

Conservation and Preservation of Historical Structures in Batu Gajah, Perak

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Abstract: The preservation and restoration of historic buildings are essential for promoting sustainable development and preserving cultural heritage. This paper delves into a case study of the challenges and endeavors associated with preserving and conserving historical structures in Batu Gajah, Perak, a town renowned for its extensive architectural heritage. The objective of the investigation is to evaluate the current restoration and preservation practices, as well as to identify the deficiencies of the structural components and the appropriate materials for their replacement. A qualitative case study, which encompassed interviews, site surveys, and archival analysis, was implemented to acquire data and insights. The results indicate that Batu Gajah is treasure-rich in historical structures that represent distinct architectural styles and eras. These structures are of significant and symbolic to the cultural, historical, and artistic value, as they serve as a testament to the town's development over time. Nevertheless, dilapidation, deterioration, and urbanization pressures pose a threat to many of these poor and forgotten structures. The results of the investigation highlight the challenges that historically significant structures face in terms of preservation and conservation, including inadequate legislative frameworks, insufficient financial resources, and inadequate public awareness and appreciation. This investigation proposes successful conservation strategies and solutions that have been implemented at other heritage sites, thereby offering valuable insights for Batu Gajah.

Keywords: *Conservation, Preservation, Historical Structures, Batu Gajah*

1. Introduction and Background

The study of historical structures is mainly important in the world because it serves as a witness to humanity's rich cultural past and highlights architectural marvels that have stood the test of time. These structures, which span several historical periods, were built with a purpose in mind and represent the workmanship, design ideas, and societal ideals of their eras. Over a quarter of all European buildings were built before the 1950s; we can presume that many of them have cultural, architectural, social, and legacy qualities (Buda et al., 2021). In terms of preserving the heritage, efforts have been made to comprehend and interpret the heritage to demonstrate how the world was before us (Taher Tolou Del et al., 2020). Take, for example, the ancient ruins of Pompeii in Italy. Houses, temples, and theatres that have been preserved provide a vivid portrait of life in a Roman city during the first century. These ruins help us understand the Roman way of life, including its social structure, urban planning, and aesthetic manifestations. By conserving and preserving these structures, we can unearth a wealth of historical information that will aid us in piecing together the complex fabric of human history.

Historic structures must be conserved and preserved for a variety of reasons. For starters, historical structures serve as educational resources, providing significant insights into a specific era's history, art, and architecture. The proper incorporation of World Heritage sites into educational programs is critical. A historical monument can contribute to this value by participating in civic education (Rosado Correia & Walliman, 2014). We ensure that future generations may appreciate and learn from these structures by preserving them, promoting a feeling of cultural continuity and identity. Second, historical structures can greatly contribute to the tourism business. Domestic and foreign tourists are lured to the fascination of learning history and immersing themselves in the unique experiences these sites provide. Preserving historical sites can enhance tourist footfall, which benefits the local economy by producing cash from tourism-related activities such as lodging, restaurants, and local businesses.

Historical structures have a profound impact on the public in terms of tourism, economy, and cultural value. These architectural marvels draw visitors from all around the world, providing a window into the past and enriching their travel experiences. Tourism growth supports economic growth in nearby areas, producing jobs

and stimulating other sectors. For heritage sites, tourism can produce revenue and employ ancillary sectors such as hotels, transportation, and so on (Taher Tolou Del et al., 2020). Furthermore, historical landmarks provide a visible link to a community's history, preserving cultural traditions and architectural styles for future generations. They are transformed into educational resources, promoting understanding of history, architecture, and societal standards. These structures unify communities and serve as gathering places for celebrations, as symbols of local identity and pride.

There has been an increasing understanding of the need to protect historical structures during the last few decades. Despite this, the conservation figures show a stable trend. With the number of properties inscribed on the World Heritage List increasing over time, it is necessary to compare the percentage of properties reported each year to the overall number of properties inscribed at the time. This information would indicate the percentage of World Heritage properties that are threatened each year. Although quickly expanding until 1993, the number of World Heritage assets subject to a State of Conservation (SOC) report has remained relatively steady after 2003, at 18.5% on average. As stated, the number of SOC reports climbed fast between 1979 (1 report) and 2004, but has been rather consistent since then, with an average of 154 SOC reports per year (Veillon, 2014).

Despite their endurance, historical structures are not immune to the impacts of time. Natural forces like freezing and thawing, heating and cooling, salt weathering, and acidic rainfall all play a role in monument degradation (Momeni et al., 2015). These problems can worsen if sufficient maintenance and conservation efforts are not implemented, resulting in significant damage and structural instability. As preservation entails preserving a cultural asset's integrity, identity, and functional efficiency, the rehabilitation process may present an opportunity to increase active functionality while avoiding decay of our physical heritage. Furthermore, historical structures are subject to abandonment when they are neglected, endure financial issues, or lose their original roles. Vandalism, theft, and unauthorized changes are all potential risks to abandoned buildings. It is vital to remember that the heritage loss in these circumstances includes not just the building and its fabric, but also its contents, such as furnishings and pieces of art that cannot be restored (Garcia-Castillo et al., 2023).

In Malaysia, historical structures play an important role in forming and defining the culture and identity of a multiracial and multicultural country. With a complex tapestry of varied nationalities, faiths, and traditions, these ancient structures serve as emblems of the nation's shared legacy and collective history. They give a tangible link to the past, providing significant insights into the architectural styles, customs, and societal values that have defined Malaysia over the years. Despite their historical value, many Malaysian historical structures have not received the recognition and attention they deserve. For example, the Sultan Abdul Samad landmark in Kuala Lumpur is a historical landmark in Malaysia that is underappreciated. Despite its spectacular Moorish design and historical significance as a former British colonial administrative centre, the structure is threatened by urban growth and a lack of maintenance. From the standpoint of Malaysia, development schemes for historic cities revolve around the concept of introducing new modern development to historic areas, revitalization of the areas, and refurbishment of historic buildings, which are frequently referred to as tools for city improvement schemes. As a result of fast population increase, economic development, and urbanization, heritage cities in emerging countries, including Malaysia, are today facing exacerbated urban challenges (Said, 2018). As a result, this research examines the conservation and preservation approach and challenges for historical buildings.

2. Literature Review

Batu Gajah is a historic town located in the state of Perak, Malaysia. It is situated approximately 20 kilometers southeast of Ipoh, the capital city of Perak. The town is renowned for its rich history, vibrant cultural heritage, and significant contributions to the region's development. The term Batu Gajah, literally translating to "Stone Elephant" in Malay, is thought to originate from two large boulders resembling elephants discovered along the Kinta River. Local legend suggests that these elephant-shaped stones were created to scare elephants that were damaging villagers' sugar cane crops (Phillip, 2013).

Another narration describes that when tin ore was found in Batu Gajah, Buddhist merchants from Sumatra who worshipped idols sculpted two rocks in the Kinta River to look like elephants. People used these stones as

markers for trade, and they may have had religious meaning as well. A more imaginative story tells of a creature called the *kelembai* that can turn living things into stones as punishment (Jasbindar, 2019). The folks believe that the *kelembai* turned two elephants that were crossing into stone.

The history of Batu Gajah goes back to the 19th century, when British tin mining companies set up shop in Perak during the colonial period. The town's strategic location near the rich tin areas led to rapid expansion and development, which drew people from both near and faraway places. The economy of Batu Gajah was built on tin mining, which made it abundant and eventually turned it into a busy mining town. Batu Gajah was home to many well-known tin mining enterprises and rich mine owners during its peak (Masron et al., 2019). The town's environment was surrounded by monumental colonial-era buildings that portrayed how affluent and flourishing the mining sector was. Many of these structures are still standing until now. They display architectural styles that were influenced by British colonial and Chinese Peranakan civilizations (Ithnin, 2021). Batu Gajah still offers loads of historical beauty, and it shows retrospectively how lively it used to be. The Batu Gajah Museum, the British Residency, and Kellie's Castle are some of the town's historic buildings.

Types of Defects in Historical Buildings

Due to their age and exposure to numerous climatic variables, historical constructions are prone to a variety of faults that can impact various aspects of the building. Some of the most prevalent forms of flaws found in historical constructions are:

Cracking

The cracks vary in width, from small hairline fractures to 25 mm (Mansor et al., 2012). Even solid ground floors and foundations may have cracks, and walls may depart from vertical alignment. These cracks can appear unexpectedly, typically accompanied by audible disturbances, and may persist for a long time after the building was built. Some outward movement of the walls may also be observed. Beyond stretching from roofs to foundations, cracks in external walls might jeopardize a building's structural stability if they are deemed unsafe. Vertical or diagonal cracks in walls are classic signs of structural instability. Cracking is often classified according to its underlying causes, which include:

- Shrinkage and Durability Cracks.
- Cracks caused by structural distress.
- Cracks caused by structural settlement.

Spalling

Spalling, or the chipping, is a consequence of unchecked cracking. If cracks are not addressed, they can grow, resulting in the concrete becoming spalled. Several factors contribute to this spalling phenomenon. Firstly, when the steel reinforcement in the structure rusts and extreme weather fluctuations, such as rapid changes between hot and cold, can also cause concrete spalling. Additionally, exposure to chemical agents or materials can weaken the concrete over time, contributing to spalling (Hanafi et al., 2018). Finally, the use of unsuitable steel reinforcement or overloading can cause concrete to crack and spall, particularly if the reinforcement cannot support the tension load, leading to structural damage (Mansor et al., 2012).

Salt Attack

Different types of soluble salts, such as sodium chloride, carbonates, nitrates, and sulphates of calcium, potassium, sodium sulphate and magnesium chloride. They are known to harm building masonry. Salt-induced damage can take two forms depending on the building area affected (Ahmad et al., 2010). When salt penetrates the surface, leading to the formation of a white powder, it's known as efflorescence, while visually unpleasant, is generally harmless. However, if salt penetrates from below the surface and becomes crystallized, a more serious condition called sub-florescence occurs (Mansor et al., 2012). The pressure from the crystallization process can cause building materials to crumble, resulting in severe damage.

Peeling Paint

Peeling paint is common on building facades, particularly plastered walls, columns, and other locations that are subjected to severe rain and humidity.

Insects or Termite Infestation

Exposure to water, high moisture content, and excessive loading can cause timber to decay rapidly. Insect and termite infestations can damage wet and digestible timber in wall plates, rafters, beams, and trusses, as well as timbers put into damp walls.

Dampness

Dampness poses a significant concern, especially for buildings situated close to water sources. The primary cause of dampness is water entering the building through various pathways. Water penetration commonly occurs in walls exposed to persistent wet winds or rain (Mansor et al., 2012). In such scenarios, gravity facilitates water infiltration through capillaries or cracks between mortar joints, bricks, or blocks, ultimately accumulating moisture behind rigid renders. Dampness can also result from other factors, including leaking gutters or downpipes, faulty drains, burst plumbing, and condensation due to inadequate ventilation.

3. Research Methodology

The case study method is employed to assess and examine the issues of conservation and preservation of historical structures in Batu Gajah, Perak. Examining the defects associated with historical structure restoration activities closely aligns with the objectives. By employing qualitative research studies, researchers can look into the experiences and insights of developers, especially when analyzing the labor and materials used for construction activities. Observation and in-depth interviews with technicians are conducted to get insights into their, motivations, decision-making process and obstacles linked to conservation efforts. These interviews and observations can add value to the knowledge of conservation and preservation, allowing the information needed to understand the variables impacting developers' decisions.

4. Results

The findings of the conservation and preservation activities at the Batu Gajah District's House and Batu Gajah District and Land Office provide numerous critical insights into the challenges and techniques involved in protecting historical structures. One notable result is the importance of undertaking detailed assessments of the structural stability and historical relevance of these structures before beginning any conservation work.

Figure 1: The façade of Batu Gajah District's House (left) and Batu Gajah District and Land Office (right)



Types of Defects in Batu Gajah District's House and Batu Gajah District and Land Office

The conservation work at the Batu Gajah District's House and Batu Gajah District Land Office represents a crucial effort in preserving the historical and architectural heritage of the region. Situated in the heart of Batu Gajah, Perak, Malaysia, this building stands as a testament to the area's rich history and cultural significance. Through meticulous restoration and preservation work, the building's unique character and architectural features are being retained, contributing to the cultural landscape of Batu Gajah. However, the study explores the types of defects in both Batu Gajah District's House and Batu Gajah District Land Office.

Table 1: The observation of defects that were found in both the Batu Gajah District's House and the Batu Gajah District and Land Office

Batu Gajah District's House		Batu Gajah District and Land Office	
	Spalling Exterior Walls Spalling, the flaking or crumbling of masonry, threatens the structural integrity and aesthetics of heritage buildings.		Mouldy Walls Mould growth on walls, often due to moisture or poor ventilation, can damage heritage materials and harm indoor air quality.
	Flaking Paint Peeling paint, caused by moisture, age, or poor surface preparation, exposes heritage walls to further deterioration.		Faded and Peeling Paint Peeling paint, often resulting from moisture, aging, or inadequate surface preparation, leaves heritage walls vulnerable to further damage and decay.
	Broken Timber Wall Broken timber walls, often caused by decay, pests, or structural stress, compromise the integrity and authenticity of heritage buildings.		Deteriorated Wooden Ceiling A broken wooden ceiling, often caused by age, structural stress, or water damage, risks further deterioration and impacts the building's historical character.
	Pest Infestation on Cornices Insect infestations in cornices, typically caused by wood-boring pests, can weaken structural elements and decorative details.		Damaged Roof Tiles Broken roof tiles, often due to weathering or impact, compromise a building's weatherproofing and may lead to internal damage.
	Cracked Wainscoting on the Wall Broken wainscoting, caused by physical damage or decay, diminishes the aesthetic and structural appeal of interiors.		

Challenges Faced by Conservators During Conservation Work

Conserving and preserving historic structures pose challenges for conservators. The challenges encompass many aspects of the conservation process, ranging from technical expertise to resource constraints. In navigating these complexities, conservators must contend with issues such as a lack of specialized expertise among consultants and the inherent limitations of time and budget. Addressing these challenges effectively requires a complex understanding of conservation principles, collaborative efforts among stakeholders, and strategic planning to ensure the successful preservation of our built heritage.

Lack of Expertise

Conservation projects require a specific set of skills and knowledge that may not be readily available among consultants. Project consultants such as architects, engineers, and quantity surveyors (QS) rarely oversee these projects and may not have prior experience or training in conservation work. Therefore, there may be gaps in their knowledge of selecting appropriate historical building materials, construction techniques, and preservation methods. For instance, a QS may misquote costs or quantities due to a lack of familiarity with the unique requirements of conservation work. Similarly, architects and engineers may overlook important historical details or specifications, leading to suboptimal outcomes in the preservation process.

Time and Budget Constraints

More often than not, construction projects work under time pressure and tight budgets. This can lead to obstacles like unforeseen issues arising during the conservation process that are not outlined in the initial scope of work and cost. In any case where conservators start to conduct remedial work, he/she may uncover underlying deficiencies or hidden damage that could extend the time required and resources to address it properly. Therefore, there are high chances that the conservation work could contribute to project delays and budget overruns, and compromise the quality of conservation work or worse, shortcuts may be taken to meet the deadlines and confine within the budgetary limits.

Discussion

The conservation and preservation work at Batu Gajah District's House and Land Office sheds an important understanding of the problems and strategies for protecting historical structures. The main highlights of the findings include conducting a meticulous assessment of structural integrity and historical value before commencing any conservation work, which is consistent with previous studies that suggest performing critical assessments of conservation efforts (Tarrafa Silva & Pereira Roders, 2012). The major challenges that emerge include a lack of expertise among consultants, time pressure, and budget limitations, which hinder successful conservation work. These challenges offer an insight into the necessity for a comprehensive study that encompasses all conservation phases, establishes qualifications for consultants and mandates rigorous assessments and documentation. Well-defined frameworks can reduce planning errors, enhance resource allocation, and support effective conservation practice. The findings also suggest that integrating conventional techniques with modern strategies is necessary for enriching the comprehensive conservation standard. By addressing expertise gaps and resource constraints, such a standard can ensure the sustainable preservation of historical structures, foster cultural heritage for future generations, and enable communities to engage with their history in meaningful ways. This holistic approach not only safeguards the integrity of these structures but also promotes a deeper understanding and appreciation of cultural heritage among the public.

5. Managerial Implications and Recommendations

The observation of conservation techniques, structural defects and preservation efforts in historical structures highlights several key recommendations for enhanced heritage conservation. The heart of these efforts is the promotion of collaboration among academic institutions, government agencies, and local communities. Through this collaborative effort, we can potentially expand knowledge exchange, resource sharing, and problem-solving via platforms such as working groups, seminars, and online forums. Capacity-building initiatives are imperative in emphasizing the upskilling of architects, engineers, conservators, and heritage-related professions in conventional building techniques, material science and conservation ethics. Ongoing professional development ensures that conservation practices provide a high quality in integrating traditional expertise with modern innovation. Cooperation with government administrations and local authorities is crucial in securing grants, funding and supporting policy frameworks that are feasible for heritage

preservation. Besides, raising awareness of the valuable treasure of historical preservation can stimulate proactive engagement from these entities, supporting systematic, coordinated conservation protocols that conform to best practice. Thorough and meticulous documentation and research set the foundation for successful conservation efforts. Relevant datasets, including archival research, condition assessment, remedial reports, and photographic documentation, contribute to the preservation of the precious heritage and condition of historical structures. Likewise, substantial investment in research and development, studying innovative conservation materials and cutting-edge technologies, facilitates evidence-based practices and advances the body of knowledge in the field.

Conclusion

This research study serves as the cornerstone in assessing the structural defects and materials used in historical structures. Key challenges include damage, cracks, spalling, and pest infestation, which contribute to the deterioration of these historical structures rather than their longevity. In-depth knowledge of these defects and their causes enables accurate methods to reduce the deterioration further. Thorough guidelines are imperative to enhance further historical structure preservation initiatives. These comprise comprehensive assessments of structural defects, rigorous documentation of conservation activities, and specific requirements for hiring qualified consultants and contractors. Standardized processes and procedures ensure a systematic and effective conservation technique. This research also contributes to the larger vocation of historical preservation by handling structural challenges, appraising conservation techniques, and proposing actionable steps in remedial work on historical structures. It supports the interest of stakeholders in preserving historical facts and enriching the place identity for future generations.

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