualize behavior. Visit dates and context controls

(weather, crowd level, special events) are summarized in Table 1.

Standardized observation checklist (applied at all sites). (a) access & wayfinding; (b) retention/readability of industrial fabric (structures, machinery, material traces); (c) program mix & spatial sequencing; (d) visitor behaviors (paths, dwell time); (e) community use (non-touristic routines, volunteering); (f) maintenance/governance cues (signage, staff presence); (g) risk factors (over-commercialization, congestion, fabric stress).

Table 1. Visit dates and on-site context.

	Visit Date	Weather	Crowd Level	Special Event
Hirosaki Brick Art Museum	2024.8.21	Sunny	med	historical overview of the building
Shiroi Koibito Park	2025.1.15.	Snow	high	/
Xiaohe Park	2025.8.16	Sunny	high	open-air concert

2.4. Comparative Evaluation Method

To evaluate the sustainability and heritage value of industrial site regeneration, this study adopts four key principles derived from the Dublin Principles jointly issued by ICOMOS and TICCIH (ICOMOS & TICCIH, 2011). These principles provide a theoretical framework for analyzing each case and serve as evaluation standards in the comparative study.

1) From observations to dimensions.

- Comprehensive Documentation

All architectural structures, equipment, archives and traditional techniques should be carefully documented. A multidisciplinary approach is necessary to comprehend and interpret the cultural and technological values of the heritage site.

- Legal and Institutional Protection

Industrial heritage should be safeguarded through legal mechanisms, heritage listings and rapid response systems. Protection measures must consider not only the buildings themselves but also machinery, documents and spatial context as an integrated whole.

- Adaptive Reuse and Reversibility

Reuse should prioritize original or compatible functions while maintaining the integrity of the heritage. Any alterations must be reversible and traceable, ensuring compliance with conservation standards and minimizing damage to historical factors.

- Local Communication and Public Engagement

The transformation process should be well-documented, from discard to renewal. Interpretation and education should occur on-site, promoting public awareness and encouraging collaboration among citizens, enterprises and local authorities.

2) Scoring rubric

We translated qualitative observations into ratings using anchored descriptors (1 = poor, 3 = adequate, 5 = exemplary):

- Comprehensive Documentation (CD): extent and quality of documentation of industrial structures, machinery, processes, and intangible skills; presence of research, recording, and interpretive media.
- Legal and Institutional Protection (LIP): clarity and enforce ability of heritage/legal protection, planning controls, compliance/monitoring, and integration in statutory/municipal plans.
- Adaptive Reuse and Reversibility (ARR): reversibility and compatibility of new insertions; material/structural fit; legibility of the industrial narrative after reuse.
- Local Communication and Public Engagement (LCPE): breadth/continuity of community participation (co-creation, programming, volunteering), inclusiveness, and everyday live ability beyond tourism.

3. Findings and Discussion

3.1. Cultural Symbolic Type (Hirosaki Museum of Contemporary Art)

Originally built about one hundred years ago as a red-brick's sake brewery, the building was renovated and reopened as the Hirosaki Brick Art Museum (**Figure 1**) in 2020 (Architects, 2020). The first-floor hosts exhibitions featuring works by local artists, while the second-floor displays information about the building's history, materials and renovation process.

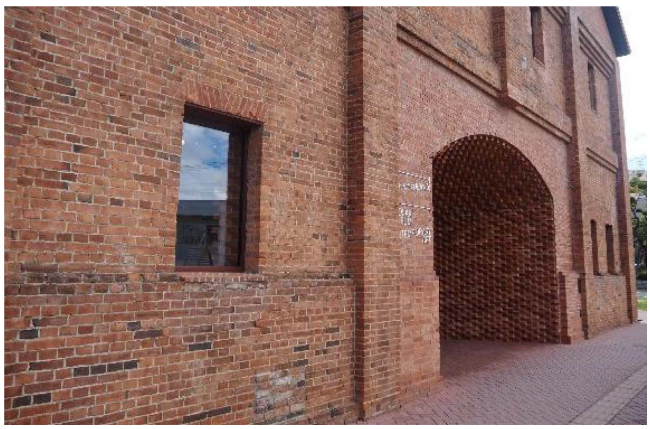


Figure 1. Exterior view of Hirosaki museum of contemporary art.

1) Comprehensive Documentation

Before renovation, the designer recorded the building's condition in detail. Old blueprints, photographs and construction notes from the original brewery were collected and archived for future reference. The renovation process was also documented and later displayed in the museum's second-floor exhibition. Brick fabric, machinery traces, and on-site panels provide clear material narrative (Princi-

ples 1 - 3; Principle 14).

2) Legal and Institutional Protection

The building is managed by the Hirosaki City government and designated as part of the city's modern heritage protection system. Although not under national protection, it benefits from stable local policy support and maintenance funding. Visible steward presence and maintenance signage reflect active administrative measures (Principles 5 - 6).

3) Adaptive Reuse and Reversibility

The renovation retained the original red-brick fade and roof structure. New lighting, display walls and accessibility upgrades were added without damaging the main frame. All new elements can be removed if necessary, preserving the integrity of the structure. Reversible, dry-joint insertions and preserved bay spacing keep the industrial layout legible (Principles 9 - 10).

4) Local Communication and Public Engagement

During visiting hours, staff members give several short talks each day, explaining the structure and construction techniques used in the original brewery and its restoration. The exhibitions include panels about local industry history, helping visitors understand the site's background. However, broader community involvement outside the museum remains limited. Steady dwell around semi-sheltered edges suggests everyday, non-touristic use (Principle 11).

5) Summary

A historic red-brick warehouse is transformed into a museum by retaining the load-bearing masonry shell and legible industrial components while inserting reversible exhibition and public spaces. In terms of access & connectivity, public foyers and a permeable ground level link tourist flows with civic use (lectures, workshops, evening events); for industrial fabric readability, material and structural storytelling—exposed brick stratigraphy, steel connections, and traces of former openings—translates production history into curatorial narratives; for program mix & sequencing, calibrated old-new joints (free-standing galleries, lightweight catwalks, and service cores set off the walls) pace movement and extend dwell time; in community operation & governance, predictable maintenance is enabled by reversible insertions that protect original fabric. The four-dimension evaluation for this case is shown in Figure 2.

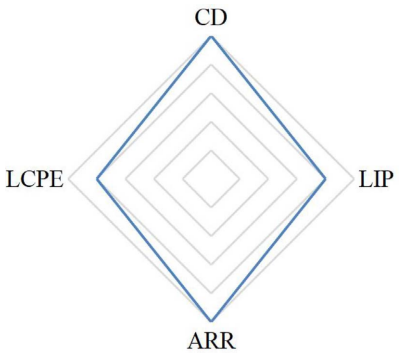


Figure 2. Evaluation of Hirosaki museum of contemporary art.

3.2. Commercial Tourism Type (Shiroi Koibito Park)

The original Ishiya Confectionery Factory was established in 1976 in Sapporo. The site underwent a large-scale renovation beginning in 2018 and officially reopened as Shiroi Koibito Park (**Figure 3**) in July 2019 (Ishiya Co., Ltd., 2024).

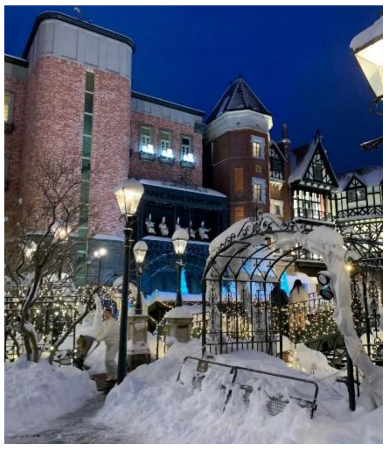


Figure 3. Exterior view of Shiroi Koibito park.

1) Comprehensive Documentation

Before renovation, the company recorded factory layouts and some production equipment for display in the museum area. However, not all machinery and technical processes were preserved. Documentation mainly focused on the brand and product history rather than the industrial system. Brand storytelling should be balanced with industrial process records to avoid narrative dilution (Principles 2 - 3; Principle 14).

2) Legal and Institutional Protection

The site remains privately owned and has not been designated as a cultural heritage property. While the project receives recognition from the Sapporo tourism bureau, it lacks formal protection under cultural property law. Future modifications depend on the company's management decisions. Strong operational management is evident, but heritage controls should be made more explicit to the public (Principles 5 - 7).

3) Adaptive Reuse and Reversibility

The park preserves part of the original factory structure, incorporating transparent viewing corridors and themed areas. New additions, such as gardens, cafes and event halls, are independent of the main factory building, allowing for reversible adaptation. The industrial identity is partly retained, though heavily commercialized. New routes and fit-outs remain compatible with significant components, though some thresholds dominate (Principles 9 - 10).

4) Local Communication and Public Engagement

The park promotes industrial culture through guided tours, workshops and viewing programs. It successfully attracts families and tourists, strengthening the city's cultural tourism profile. However, the engagement is mainly consumer-ori-

ented; educational or community-based programs are limited. Tourism-heavy programming risks narrowing engagement; broader community channels are desirable (Principle 12).

5) Summary

A confectionery brand—centered complex organizes production—viewing galleries, brand galleries, gardens, cafés, and retail into a narrative loop from making to tasting to purchasing, ending in a garden stroll. In terms of access & connectivity, clear entry sequencing and looped circulation keep flows legible and minimize backtracking; for industrial fabric readability, transparent production windows and curated "reveal" moments translate manufacturing processes into visitor-facing stories; for program mix & sequencing, tasting labs and courtyards act as dwell-time nodes that pace families and tour groups between retail anchors; in community operation & governance, a private operator under a municipal permitting interface stabilizes crowd control, safety, and events through a diversified revenue mix (admissions, merchandise, events). The four-dimension evaluation for this case is shown in **Figure 4**.

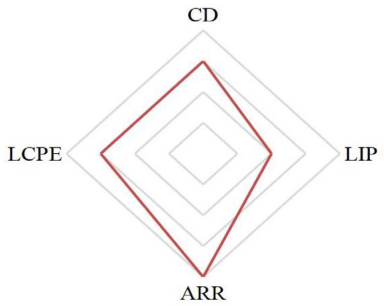


Figure 4. Evaluation of Shiroi Koibito park.

3.3. Community Integrated Type (Xiaohe Park)

The original Xiaohe Oil Depot was constructed around 1951 along the Grand Canal in Hangzhou. The depot ceased operations in 2019 and was redeveloped into Xiaohe Park (**Figure 5**), which officially reopened to the public in 2022 as part of the city's waterfront regeneration project (Kengo Kuma & Associates, 2024; Feng & Wu, 2024).

Figure 5. Exterior view of Xiaohe park.

1) Comprehensive Documentation

Before redevelopment, the local government recorded the site's structures, equipment and canal-side layout. Some of the original storage tanks and pipelines were retained and documented as part of the park's design archive. However, detailed technical documentation of the oil facilities was limited. Traces of former industry are retained and legibly referenced on site (Principles 2 - 3; Principle 14).

2) Legal and Institutional Protection

The site is included in Hangzhou's local industrial heritage list and managed under the Grand Canal protection plan. It benefits from municipal-level legal oversight and funding for landscape maintenance (Chen, 2023). However, it has not yet been listed as a national cultural heritage site. Routine upkeep and clear rules are visible in signage and stewarding (Principles 5 - 6).

3) Adaptive Reuse and Reversibility

The project preserved the main oil tanks, converting them into cafe galleries and exhibition spaces. Open lawns and pedestrian paths were added while maintaining the industrial layout. New interventions are subtle and reversible, demonstrating a respectful approach to the site's original structure. Additions respect historic alignments and keep river-edge structures readable (Principles 9 - 10).

4) Local Communication and Public Engagement

The park attracts residents and tourists with regular art markets and environmental workshops. The reuse of oil tanks as public spaces enhances awareness of industrial heritage. Public participation is strong, supported by community events and university collaborations. Slow-traffic loops and semi-outdoor rooms enable daily neighborhood use and co-presence (Principle 11).

5) Summary

A former industrial-storage belt is reimagined as a riverside public realm where linear greenways, a slow-traffic network, community nodes, and small-scale commerce form a continuous everyday landscape (Feng & Wu, 2024). In terms of access & connectivity, shaded walkways and permeable riverfront edges enable short, frequent visits rather than one-off "destination" trips; for industrial fabric readability, selected relics are adapted as furniture, shade, and wayfinding to create legible old-new joints; for program mix & sequencing, semi-outdoor pockets and covered corridors extend dwell time and support informal use (exercise, children's play) between formal anchors; in community operation & governance, district-level coordination with neighborhood partners enables lightweight programming and predictable maintenance, keeping costs low. The four-dimension evaluation for this case is shown in **Figure 6**.

4. Conclusion

This study compared three cases of industrial-heritage reuse—Hirosaki Brick Art Museum, Shiroi Koibito Park, and Xiaohe Park—through four operationalized principles derived from the Dublin Principles (ICOMOS & TICCIH, 2011): comprehensive documentation, legal protection and planning instruments, adaptive

reuse with reversibility, and locally resonant communication and participation. Detailed comparative ratings by dimension are presented in Table 2. A shared strength across cases is adaptive reuse: each project preserves essential industrial fabric while introducing cultural, recreational, or public programs that broaden accessibility and support year-round use.

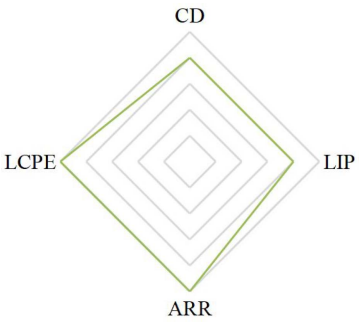
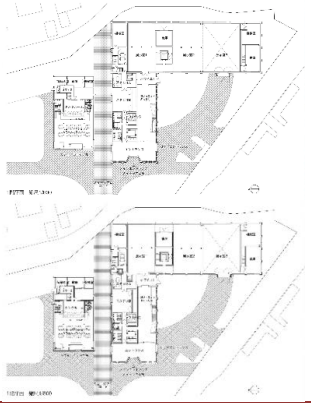
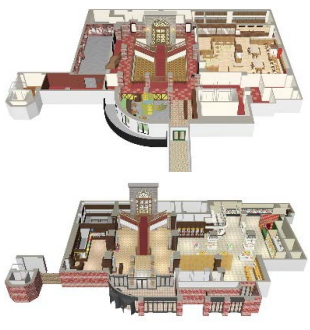


Figure 6. Evaluation of Xiaohe park.

Table 2. Basic information of the three case studies.

	Hirosaki Brick Art Museum	Shiroi Koibito Park	Xiaohe Park
Location	Hirosaki, Aomori, Japan	Nishi-ku, Sapporo, Japan	Gongshu District, Hangzhou, China
Original Function	Sake Brewery (Red Brick Warehouse)	Ishiya Confectionery Factory	Oil Depot and Storage Facilities
Current Use	Contemporary Art Museum	Themed Park	Riverside Public Park with Mixed Functions
	Cultural Symbolic Type	Commercial Tourism Type	Community Integrated Type
Construction Year	1921	1976	1951
Renovation/Reopening Year	Renovated 2018-2020, Reopened 2020	Renovated 2018-2019, Reopened July 2019	Redeveloped 2020-2022, Reopened 2022
Site Area/Building Area	Site Area: 3606.75 m^2 (including cafe building and park) Building Area: 1693.78 m^2 Total Floor Area: 3089.59 m^2	Site Area: 42,000 m^2 Building Area: 14,000 m^2	Site Area: 51,000 m^2 Building Area: 7000 m^2
Floor Plan			

Continued

Site Plan			

Governance and protection diverge more clearly. The two Japanese cases operate through a blend of municipal coordination and private ownership/operation, where conservation outcomes are stabilized via agreements and sustained cultural/brand programming. Xiaohe Park benefits from a transparent district-level regeneration framework that links heritage reuse to riverfront upgrades and neighborhood services (Chen, 2023). This contrast indicates that legal tools alone are insufficient; maintenance budgets, operator capacity, and program curation jointly determine long-term integrity.

On documentation, Hirosaki and Xiaohe offer relatively transparent records—design intents, phasing, and construction logic—supporting maintenance and scholarly appraisal. Shiroi Koibito effectively attracts visitors through brand-led narratives, yet this can obscure material and technical histories unless balanced by on-site interpretation. For public communication, the Japanese cases emphasize curated exhibitions and immersive experiences, whereas Xiaohe prioritizes community participation and environmental education along the canal.

Practice guidelines follow:

1) protect the carrier while diversifying uses;

2) document to operate—publish as-built archives, diagnostics, and maintenance protocols;

3) govern for continuity through multi-party stewardship and performance-based agreements;

4) communicate place-specific meaning via layered interpretation and digital media.

Design implications extend beyond facade retention, recommending reversible insertions with legible old-new joints, recombined circulation and open-space structures, seasonal comfort through calibrated indoor-outdoor gradients, and discreet service upgrades. Management implications include staged programming to mitigate seasonality, diversified revenue to fund conservation, and dual-track KPI that monitor both business and heritage metrics.

Limitations include the small sample; future research should expand cases, co-produce a weighted rubric with local stakeholders, quantify life-cycle environmental gains, and test how interpretive media shape public understanding.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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