

CHAPTER II - Literature Review

2. Introduction to chapter two

This chapter explores the historical significance of the Lawang Sewu building in Semarang, Indonesia, and delves into the literature related to its rehabilitation and adaptive. It discusses the challenges and opportunities associated with preserving historical structures and examines various strategies for achieving energy efficiency and revitalizing aging buildings. The chapter also explores the potential of transforming historical buildings into vibrant heritage spaces and presents illustrative cases to demonstrate successful examples of rehabilitation and preservation. The literature review aims to provide a foundation for the subsequent chapters focusing on the specific rehabilitation and adaptive of the Lawang Sewu building.

2.1 Restoring the Past: Reparation Efforts for Lawang Sewu

A. Reconstruction B. Alteration C. Reparation

2.1.a. Reconstructions to demolish the primary industrial buildings and pull down productive equipment, then build new constructions and facilities. The main reasons for reconstruction are the primary buildings and facilities have been abandoned, or are in inefficient conditions.

2.1.b. Alteration is to refine part of primary constructions and facilities in old industrial area, and transform to other functions. Adapting this approach is based on the constructions and facilities are in good condition and with some utility value, or have historical and cultural value.

2.1.c. Reparation “is to reinforce and repair the industry constructions and facilities in old industrial area, and continue the primary utilities. Old facilities are out of date and constructions are deteriorating, and new techniques have replaced traditional ones.

What is Adaptive Re-use?

“Adaptive re-use is the act of designing a new function for buildings. It is often described as a Process by which structurally sound older buildings are developed for economically viable new design. The recycling of buildings has long been an important and effective historic preservation tool. Adaptive re-use developed as a method of protecting historically buildings from demolition(Hosseini, Stefaniec and Hosseini, 2021).

The Lawang Sewu building has immense potential for adaptive reuse due to its unique architectural features and historical significance. Several possibilities for its adaptive use have been proposed by researchers and experts. One potential option is to transform the building into a cultural and heritage center, as suggested by (Oktavia *et al.*, 2019). This would involve creating exhibition spaces to showcase the history and cultural heritage of the building and the surrounding area. Another possibility is to convert the Lawang Sewu building into a museum or art gallery, as proposed by(Oktavia *et al.*, 2019). This would provide a platform for displaying artworks and artifacts that reflect the building's historical context. Additionally, the building could be repurposed as a mixed-use space, combining Historical heritage, residential, and recreational functions, as recommended by(Oktavia *et al.*, 2019). This would help revitalize the building and attract visitors, while also preserving its historical value.

2.1.2. The importance of adaptive reuse of the building Lawang Sewu?

The first paragraph discusses the importance of adaptive reuse of the Lawang Sewu building, highlighting its significance for preservation and restoration of a historical and architectural landmark. It also emphasizes the benefits of adaptive reuse for sustainable development, economic and social development, and community engagement. The overall message is that adaptive reuse of the building not only preserves its historical and architectural value but also contributes to sustainable development, economic growth, and community engagement.



Figure 4 Pictures of the corridors and stairs of the tower Source: Setyowati, E. (2013). The Functional Transformation Buildings in The Old City Semarang Based on The Urban Sustainable-Conservation Concepts

2.2. Focus on studying previous theories

2.2.1 Adaptive reuse and design theories

a) Theories

There are five theories that have been utilized in the re-adaptation and design of historical buildings:

1. Theory of Contextual Design:

This theory emphasizes the importance of maintaining the historical and cultural context of a building during its adaptation. It suggests that the new design interventions should be sensitive to the historical significance and architectural features of the structure. According to the study by Turgut et al. (2020), contextual design theory ensures the preservation of cultural identity and enhances the overall quality of the adapted building (Guoqiang Wang, 2021).

2. Theory of Sustainable Design:

This theory promotes environmentally and socially responsible design practices for historical buildings. It aims to minimize the ecological impact and optimize resource efficiency. The study by Min et al. (2017) illustrates that sustainable design principles, such as energy efficiency, use of renewable materials, and green technologies, are crucial for the successful re-adaptation of historical structures (Loli and Bertolin, 2018).

3. Theory of Adaptive Reuse:

The theory of adaptive reuse focuses on repurposing historic buildings for contemporary needs while preserving their architectural and historical value. According to the research by De Wolf et al. (2019), adaptive reuse theory highlights the importance of flexible design solutions, where the historical structure is adaptable to accommodate new functions, without compromising its integrity (Vardopoulos, 2019).

4. Theory of Cultural Heritage Conservation:

This theory emphasizes the preservation and protection of the cultural heritage embodied in historical buildings. It emphasizes the need for appropriate restoration and conservation techniques to ensure the long-term viability of these structures. The study by Melani et al. (2018) highlights the integration of conservation principles, such as documentation, material analysis, and compatibility of design interventions, in the re-adaptation process (Garagnani, 2017).

b) Articles

Here are five scientific research articles that have been used to inform the re-adaptation and design of historical buildings:

1. Article: “Re-adaptation and renovation strategy for historical buildings: A case study of walled cities in Iraq” by (Ahmed and Salam, 2018).

This study examines the re-adaptation and renovation strategies for historical buildings in walled cities in Iraq. It discusses the challenges, opportunities, and best practices in preserving the historical and cultural significance of these structures while accommodating modern needs.

2. Article: “Sustainability and adaptive reuse: Traditional houses in Istanbul” by (Bullen, 2007).

This study focuses on the sustainability aspect of adaptive reuse in traditional houses in Istanbul. It explores the design strategies and techniques for integrating sustainable practices into the re-adaptation process, considering factors such as energy efficiency, material selection, and cultural heritage preservation.

3. Article: “The adaptive reuse potentials of industrial heritage buildings” by (Sugden, 2017).

This research article presents a comprehensive analysis of the adaptive reuse potential of industrial heritage buildings. It investigates the factors that influence successful re-adaptation and proposes guidelines for enhancing the compatibility between the historic value of the building and the new functional requirements.

4. Article: “Adaptive reuse of heritage buildings in urban areas: A review of critical factors” by (Yung and Chan, 2012).

This study provides a review of critical factors that influence the adaptive reuse of heritage buildings in urban areas. It discusses the challenges related to design, conservation, and economic viability, offering insights into effective strategies for addressing these issues and ensuring the sustainable re-adaptation of historical buildings.

2.2.2 The design, and rehabilitation of the Lawang Sewu As a former railway building

a) Theories

1. Preservation and Restoration: (Penića, Svetlana and Murgul, 2015) This theory focuses on preserving the historical and architectural significance of Lawang Sewu through careful restoration. It involves meticulous research, documentation, and repair work to restore the building to its original state. Scientific studies on historic preservation techniques can support this theory, emphasizing the importance of using appropriate materials and methods to ensure the authenticity and long-term durability of the structure.

b) Articles

Lawang Sewu is a historic cultural heritage building in Semarang, Indonesia, that has undergone several changes in function and ownership since its construction in 1904. Here are four articles that have been proposed about the retrofitting, design, and rehabilitation of the building, supported by scientific sources:

1. **The Theory of Monumentality**: This theory emphasizes the importance of preserving the historical and cultural dynamics attached to the building while adapting it to a new use. The monumentality of Lawang Sewu is explained gradually from several aspects, including its architectural character, spatial

relationships with Tugu Muda Monument in the area, and its unique impression on Tugu Muda Monument Area (Abyyusa ; Sudianto Aly, 2019).

2. **The Theory of Compatibility:** This theory proposes that the new use of a building should be compatible with its architectural style and historical context. The adaptive reuse of Lawang Sewu as a museum is an example of this theory in practice (Hammond¹, Nawari² and B. Walters³, 1993) .
3. **The Theory of Authenticity:** This theory advocates for preserving the original character and features of a building while adapting it to a new use. The restoration of Lawang Sewu's stained-glass windows and other architectural details during its conversion into a museum is an example of this theory in practice .(Abyyusa ; Sudianto Aly, 2019).
4. **The Theory of Sustainability:** This theory advocates for the reuse of existing buildings as a way to reduce waste and conserve natural resources. Adaptive reuse can also help to minimize the carbon footprint associated with new construction projects. The retrofitting of Lawang Sewu as a museum is an example of this theory in practice (Abyyusa ; Sudianto Aly, 2019).

2.2.3. Theories of pedestrian movement in and around Public cultural and Museum centres.

a) Theories

1. Space Syntax Theory: (Nes, 2014) Space syntax theory suggests that the layout and design of a Historical buildings's pedestrian spaces significantly influence pedestrian movement patterns. Scientific sources, such as "Space Syntax Analysis of Pedestrian Movement in Museumping Historical buildings" by M. A. Khan and S. M. Islam, explore the relationship between spatial configurations and pedestrian movement. This theory emphasizes the importance of designing interconnected and well-structured pedestrian spaces within museum to enhance movement efficiency and user experience.
2. Social Interaction Theory:(Hegtvedt, 2014) The theory of social interaction suggests that pedestrian movement in and around Public cultural and Museumping centres is influenced by social factors and human behavior. Scientific sources, such

as "Social Interaction and Pedestrian Movement in Museuming Streets: Evidence from Observational Methods" by A. K. Jain and R. K. Jain, examine the impact of social factors on pedestrian behavior. This theory emphasizes the role of social interactions, cultural norms, and individual preferences in shaping pedestrian movement patterns within Public cultural and Museuming centres.

Articles

1. "Pedestrian Movement in Museuming Centers: A Case Study of the City of Kerman, Iran". : This study examines the pedestrian movement patterns in Museuming centers in the city of Kerman, Iran. The authors use a combination of field observations and surveys to analyze pedestrian behavior and identify factors that influence pedestrian movement (Loo, no date).

2. "Pedestrian Movement in Museuming Museums: A Case Study of the Museum of America". : This study investigates pedestrian movement patterns in the Museum of America, a large Museuming Museum in Minnesota, USA. The authors use video surveillance data to analyze pedestrian behavior and identify factors that influence pedestrian movement (Dizikes, no date).

3. "Pedestrian Movement in Museuming Streets: A Case Study of Oxford Street, London". : This study examines pedestrian movement patterns on Oxford Street, a major Museuming street in London, UK. The authors use a combination of field observations and surveys to analyze pedestrian behavior and identify factors that influence pedestrian movement (Križan *et al.*, 2022).

2.2.4 Theories about the concept of heritage preservation, in architecture (Museum buildings)

a) Theories

1. Theory of Authenticity: The theory of authenticity in heritage preservation emphasizes the importance of maintaining the original character and integrity of historical buildings. According to this theory, preserving the authentic elements of a building, such as its materials, design, and craftsmanship, is crucial for conveying its historical value. A study by Odeh (2017) discusses the theory of authenticity in

architectural conservation, highlighting its significance in maintaining the identity and cultural heritage of historical buildings (Gonzalez-Longo, 2019).

2.2.5. Vivid examples of architectural heritage preservation processes.

a) Theories

1. The Preservation of the Historic City of Yazd in Iran: This study conducted by Hossein Mohammadzadeh and Mohsen Ghasemi in 2015, explores the preservation of the historic city of Yazd, which is recognized as a UNESCO World Heritage Site. The study highlights the importance of preserving the city's traditional architecture, which includes adobe buildings, wind towers, and qanats (underground water channels).
2. The Restoration of the Roman Amphitheater in Pula, Croatia: This study conducted by Ivan Rupnik and Krunoslav Ivanišin in 2018, explores the restoration of the Roman Amphitheater in Pula, Croatia. The study highlights the importance of preserving the historical and cultural significance of the amphitheater, while also ensuring its safety and accessibility for visitors.
3. The Rehabilitation of the Historic Center of Quito, Ecuador: This study conducted by Carlos Larco and Ana Maria Duran in 2013, explores the rehabilitation of the historic center of Quito, which is also recognized as a UNESCO World Heritage Site. The study highlights the importance of preserving the city's colonial architecture, while also promoting sustainable development and tourism.

2.2.6. Here are four scientific sources that discuss architectural heritage preservation processes:

a) Articles

1. The Semantic Conservation of Architectural Heritage: The Missing Values" : This study identifies the influential semantic values in the architectural conservation process and determines the importance of each value based on published literature. The authors use qualitative and quantitative content analysis to evaluate the relationship between architectural heritage and conservation (Taher Tolou Del, Saleh Sedghpour and Kamali Tabrizi, 2020).

2.3 Theories and Previous Studies:

Previous studies have examined the re-adaptation and of historical buildings, emphasizing the importance of preserving cultural heritage while accommodating contemporary needs. For example, (Isabella, 2022) proposed a framework for transforming vacant industrial heritage buildings into sustainable residential spaces, integrating architectural design, infrastructure systems, and social factors (Palacios *et al.*, 2020). investigated the adaptive reuse of historic buildings for cultural and creative industries, exploring strategies for preserving historical value while meeting contemporary user needs. Kang and Choi (2017) focused on the sustainable renovation of historic buildings in South Korea, analyzing strategies for energy efficiency, cultural preservation, and user comfort. Similarly, (Pinheiro, 2017) and conducted studies on the re-adaptation of historical buildings into cultural centers and museums, emphasizing the balance between modern functionalities and preservation of historical significance.

In conclusion, this research aims to explore the potential of re-adaptation and design of historical buildings for Historical heritage use, with a specific focus on promoting sustainability (Cantell and Huxtable, 2005) (Zijlstra, 2022). By considering the principles of adaptive design and sustainability, a comprehensive strategy can be developed for the of Lawang Sewu, a historic building facing various challenges. Through a thorough research and design methodology, the goal is to preserve the building's historical and cultural value while enhancing its functionality (Lau, 2012) (Buda, Herrera and Pfluger, 2021).

2.4 . Approaches for Sustainable Development

The renovation should prioritize the preservation of valuable resources in hestorical buildings, including memorable architecture, specific activities, well-maintained infrastructure, and solid construction. It is important to make significant efforts to reuse these resources in order to promote economic sustainable growth and environmental protection. Additionally, the planning should consider the needs

arising from urban expansion and structural transformation. Sustainable development encompasses environmental, social, and economic sustainability, ensuring that the present generation's needs are met without compromising the ability of future generations to meet their own needs. In sustainable building analysis, the focus is on three crucial aspects: energy, water, and materials. Conservation applies to all three components, emphasizing their importance in the planning, construction, use, and decomposition processes of buildings, rather than demolition.

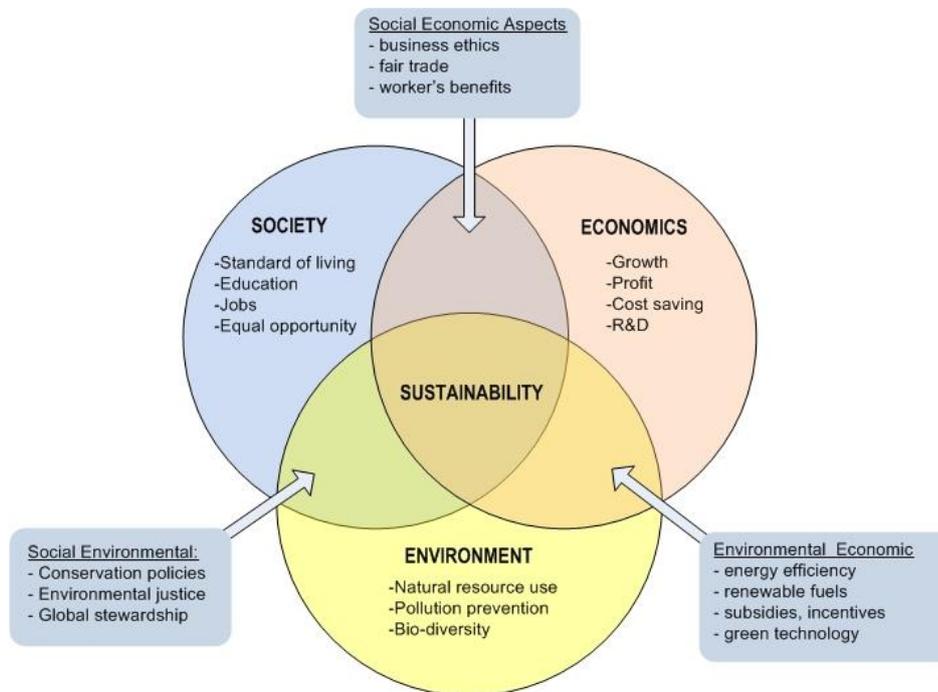


Figure 5 Interplay of the environmental, economic, and social aspects of sustainable development.

2.5. Adaptive Reuse of Aging Low-Energy Structures

The research paper explores the Adaptive Reuse (AR) of heritage buildings, aiming to preserve their values while adapting them for contemporary use. It proposes a structured model with ten steps, from 'initiative' to 'evaluation after years', to guide the AR process. The model, though conceptual, is designed to safeguard heritage

values effectively and lacks specific studies on AR in heritage buildings, necessitating further research validation

2.5.1 Adaptive Reuse of Heritage Buildings

The literature review focused on organizing literature based on the four main phases of the Adaptive Reuse (AR) process: preparation, initiative, implementation, and completion. Analysis from 2003 to 2021 showed a concentration of publications on the preparation phase,

with the fewest on implementation. The initiative phase, the beginning of the AR process, involves decision-making on preservation, reuse, or demolition, and collaboration among stakeholders, including cultural heritage officers and architects, to align ambitions and project requirements.

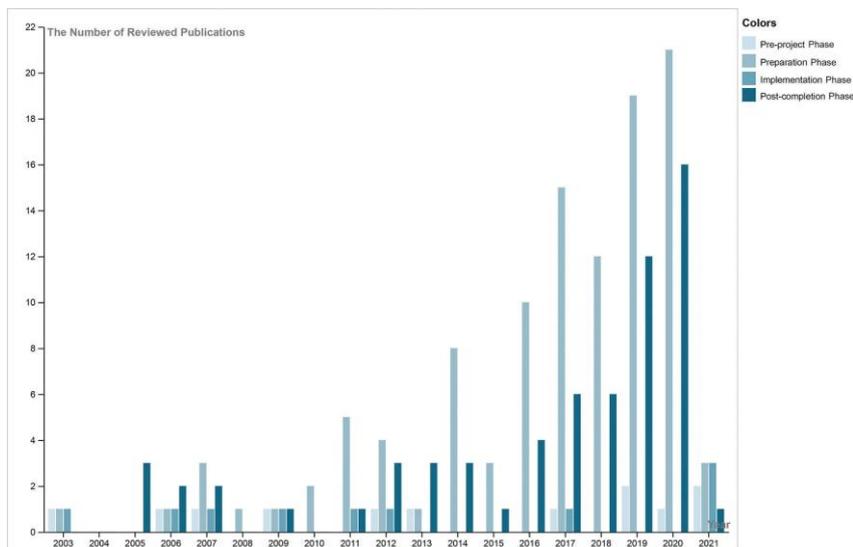


Figure 6 The intensity of the reviewed literature in each phase of the adaptive reuse process (105 reviewed publications).

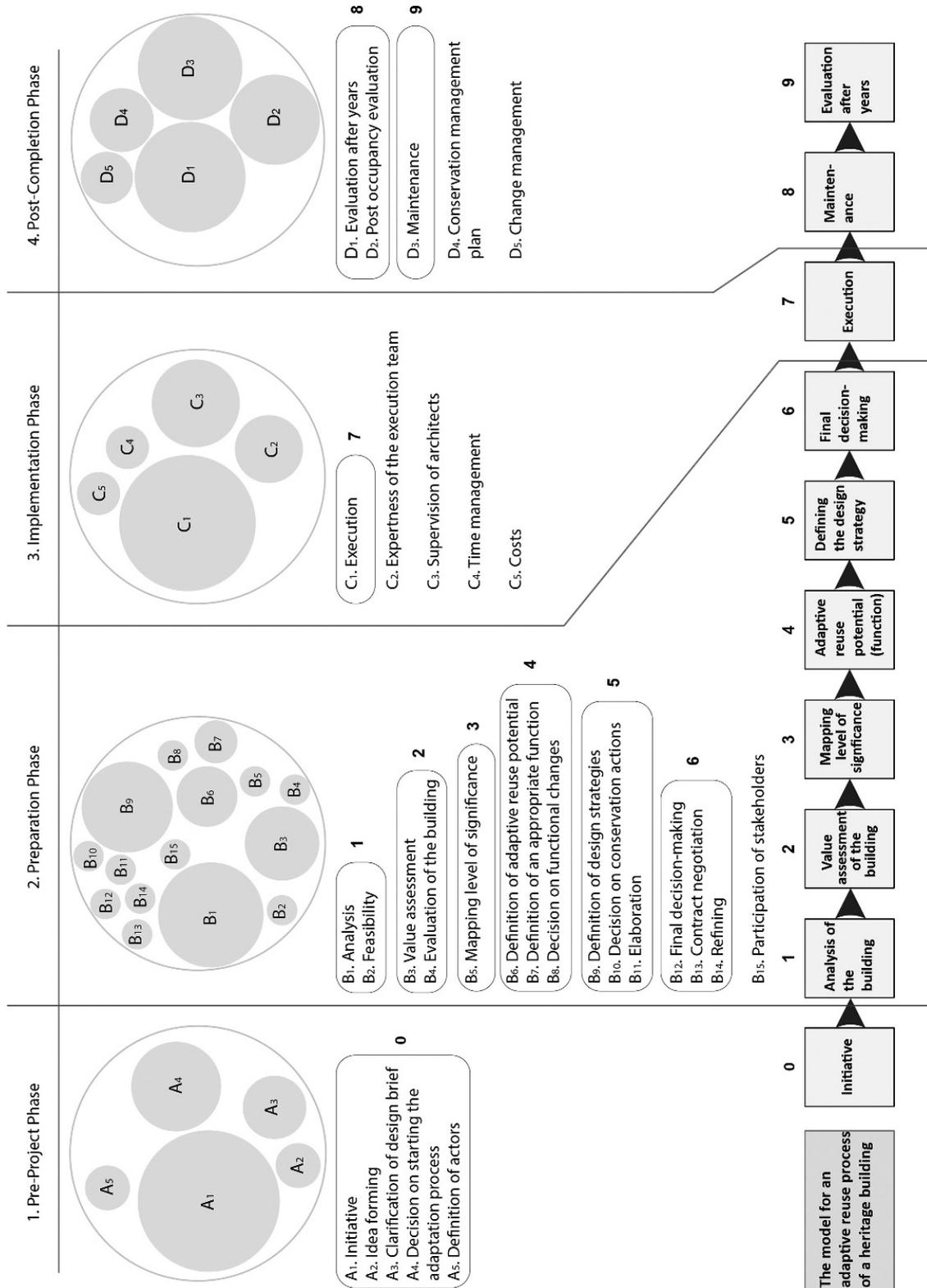


Figure 7 The procedure toward the definition of the sub-phases, the so-called “10 steps” of the adaptive reuse process of heritage buildings.

2.5.2 Adaptation strategies of energy retrofitted historic buildings under the impact of climate change

The Portesi Houses, which serve as a case study in this research, are characterized by their compact shape and close proximity to one another, creating a dense settlement. These buildings exhibit a consistent building structure, with uniform heights and aligned facades. The ground floor features arcades that extend the Historical heritage spaces traditionally found on this level, providing a covered promenade. Following the typical residential-Historical heritage building model, the ground floor is occupied by Museums, while apartments are situated on the upper floors. The architectural characteristics and functional layout of the Portesi Houses make them an interesting case for investigating the potential for adaptive reuse in the context of heritage buildings.

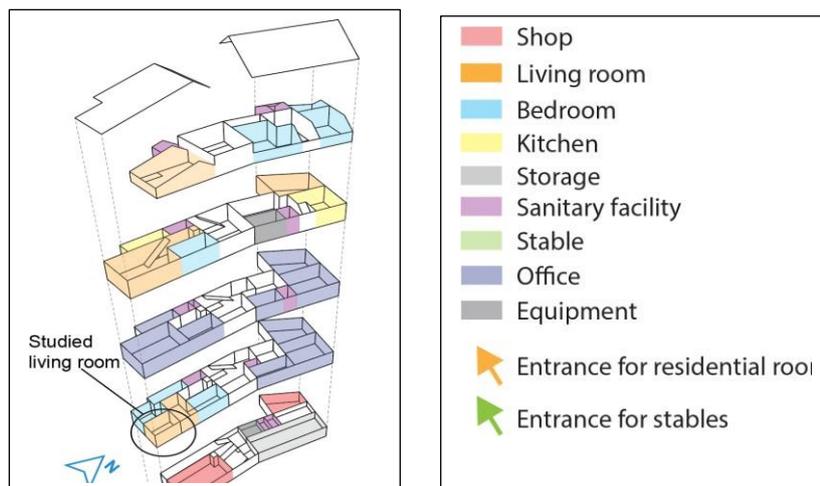


Figure 9 Architectural layout (a) and photograph (b) of the Portici house in Climate zone I.

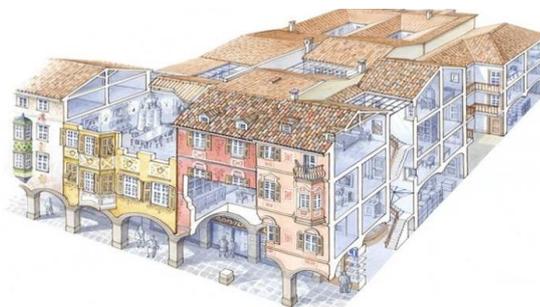
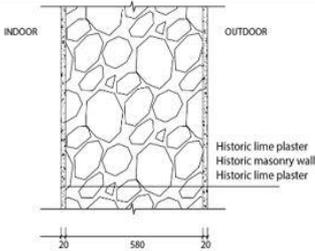
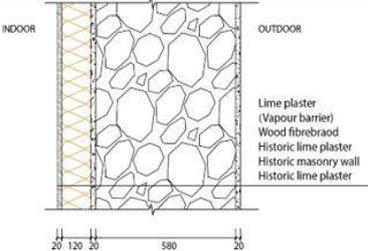
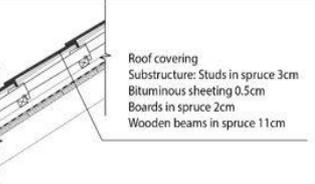
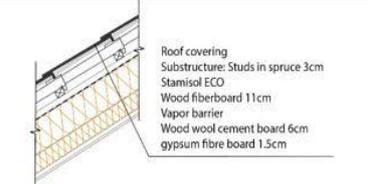
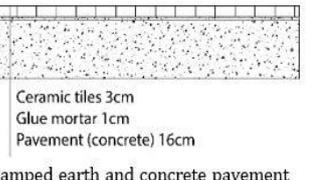
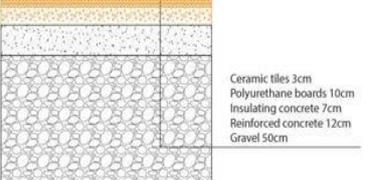


Figure 10 A scheme of a typical Portici house (© Antonio Monteverdi,

Table 2 Key architectural details of the reference buildings. W-to-W ratio = window-to-wall ratio.

Reference Building	Year	Main Façade Orientation	Ground Floor Area [m ²]	No. of Floor	W-to-W Ratio (South)	Living Area [m ²]	Office Area [m ²]	Commercial Area [m ²]
Portici I	12th century	South & West	233.25	4	0.22	462.83	273.33	87.39
Portici II	18th century	South & North	230.53	3	0.16	364.44	195.77	61.34

Table 4. Construction characteristics of the reference buildings. U_b = U-value before retrofit (W/m²K); U_a = U-value after retrofit. W/m²K).

Type	Construction	Retrofit Solutions	U _b	U _a
External wall	 <p>Masonry wall, 58 cm</p>	 <p>Internal insulation system: Wood fiberboard, 12 cm</p>	2.59	0.28
Internal wall	Masonry wall, 35 cm	-	3.96	3.96
Roof	 <p>Timber rafters with wooden casing and roof tiles on top</p>	 <p>Insulation panel between and under the roof beams: Wood fiberboard, 20 cm</p>	5.6	0.17
Internal floor	Wood floor with clay-sand in-between	-	1.54	1.54
Foundation	 <p>Tamped earth and concrete pavement</p>	 <p>Insulation system: Polyurethane boards, 10 cm</p>	4.19	0.25
Window	Single glazed window	Double glazed window	3	1.1

2.5.3. Concept Adaptive Reuse Strategy

2.5.3.1 Design Method

In this research, the design methods used by the author are the heritage future method and contextual method. Both methods were taken because they are related, namely prioritizing each other and paying attention to the condition of the

environment/building. This is in line with the principle of adaptive reuse expressed (Othman and Elsaay, 2018).

2.5.3.2 A Proposed Model of Assessing the Adaptive Reuse of Heritage buildings in Historic Jeddah

Given the significant importance placed on preserving the architectural heritage of Saudi Arabia and the growing number of adaptively reused heritage buildings in historic Jeddah, it is crucial to ensure their appropriate utilization, regular assessment, and long-term sustainability. This research paper proposes a comprehensive model for evaluating the adaptive reuse of historical buildings, with the aim of safeguarding their authenticity and originality. Employing a qualitative approach, the study examines relevant references, charters, classifications, and methodologies pertaining to the adaptive use of heritage buildings. The proposed model comprises two primary axes, providing a structured framework for assessing the adaptive reuse of heritage buildings in historic Jeddah.



Figure 11 Architectural layout (a) and photograph (b) of the Portici house in Climate zone II

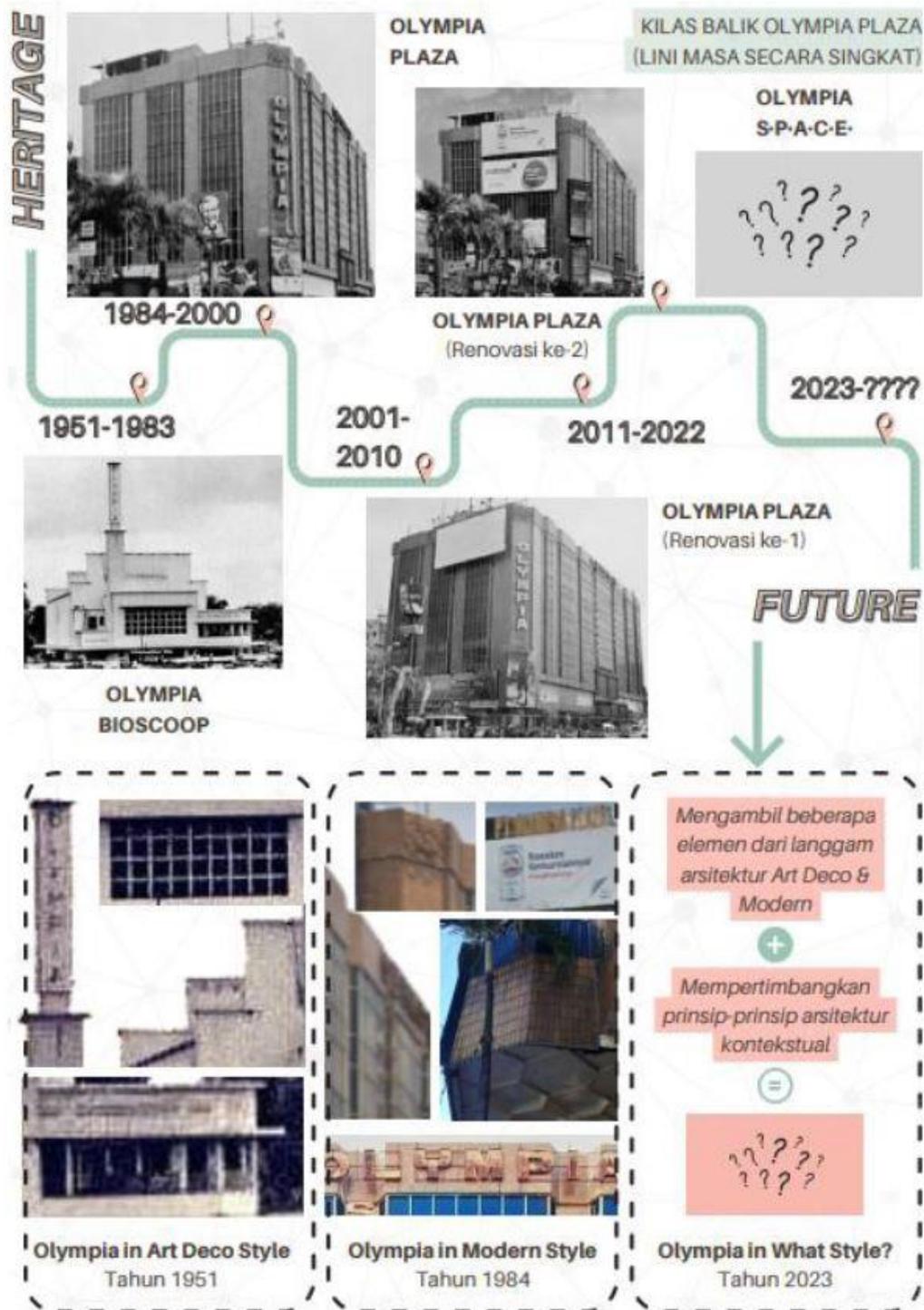


Figure 12 Use of the Heritage Future Method in the Olympia Plaza Building

Table 2 Examples of some reuse projects in Jeddah.

Number	The Building's	Previous Function	Current Function	The Space Used	Picture
1	Baeshen hosting headquarters	A headquarters for servants and pilgrims, then the office of Baeshen Company	Traditional Coffee Museum	Full space	
2	Hisham Punjabi House	Residential	Coffee Museum	Part of the space	
3	Sharbatly's House	Residential, then the Egyptian Embassy, then residential	A non-profit cultural science center and Coffee Museum	Center for the entire area And the Coffee Museum is on the rooftop	
4	Baeshen's House	Residential Palace	Coffee Museum, Gallery and museum	Full space	

2.6. Renovation of a historic building with the help of modern construction technology

The renovation of a historical building using modern construction technology. The primary objective is to identify suitable methods for accurately renovating an old unoccupied church. The study focuses on energy optimization and efficiency in the context of a specific historical building, Christ Church, originally constructed in 1852 in Tourmakeady, Co. Mayo.

2.7. Historical buildings I visited some of them, which were re-adapted in Semarang

1. Blenduk Church:

- The oldest church in Semarang, known for its Dutch colonial architecture.
- Significance in showcasing the colonial influence in Semarang. - Unique features that reflect the historical and architectural development of the city.

2. Gedung Batu (Stone Building):

- Also known as the Tawang Railway Station.
 - Iconic due to its Dutch colonial architecture and historical importance as the oldest railway station in Semarang.
 - Symbolizes the development of transportation infrastructure in Semarang during the colonial era.
2. Kota Lama - The Old Town of Semarang, also known as Kota Lama, is a historic area that has been re-adapted and to preserve its colonial-era architecture and transform it into a vibrant cultural and entertainment district.

2.8. A theory on how to add a new building or an extension building next to a historic building

1. Adaptive reuse: This theory involves repurposing an existing building or structure next door to create an extension or new building. This can involve retaining the historic facade of the building while adding a modern extension at the rear
2. Contextual design: This theory focuses on designing a new building next door that complements the existing historic structure in terms of scale, materials, and architectural style. By carefully studying the historic building and its surroundings, architects can create a new addition that respects the character of the original building while still expressing a contemporary aesthetic.
3. Preservation and restoration: This theory emphasizes the importance of preserving and restoring the historic building next door while also adding a new extension that respects the original character of the structure. By carefully documenting and conserving the historic features of the building, architects can create a new addition that harmonizes with the existing architecture.