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Action on Heritage Conservation of Wooden Structures

Enhancing the Cultural Spaces of Pontianak by Reconstruction of a Traditional Malay House

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Abstract – Preserving damaged memorial buildings are vital to maintain a cultural identity to be reused and inherited by future generations. Buildings established in the past will overlook that they will be aging and weathering. Wooden construction in Malay traditional houses built more than 100 years ago faces durability issues. Environmental conditions equally make its structure unusable. In addition, its surrounding environment has changed, and the demands for new functions for improving the structure's condition have become challenges in retrofitting the traditional roles into the current contemporary activities needs. The traditional Malay house in Kampung Bangka, Pontianak, which experienced a transfer of ownership from the original owner to the city government, altered its function from a residential house to a cultural house. Buildings having experienced weathering requires a well-planned reconstruction and re-functioning efforts from the city government. The reconstruction stages and house's identification process of previous roles are required to accommodate new activities fit for culture and public space. Identification and analysis process carried out to resolve the damaged condition of structural elements of the building to maintain its authenticity as memorials building for the community. Identification is also required to anticipate the new function of the building by providing a new structure or reinforcement to govern the future activities during the operation period of the building. Cultural and structural analysis is carried out to improve the function of the building and the surrounding area into a cultural space that enhances its image as a public space.

Keywords: *Malay traditional house, reconstruction, wooden structure.*

I. INTRODUCTION

Indonesia has many traditional buildings that need to be conserved because their durability has decreased over time. Traditional buildings in some areas were constructed with different materials. The wooden architecture found in the past building establishment used materials for its construction structure, and they are still maintained now. The world's most beautiful constructed heritage examples are wooden constructions. It carried a perfect design with an essential expression of local materials and spiritual culture (Tomaszek, 2016). Additional comparison studies from multi-specialized experts on the issues of historical buildings as human heritage lead to some critical factors to be emphasized for consideration in the reconstruction procedure (Hegazy, 2015). Interdisciplinary experts are needed to have appropriate conservation of heritage structures. Fascinating disciplines of expertise work together

to analyze some aspects, such as traditional knowledge of building materials, techniques, and specifications (Gupta & Prakash, 2018).

The modern style has influenced the changed architecture in contrast to some traditional structures from the past. Modern architecture dominates the community's life today, and it decreases the function of the traditional houses that all individuals should respect as memorial structures for the next generation (Khairudin et al., 2018). Malay traditional house is one of the unique heritages of house designs that can be found in Asia. The structures of Malay traditional houses are significant to be preserved and conserved closely related to the local iconic identity of a whole community (Md. Rashid & Hanafi, 2018). West Kalimantan is the location for dozens of Malay sultanate palaces with thousands of distinguished traditional dwellings as structures with the unique construction of timber materials (Zain & Putro, 2021). Some heritage objects in West Kalimantan are in the present condition of some determination problems for suitable conservation actions to be saved as the cultural heritage architecture of wooden structures. The conservation of traditional houses in West Kalimantan needs a proper procedure to conserve their authenticity as wooden structures.

Generally, traditional houses in Pontianak were established on the Kapuas River's riverbanks, and many of them have decayed or been damaged because of environmental and climate conditions. One of the traditional houses is in the Bansir Darat district, which has been donated to the Pontianak city government to be conserved for a new purpose. The condition of this traditional wooden structure at the time of taking over by the city government is there has been an inclination for construction, and it is no longer used for new purposes anymore. According to this condition, the city government provides preservation activities by involving academicians and professional architects to conserve the structure and function of the traditional house to enhance it as a cultural house for the public community in the surrounding environment.

II. Literary Reviews

According to Atalan (2018), the transfer of culture from generation to generation as protection and maintaining the culture's importance is defined as Heritage. Cultural Heritage reflects people's ever-changing importance, beliefs, knowledge, and traditions that have transferred to current society. The conservation of cultural heritage buildings needs to be done by the heritage expert team. According to Zain & Putro (2021), the requirements identification of cultural heritage buildings with a review of the research approach of the related studies on wooden structures of the factors that cause damage and degradation to structures and materials. Historical timber structure conservation requires constructive knowledge and understanding of the wood's behavior and its single elements. The assignment will involve experts on its restoration as a basis for specific data for an appropriate conservation project of historic timber structures (Bertolini et al., 2010). The historical and traditional culture of wooden structures is fundamental for any intervention. Reconstruction must be based on reliable evidence and authentic documentation. For timber structures, reconstruction often becomes desirable to ensure an accurate analysis of the adequate load-bearing durability of the existing structural system and appropriate strengthening interventions (Piazza & Riggio, 2007).

III. Method

As stated by Zain (2016) and Sari et al. (2019), a literature review needs to be conducted to understand the identification and reconstruction process for Malay traditional houses and wooden structures. Identification was conducted on the structural elements of traditional Malay houses in West Kalimantan or, more specifically, on the architecture of the Malay houses in Pontianak. Formulation of the reconstruction process by the basic process of establishing structure and the construction of a traditional house (Zain and Fajar (2014)). Data selection for the house reconstruction is retrieved from the literature review and primary data collection on the field through surveys and interviews. A review of house history, the construction stages, and the establishment of a traditional house are the steps of reconstruction of the house structure to a new function as a cultural house—the building identification forms general information about specific characteristics of the building construction phases on site. According to Croatto & Turrini (2014), In the restoration of historical timber as structures belonging to historical buildings, the main criteria include the topics of compatibility and reversibility. Interventions without any attention to the compatibility of materials and the possibility of bringing back the element

or restoring it to its original aspect are the primary consideration of this reconstruction activity.

IV. OBJECT INFORMATION BEFORE RECONSTRUCTION

The house's owners, which is currently located on H Salmah alley in Imam Bonjol street of the Bansir Laut Village, Southeast Pontianak district, are Haji Arief bin Haji Ismail and Hajjah Salmah binti Haji Abdul Karim. Haji Arief is known as a wealthy philanthropist and one of the founders of the Islamic School near his house. After his second marriage with Salmah bint Haji Abdul Karim, Haji Arief transformed his business occupation into agriculture and plantations. Hajjah Salmah is a hard-working woman. Related to his business, Haji Arief then owned several rubber plantations, coconut plantations, and several houses for rent. Then in 1925, Haji Arief built a rubber processing plant. The company's location, Malaya Rubber Works, is not far from the rear of his house. The house was built by Haji Arief in 1913 to live with his second wife Salmah bint Haji Abdul Karim, located in Kampung Bangka, on the banks of the Kapuas River (see Fig. 1). This house was built on land obtained from the issuance of the legacy given by his father Haji Ismail bin Haji Zainal Abidin. Of the issue of having more space for his house, Haji Arief bought land belonging to his brother Haji M. Yoesoef bin Haji Ismail which was located beside his house ground.

Fig. 1. The Front Façade of Hajjah Salmah House in the Early 1930s
Source: This picture was collected from the private collection of M Hatta bin H Saleh bin H.M. Arief.

Based on the field data identification, Hajjah Salmah's house is located about 30 meters from the perimeter of the Kapuas river with the construction of a stage house on stilts with an elevation of 2 meters from the ground. Like most traditional Malay houses, this building was designed with considerable openings as doors and windows positioned in all spaces. Typically, as a Malay traditional house in West Kalimantan, this house consists of two (2) masses of structures: the main house and the support house. The space arrangement in the main house consists of the front Serambi, middle Serambi, and rear Serambi, with the support house as a kitchen space. An open platform merges the main house and the support house. Like most traditional Malay houses, there are differences in the floor elevation of the main house and the support house. The floor construction of the main house is constructed by 15-20 cm higher than the support house. The open platform between the two building masses follows the floor elevation of the support's house. This open platform has a door situated on the right side of the building leading to the Gertak (wooden bridge). The culture of the Malay community living along the Kapuas River can be seen from the attribute in the form of wooden bridges. Gertak is an ordinary term used by the people of West Kalimantan to a bridge the formation of wooden boards' construction with a width of 72-150 cm that connects houses on the banks of the river (Khaliesh et al., 2012). Sari (2013) explains that the neighbourhood character in the Riverbank of Kapuas can be found with residential houses, wooden bridges in the front of the respective houses, a canal (Parit), and a courtyard in front of the house. In a particular area, a curved shape bridge above the canal is also found to connect two parallel wooden bridges. The canal (Parit) and the row of houses on both sides of the canal form a configuration of outdoor space. Canals and houses grow organically as the ordinary shape of traditional settlements in Pontianak. The settlement creates a clear pattern of relations between public and private spaces (Abubakar et al., 2019).

This house is estimated to be last inhabited by the heirs until the 1985s. Afterward, Hajjah Salmah's house is no longer inhabited for reasons of the structural material condition and safety of the occupants because the construction conditions of the house are increasingly worrying about living in. At the end of 2019, Hajjah Salmah's house was found with the condition of the failure of some roofing material, some of the leaned foundations, partly missing components of the walls, an un-covered floor,

weathered beams and rumbles, and some missing or damaged opening parts (see Fig. 2).

Fig. 2. Some Pictures Were Taken in Early 2019 About the House Condition Before Reconstruction. The condition of structures was found to shift because of riverbank erosion and material decay.
Source: Authors (2023)

V. ANALYSIS OF THE HOUSE'S SPACE AND FORM

Reconstruction activities begin with a collection of physical data from the field by taking into account the current condition of the building. This location data about the physical properties of the house was further compared with the information collected from some interviews. The interviews will be obtained from the heirs and the people who lived and knew the condition of this house when it was still undamaged condition. In addition, it was also carried out literature studies as a comparison related to traditional Malay houses in West Kalimantan.

From comparing some works of literature, this house has similarities with the type of Limas (Potong Limas). Its distinctive feature is the shape of a high slope and the huge volume of the roof shape. According to Zain (2012), stage houses are defined as traditional West Kalimantan architecture and are categorized into three types of buildings, namely; 1) *Kawat*-type House, 2) *Godang*-Type House, and 3) *Limas*-Type House. In addition, another characteristic of traditional Malay houses is the composition of the building with two masses (Zain & Andi, 2020). According to Zain (2012), traditional Malay houses in West Kalimantan generally consist of two parts, the main house (*Rumah Induk*) and the support house (*Rumah Anak*). The main house is the main building consisting of spaces in the consequences of a front *Serambi* (veranda), middle *Serambi* (living room), Rear *Serambi* (living room), and bedrooms. The support house is defined as a supporting building in the rear of the main house and it serves as a kitchen with an open platform. Platform (*Selang*) is usually found between the main house and the support house as a corridor. Based on field observations and interviews with the heirs, the construction, type of space, and arrangement found in Hajjah Salmah's house are the same as stated in the many works of literature about the type and arrangement of space for Malay houses in West Kalimantan. Based on these results, a floor plan and views with the spatial arrangement are formulated as presented in Figure 3.

Zain (2012) found similar to a traditional house in Sambas, the foundation will use wooden piles of 14/14 cm with First-class timber as commonly used for material. These piles are constructed as posts continuously to the top and serve as supports of the wall structure. This residence is located approximately 30 meters from the river. Furthermore, the foundations found with continuous beam pads (alas) constructed along the river's flow support all old piles. On the other hand, the river or canal can erode land around the piles. Zain (2016) claims that bearing pads must be put under the piles that follow the river or the canal to facilitate structural damage. Since massive constructions of wooden structures cannot be supported by the ground along river or canal banks, all bearing pads serve an essential purpose. In addition, other architectural elements were also found with distinctive motifs in the form of ornaments, openings, finials, and roof edges. Based on the information from the photos shared by the heirs, the architectural elements will be redrawn and placed in their position (see Fig. 4).

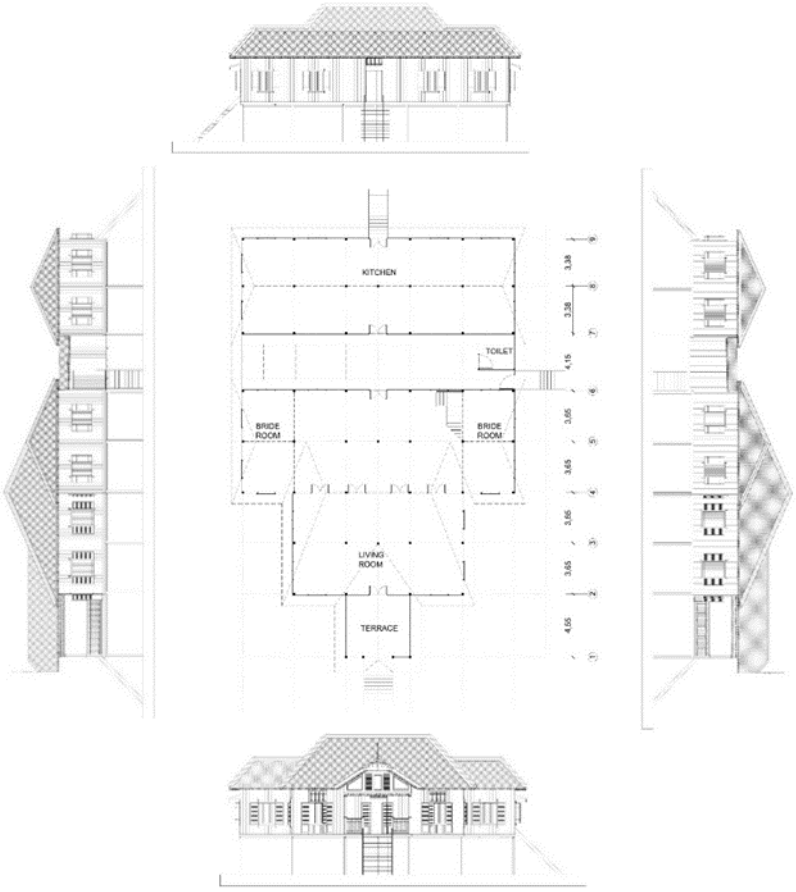

Fig. 3. Floor Plan and Views of the Hajjah Salmah House for Reconstruction
Source: Authors (2023)

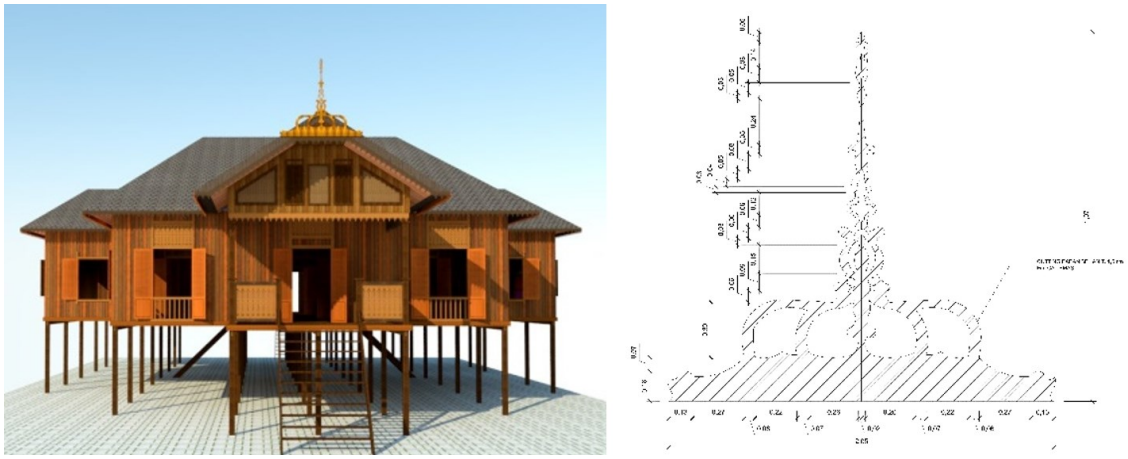

Fig. 4. Front Façade and Architectural Details of Finials in the Hajjah Salmah House
Source: Authors (2023)

Another critical matter is organizing the appropriate materials and construction of the building to maintain its authenticity as a traditional Malay house of Pontianak identity. Sim (2010: 19) conveyed that Cengal (*Neobalanocarpus heimii*), Belian (*Eusideroxylon zwagerii*), Merbau (*Intsia Palembanica*), or *resak* are the hardwood timbers typically utilized for Malay traditional houses (*Vatica spp.*). Furthermore, as emphasized by Sim (2010: 20), hardwoods like Meranti (*Shorea spp.*) and Jelutong are used for the secondary structure's rafters, floor joints, wall studs, window frames, and door frames (*Dyera costulata*).

Furthermore, the reconstruction method must also refer to the stages of construction established for wooden structures. The stages of construction for wooden structures consist of four stages. The first

stage is establishing a foundation by connecting some elements of structures, such as wooden posts with bases, beams, and girders. In the second stage, the house's frame structure exists by pitching the truss and bracings for each side of the wall and completing by installing upper beams at the top of the wall trusses. To keep the construction stable, some temporary beams were installed to keep the structure rigid. The third stage is the construction set for the roof; the roof truss is connected to the upper beam, followed by curtains, rafters, and battens. The last stage is the installation of the roof cover—roof cover material made of Belian wood shingles. The fourth stage is establishing floor, wall, door, and window construction.

VI. CONSTRUCTION PROCESS

In carrying out the reconstruction, maintaining the remaining structural elements will be a consideration, and the construction also follows the structural system commonly used for Malay traditional houses in West Kalimantan (see Fig. 5). Wooden construction has a distinctive structural system because it is suitable for constructing on land with low soil-bearing capacity. According to Zain and Fajar (2014), the construction stages of traditional Malay houses are based on three sections, i.e., the substructure, the middle structure (bottom side superstructure), and the upper side superstructure. The stages of construction of Traditional Malay residential houses pay attention to the elements forming the structure to ensure stability with the influence of several internal and external factors. Based on the conditions at the location, this building still looks to have a pillar and beam structure in the main house building.

For this reason, adjustments are made to the house structure of the main house by adjusting the position so that it is back upright. In addition, reinforcement is carried out on the foundation for structural elements that have undergone weathering or subsidence. According to Zain (2016), the Limas-type house generally uses a continuous wooden base under the poles with the placement in line with the direction of the river stream. The condition of the wooden bases under the poles was found to fit the statement of Zain (2016) regarding the readjusting of the main structural foundation of the main house. The old wooden basis was found in continuous elements with the placement in line with the direction of the river stream. According to existing conditions, the continuous wooden basis was maintained in its original condition. Some Parts of the supporting foundation in structural elements will be reinforced with additional supporting foundations on both sides. According to Zain & Putro (2021), there were pieces of porous wood around foundation piles in severe condition. Wood on the inside structures of the house was decayed by insect attacks. To the condition of some porous wooden piles, substituting a new material becomes a decision to upgrade the house's structural strength. In West Kalimantan, where many traditional houses are located, Zain (2012) claims that continuous bearing pads enhance a traditional house structure by minimizing the shift on wooden frames that is not synchronous in one of the grids caused by a weakness in the soil's carrying capacity.

According to Zain (2012), the wooden connections between beams and columns on the wall structure of Malay traditional houses used wooden nails (*Pasak*) to strengthen the joints. Zain (2016) stated that traditional Malay houses generally use hardwood for the main structure and the type with the lower class for the supporting structure (see Fig. 6). Based on this statement, the substitution of the main structure is directed to the reuse of the original material that can be maintained during the reconstruction. It is also important to determine that the traditional wood connection method must be used to replace the damaged structural elements.

Fig. 5. Construction Process on the Reconstruction of Hajjah Salmah House. Re Adjustment of House Structure
Source: Authors (2023)

Fig. 6. The Use of Traditional Wooden Joint for New Substitution Element on the Hajjah Salmah House
Source: Authors (2023)

As mentioned by Zain (2012), timber construction used as a material can be classified based on the function of the structures. It can be divided into the main structure (foundation, posts, etc.) and the support structure (wall, roof, etc.). First-class wood, like Belian, was utilized for the main construction, while second-class wood, like Jelutung, Selimpau, Rengas, etc., was used for the support structure. The homes were built in layers, with the lowest level being between one and five meters above the ground. The positioning of house was on stilts higher from the ground level, around 1-1.8 meters, so that other people outside the house could not see directly into the house (Sari et al., 2019).

The architecture of the traditional Malay houses in West Kalimantan, Indonesia, one national heritage, has contributed to particular characteristic structures. The joint wood connection technique with holes and pins was used to construct wooden house structures in West Kalimantan. According to Zain (2012), the connection technique at the frame joint must spend full attention to some installation

of the supplementary construction to make stable structural elements have been installed as a whole. The supplementary construction will be released one by one after the wooden boards, as wall structures are established on all sides of the house. The upper structure consists of a frame and roof surface. In some traditional houses in West Kalimantan, simple structures were used for the roof structure. According to Gabriela et al. (2017), the house's traditional structure on the roof comprises the top plate, prop, ridge, roof ridge, roof valley, rafter, and roof sheathing. There are found only two main balks in the roof structure: the post (vertical) and the beam (horizontal). To strengthen the roof structure, the trestle construction chosen for the current structure is more appropriate than the traditional structure with post and beam by the rationale to have a stable construction for the house (see Fig. 7).

Fig. 7. Trestle Structure for Roof Construction of the Hajjah Salmah House
Source: Authors (2023)

Fig. 8. Current Progress on the Reconstruction of Hajjah Salmah House
Source: Authors (2023)

VII. CONCLUSION

The action of building or the reconstruction of Heritage conservation of wooden structures to enhance a traditional Malay house to the cultural spaces of Pontianak is a real-life activity to save history for our future generation. By following the importance of carrying out the reconstruction stages and the house's identification process of the past, the future generation will have the authenticity of a legacy of the past. It is essential to follow the stages of the conservation of wooden structures with appropriate identification based on field data collection and literature studies. Any issues of compatibility, reversibility and interventions in the reconstruction of the wooden frame should continue without any attention to the compatibility of materials. Furthermore, all actions must contribute to the possibility of bringing back the element or restoring it to its original configuration (see Fig. 8). By involving academicians and professional architects to conserve the structure and function of the traditional house, the action will further enhance the reconstruction of the Malay traditional house to fit the public community needs of the surrounding environment.

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