

ENVIRONMENTAL ADAPTATION: THE ARCHITECTURE OF RUMAH KAPITAN AND MUSI RIVERSIDE

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Abstract

Palembang's Chinese community began inhabiting Kampung Kapitan 7 Ulu following the issuance of a mandate by Sultan Abdurrahman, granting the Chinese the privilege to inhabit the dry lands by the Musi River. Following the migration to the dry lands, the Chinese community implemented different forms of adaptation to the natural and socio-cultural environment to survive on the Musi Riverside, including in the form of residential architectures. This research is a case study, aiming to explore, examine and discuss the process of environmental adaptation and the different aspects that affect the residential architectures on the Musi Riverside. Analysis is done on the architecture of Rumah Kapitan, studying from the morphological and typological point of view, consisting of its positioning and orientation against the Musi River, spatial order, architectural form, and tectonics system, all of which are the manifestation of adaptation to the natural and socio-cultural environment of the Musi Riverside.

Keywords: *adaptation; Musi riverside environment; Rumah Kapitan.*

INTRODUCTION

The Chinese community relocated from the raft house on the Musi River to the dry lands by the riverside following the mandate by Sultan Abdurrahman in 17th century. The mandate was issued by the

Sultan as a privilege due to the contribution of the Chinese merchants to the Palembang economy. The Chinese community proceeded to establish residence by the riverside, one of which has become a landmark in the present day, named *Rumah Kapitan*, located in Kampung Kapitan 7 Ulu, Palembang. *Rumah Kapitan* was occupied by a Captain, ("Kapitan" in the local language, hence the name), in the 18th century during the Dutch colonial era [1]. The Captain was of Chinese descent and was appointed by the Dutch colonial government and was in charge of collecting taxes from the native Indonesians and the Chinese merchants in Seberang Ulu, Palembang, as well as to maintain security and regulate the opium trades [2].

The architecture of *Rumah Kapitan* is a result of adaptation to the physical and non-physical aspects of the environment surrounding the Musi riverside. The physical aspects refer to the geographical and natural conditions on the Musi riverside, whereas the non-physical aspects refer to the political,

economic, and socio-cultural influences that affect the architecture of *Rumah Kapitan*. This research examines both the physical and non-physical aspects through a study of the morphology and the typology of *Rumah Kapitan*. Morphology refers to the position and orientation of *Rumah Kapitan* against the Musi River, whereas typology refers to the physical appearance of *Rumah Kapitan*. The research framework can be found in Diagram 1.

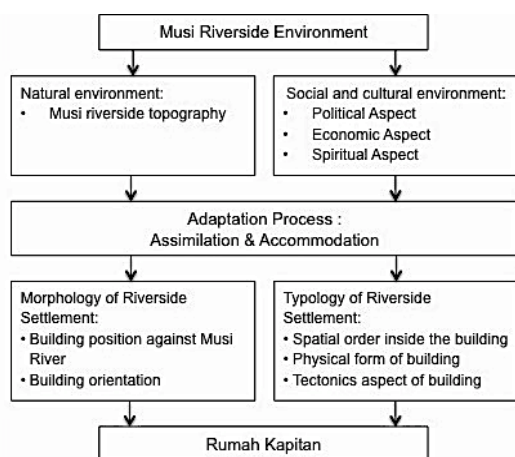


Diagram 1. Research Framework

METHODOLOGY

This research paper is a case study, in which an in-depth examination is conducted using systematic observation, data collection, and information analysis. This study begins with collecting primary data (field data) and secondary data (literature study). The primary data is collected through surveys, mapping, sketches, photographs, and interviews with the locals, resulting in field data

containing the position and orientation of *Rumah Kapitan* against the Musi River, the physical form of *Rumah Kapitan*, the spatial order, form / type of the building, and the tectonics system. The secondary data contains literature on architectural adaptations to the environment of Musi riverside within the scope of morphology and typology. The analysis is made through a comparison and interpretation between the primary data and secondary data. The stages of research are reflected in Diagram 2.

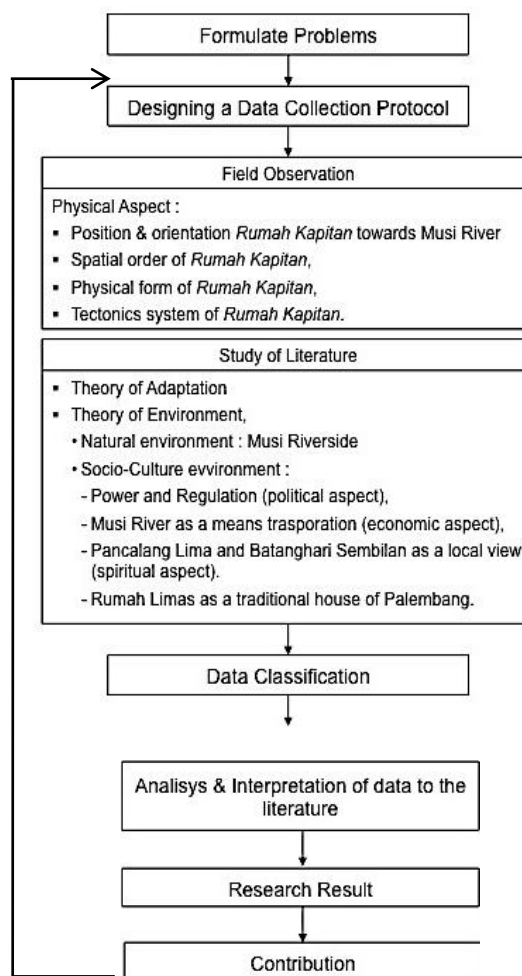


Diagram 2. Research Stage

THEORETICAL REVIEW

1. Theory of Adaptation

In the context of architectures, adaptation refers to any intervention effort to adjust, reuse, or improve the built environment to suit to a new condition or environment [3]. The human presence is interrelated with the condition of its surrounding environment as it determines the human behavior in order to survive. When the environmental condition is more dominant than humans, humans will adapt to achieve the harmony. However, when humans are more dominant than environment, humans will change the environment so that harmony can be achieved.

Jean Piaget theorizes that environmental adaptation is part of human intelligence. Piaget's theory discusses the emergence and the realization of a schema pertaining to the human perception of the environment in the human intellectual development. Piaget presents three aspects in intellectual development: structure, idea, and function. The cognitive structure is a mental framework built by retrieving information from the environment, followed by interpreting, reorganizing and transforming the information (Flavell, Miller & Miller, 1993). Idea is the pattern of human behavior reflected on the response to different problems or situations. Function

relates to the means to develop human intelligence, consisting of organization and adaptation. Organization is the ability to schematize or organize the physical or psychological processes into a system that is orderly and interrelated. Adaptation is performed through two processes, assimilation and accommodation. Assimilation is the process of adding new information into the existing scheme. Accommodation is the form of other adjustments involving the change or replacement of the schema due to the presence of new information that does not correspond to the existing schema. Through the two processes of adaptation, the human cognitive system transforms and develops until it reaches equilibrium, a balance between its cognitive structures and its environmental experience [4].

James Fernandez in his work "Fang and Zulu People" asserts that the relationship between humans and environment is reciprocal and assertive. Environment affects those who exploit the potentials of surrounding environment. This process is very important in the creation of cultural metaphor, starting from the identification of a place and establishing the identity, the community then will build environment, settlement, and architectural elements [5].

2. Theory of Environment

Based on its composition, environment is divided into natural and socio-cultural environment. Natural environment is the geographical conditions on the Musi riverside, consisting of marshlands, the high and low tides of the Musi river, and the tropical climate, all of which influence the typology of the architecture. One type of residential architecture commonly found on the Musi riverside is “Rumah Panggung” (lit: “stage house”, house built on stilts) [6], of which the main structure utilizes wooden constructions with pyramid-shaped roofs.

Socio-cultural environment includes the political, economic, and spiritual aspects that influence the morphology and typology of the architecture on the Musi riverside.

Kim Dovey, an architectural theorist, examines the phenomena that occurred in the architectural world through his views on power. Power is the medium in which the built environment is formed, through regulations or policies, among others. Power in architecture is identified through: *Orientation / Disorientation*, architecture orients, disorients, and/or reorients through spatial frames; *Publicity / Privacy*, the space in which a particular human being/ place / action is placed under supervision; *Segregation / Access*, limits and lanes segregate places with different social status, gender, race, age,

as well as creating pockets in the society; *Identity / Difference*, buildings and spaces signify the identity of social status and the difference in class and culture in the society.

Economic aspects relate to the main occupations of the Musi Riverside community, which are mainly fishermen, traders, and rock and sand miners. The Musi River became the primary means of water transportation for ships carrying commodities. The livelihood of the community was highly dependent on the Musi River, therefore the residential area was established within the shortest possible distance to the river, further supplied with the pier and the port. The residential buildings were also constructed with the orientation facing toward the Musi River.

Spiritual aspects relate to the spiritual views and beliefs of the native people of Palembang. The Musi River was viewed as a mystical element and was central to the local beliefs *Pancalang Lima* and *Batanghari Sembilan*, which were used as guidelines in the construction of the *Rumah Limas*, the traditional house of Palembang. Further discussion on the influence of *Pancalang Lima* and *Batanghari Sembilan* on the *Rumah Limas* can be found on sub-chapter 3.3 and sub-chapter 3.4.

3. Pancalang Lima and Batanghari Sembilan

The native people of Palembang view the river and the sun as the two natural elements influencing the human life. The Musi River provides water as a source of life, and the sun is a source of light for daily activities. The flow of the river and the movement of the sun are so significant to the Palembang natives that they became guidelines in determining the morphology of the settlement, as seen in the position and orientation of the *Rumah Limas*. According to a study conducted by Dadang Hikmah Purnama, titled *Rumah Limas dan Struktur Pemikiran Orang Palembang* (Rumah Limas and the Thought Structures of the Palembang People), Pancalang Lima dictates that the position of a *Rumah Limas* should be on the intersection of the imaginary flow line of the river, head to mouth, and the axis of the sun's movement from east to west. Thus, the position of a *Rumah Limas* has five points of reference: riverhead, rivermouth, east (sunrise), west (sunset), and *Rumah Limas* in the center symbolizing the center of activity of the human life.

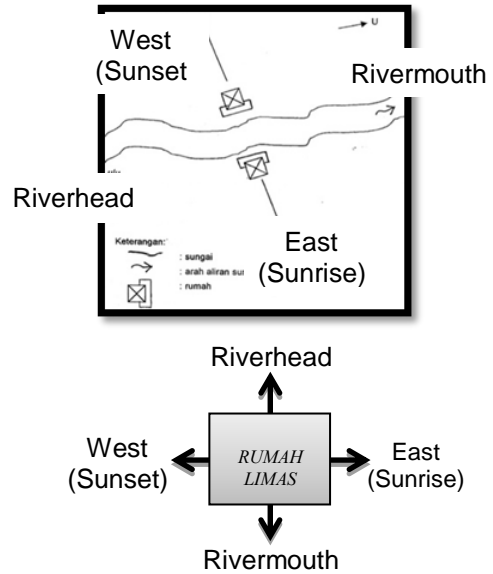


Figure 1. Position and Orientation of *Rumah Limas*
(Source : Dadang Hikmah Purnama, 2000)

In Dadang Hikmah Purnama's study, Batanghari Sembilan consists of one central element surrounded by eight elements. The harmony and balance of these nine elements are illustrated in Figure 2, in which the Musi River is depicted as the estuary of the eight tributaries. In the spatial order of the *Rumah Limas*, the application of Batanghari Sembilan represented by *Amben Tetuo* and the surrounding eight other rooms as depicted in Figure 3.

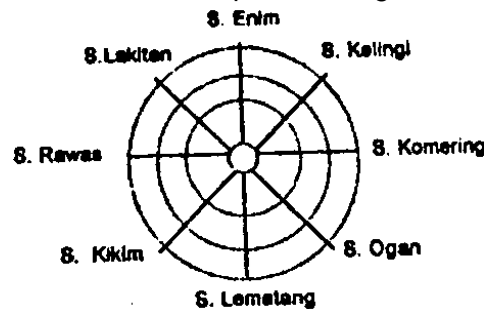


Figure 2. Concept of Batanghari Sembilan
(Source: Dadang Hikmah Purnama, 2000)

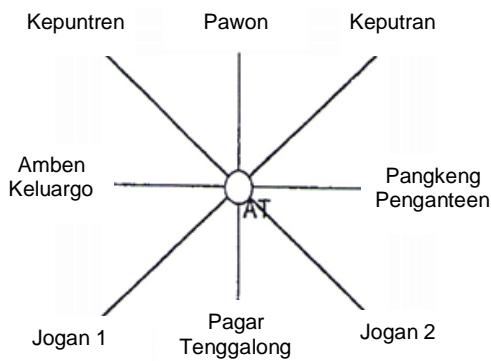


Figure 3. Spatial order of *Rumah Limas*
(Source: Dadang Hikmah Purnama,
2000)

4. *Rumah Limas* as a manifestation of *Pancalang* *Lima* and *Batanghari Sembilan*

From a typological point of view, the *Rumah Limas* adopts a rectangular plan with a pyramid-shaped roof. The natives of Palembang believe that a rectangular house plan reflects balance and harmony in life. Thus by living in the *Rumah Limas*, the natives believe that peace in family, social and religious life can be achieved. The *Rumah Limas* is occasionally used as a venue for traditional ceremonies or events.

There are five levels (*bengkilas*) in the *Rumah Limas*, each representing a different aspect of the community's life: age, type, talent, rank and dignity [7]. Furthermore, each level is representative of the caste system in the native Palembang community. The five levels in the *Rumah Limas* are as follows:

- 1st level: *Pagar Tenggalong*, the lowest level in the form of a room

without bordering walls, serving as a public place or as a living room for guests who are in the caste groups *Kiagus/Nyanyu*.

- 2nd level: *Bengkilas Bawah*, a level separated from the inner part of the house in which guests from the caste groups *Kiemas/Nyiemas* are entertained.
- 3rd level: *Bengkilas Pooocook*, a level where guests from the caste groups *Masagus/Masayu* are entertained. This level serves as a gathering place for special invites and honorable guests of the owner of the house. This level typically has *Jogan*, a room for the house guards, on its left and right sides.
- 4th level: *Gegajah*, the highest level, located directly below the main roof. It is the most honorable space with the highest level of privacy. *Gegajah* is divided into three parts: *Amben Tetuo*, flanked by *Pangkeng Penganten* and *Amben Keluarga*. *Amben Tetuo* is used as a living room for senior family members, as well as a ceremonial space for matrimonial events. *Pangkeng Penganten* is a room for newly married couples, and *Amben Keluarga* is a room for married families. Next to *Pangkeng Penganten* and *Amben Keluarga*, there is *Kepuntren* (girls' room) and *Keputran* (boys' room). Only

persons belonging strictly to the caste groups *Raden/Raden Ayu* are allowed to enter this level.

- *Pawon* is located at the rear of the house with a lower position than *Gegajah*. There are three main parts of *Pawon* that are each used for food storage, kitchen, and washing.

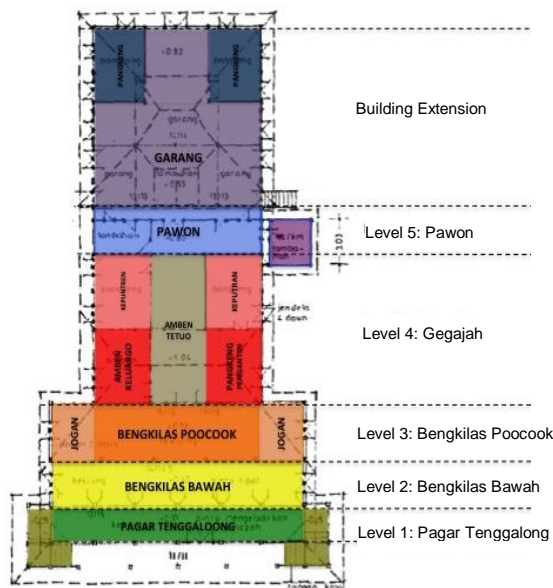


Figure 4. Spatial Layout of *Rumah Limas* (Source : Dadang Hikmah Purnama. 2000)

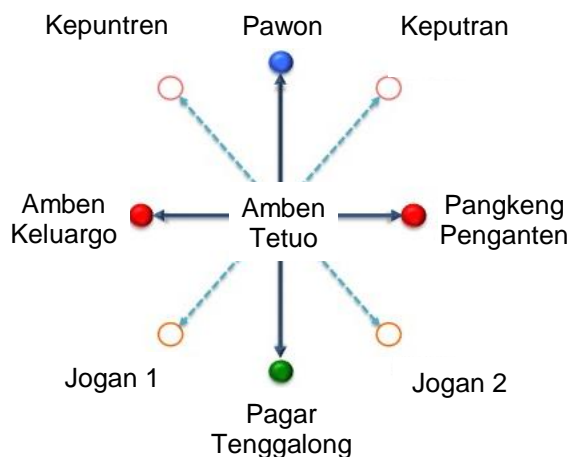


Figure 5. Spatial Layout of *Rumah Limas* in *Batanghari Sembilan* (Source : Dadang Hikmah Purnama. 2000)



Figure 6. Elevation of *Rumah Limas* (Source : www.gosumatra.com)

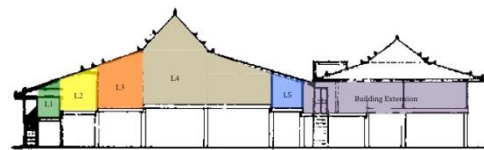


Figure 7. Section of *Rumah Limas* (Source : www.gosumatra.com)

In addition, the layout of *Rumah Limas* is designed in accordance to binary oppositions such as east and west, north and south, riverhead and rivermouth, good and bad, front and rear, public and private, man and woman, life and death, married and unmarried, right and left, as well as senior and junior [8].

Discussion

Rumah Kapitan is one of the first residential buildings created at Kampung Kapitan 7 Ulu. *Rumah Kapitan* formerly consisted of three main buildings, one of which has collapsed due to lack of maintenance caused by resource constraints. One of the remaining buildings functions as the residence, while the other is used for religious purposes (Figure 7 & Figure 8). This research offers an in-depth discussion on the first building. Furthermore, a 1945

map (Figure 7) shows that *Rumah Kapitan* was built next to the Musi River. However in the present day (Figure 8), *Rumah Kapitan* is shown to be located further inland. Continued sedimentation has caused the riverbank to extend into the river, allowing the emergence of newer settlements on the newly formed land.

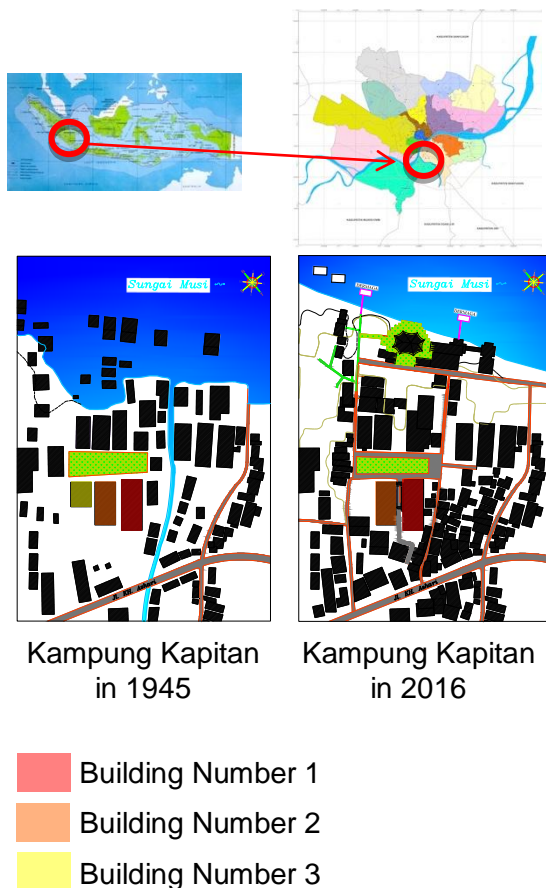


Figure 8. Location of *Kampung Kapitan 7 Ulu*

1. Adaptation to Physical Aspects of the Environment

Geographically, Kampung Kapitan 7 Ulu is surrounded by marshlands, which are affected by the tidal cycle of the Musi River. To accommodate the high and low

tides, the most appropriate type of residential structure is “rumah panggung” for its elevation above ground. From a typological point of view, *Rumah Kapitan* adopts the shape of the traditional *Rumah Limas* of which the structure is “rumah panggung”. From a tectonics point of view, the main structures of *Rumah Kapitan* utilize wood as the primary material, driven by the geographical conditions and the availability of wood in Palembang. Several types of wood were used including *tembesu* (for wall, flooring and door), water-resistant *unglen* (for main structures) and *seru* (for house frame). The base of *Rumah Kapitan* was made of bricks, influenced by the presence of colonial architectures brought by the Dutch colonial government. The roofs are pyramid-shaped with overhangs to protect the building from the sun and the rain. The roof tiles are made from clay that acts as insulation against heat from the sun. The incorporation of the elements of *Rumah Limas* and the influences from the Dutch colonial architecture into the physical form of *Rumah Kapitan* is found to be the realization of assimilation, one of the two processes of adaptation as theorized by Jean Piaget.

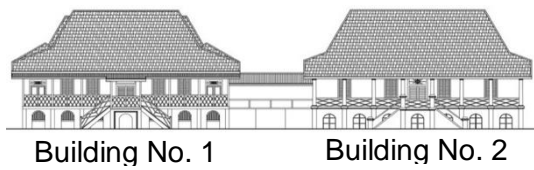


Figure 9. Elevation of *Rumah Kapitan*



Figure 10. *Rumah Kapitan*
(Source : National Geographic Indonesia)

2. Adaptation to Non-Physical Aspects of the Environment

The non-physical aspects of the environment are the socio-cultural elements that influence the architecture of *Rumah Kapitan*, consisting of political, economic and spiritual aspects.

Political aspects: The Chinese merchants, previously residing on raft houses on the Musi River, were issued a mandate by Sultan Abdurrahman, instructing them to migrate to the dry lands by the riverside. The Chinese merchants were allocated across Benteng Kuto Besak, the residence of the Sultan, to enable close supervising of the merchants' activities. However, during the Dutch colonial era, there was a transition in the role of governing body from supervisory in the Sultanate era to a partnership, marked with the appointment of the Captain as an extension of the government [9].

Economic aspects: The Musi River contains wealth and resources such as water, fish as main sustenance, as well as rocks and minerals for construction. The Musi River was also the primary means of transportation, connecting merchant ships carrying commodities from Sumatra's inlands to the coastal areas. Merchants also traded goods on the Musi River and turned Kampung Kapitan 7 Ulu into a trading hub, marked with the construction of the port and pier. *Rumah Kapitan 7 Ulu* was positioned directly facing the Musi River, presenting the Captain with a considerable advantage in monitoring the traffic of the merchant ships.



Figure 11. The Position of Kampung Kapitan 7 Ulu towards Benteng Kuto Besak
(Source : Johannes Adiyanto)

Spiritual aspects: *Rumah Kapitan* adopts the *Pancalang Lima* and *Batanghari Sembilan* principles, resulting in its positioning against the Musi River as well as its spatial order. On top of adopting the principles of the *Batanghari Sembilan*, there are elements in the *Rumah Kapitan's* layout that were

adopted from traditional Chinese residential buildings. According to the building plan (Figure 12), *Rumah Kapitan* is formed by two main building units separated by an inner court in the middle, a specific characteristic of a traditional Chinese house.

The front of the building has four zones:

- (Z1) The first zone is the terrace that is accessible through the staircase. This terrace is used to receive guests with common family relationships and is used as a reception area during big events. When compared to the layout of *Rumah Limas*, this kind of terrace is equivalent to *Pagar Tenggalong*.
- (Z2) The second zone is a living room used to entertain guests with close relationships to family. This room has the combined functions of *Bengkilas Bawah* and *Bengkilas Pooocook* of *Rumah Limas*.
- (Z3) The third zone consists of a main room flanked by two bedrooms on each of its left and right side. The main room, equivalent to *Amben Tetuo* in *Rumah Limas*, serves as a prayer room with an altar placed in the middle. The four flanking rooms have the same functions as *Amben Keluarga*, *Pangkeng Penganten*, *Keputran* and *Kepuntren* in *Rumah Limas*.
- (Z4) The fourth zone is a service room that supports the main room,

equivalent to *Pawon* in *Rumah Limas*.

The front and the rear of the buildings are connected with a terrace that surrounds the inner court. On its right and left sides, there are two rooms accessible from both the inner court terrace and the front terrace. These rooms are equivalent to *Jogan* in *Rumah Limas*. On the inner court terrace, there is also access to a bathroom that does not exist in a typical *Rumah Limas*, an example of the modernization of *Rumah Kapitan*. The layout of the rear of the building is similar to that of the front of the building, consisting of four zones:

- (Z1) The first zone is a common area in the form of terraces.
- (Z2) The second zone is the family room, an essential part of the rear building and flanked by two bedrooms on each side.
- (Z3) The third zone is the dining room.
- (Z4) The fourth zone is a kitchen with storage on its left and right sides.

In Figure 12, it can be seen that *Rumah Kapitan* has a main, linear circulation pattern. Branching patterns are found in the living and main rooms that become the core of both the front and rear of the building. This composition is similar to *Amben Tetuo* in *Rumah Limas*. The bedrooms form the right and left axes, while the terrace and the kitchen form the front, rear, and the diagonal axes of *Rumah Kapitan*, reflecting

the Batanghari Sembilan principles. In Figure 13, it can be seen *Rumah Kapitan* has no floors of different elevation levels as the inhabitants of *Rumah Kapitan* were of Chinese descent who did not follow the caste system of the Palembang people. The even level of the floors, as well as the adjustments made to *Rumah Kapitan*, such as the combining of the functions of *Bengkilas Bawah* and *Bengkilas Poocook* of *Rumah Limas*, is found to be the realization of accommodation, one of the two processes of adaptation as theorized by Jean Piaget.

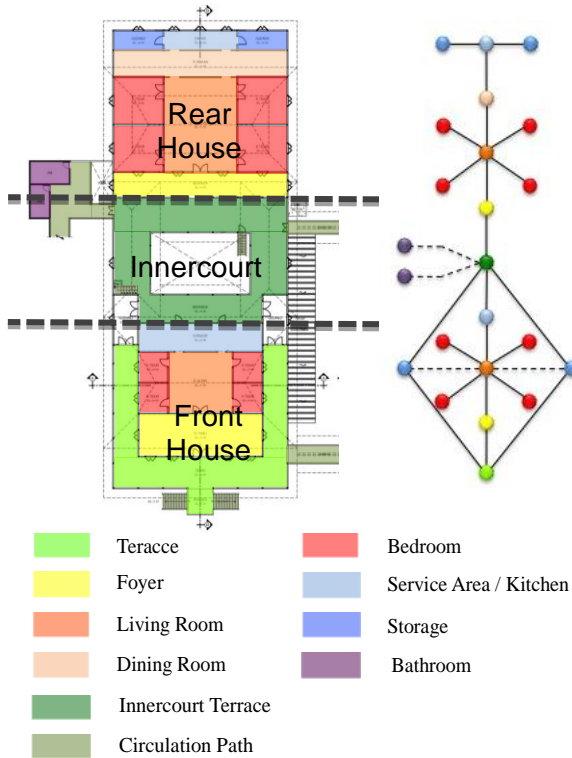


Figure 12. *Rumah Kapitan* Floor Plan

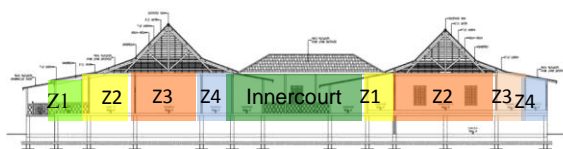


Figure 13. Sectional Image of *Rumah Kapitan*



Figure 14. Interiors of the front of *Rumah Kapitan*



Figure 15. Inner court



Figure 16. Interiors of the rear of *Rumah Kapitan*

Despite adopting the local values for the construction of *Rumah Kapitan*, the Chinese inhabitants still retained parts of their cultural values in the form of traditional Chinese ornaments as architectural elements (Figure 17).



Figure 17. Chinese Architectural Ornaments at *Rumah Kapitan*

CONCLUSION

Adaptation is an integral part of human habitation. For migrants, adaptation is vital to ensure survival in new geographical and social environments. Aspects that influenced the process of adaptation of the Chinese community in Palembang are displayed in the architecture of *Rumah Kapitan*. The scope of morphology is shown in the position and orientation of *Rumah Kapitan*, are determined by the policies of Sultan Abdurrahman (move the settlement of Chinese community to the inland), the function of the Musi River as a means of transportation that supports economic sector for the community in the Kampung Kapitan 7 Ulu, and the

Pancalang Lima which is determine the house should be facing the Musi River. With regards to the type of residential unit, *Rumah Kapitan* combines typology, material selection, as well as the structural system and construction of *Rumah Limas* (*rumah panggung* type with pyramide-shape roof), adopting from the colonial architecture for the construction of the base of the building (utilizing bricks) and the traditional Chinese spatial order (with the placement of inner court).

Upon their migration to the Musi Riverside, the ethnic Chinese in Palembang adapted and adjusted to the various elements in the environment surrounding the Musi Riverside. The first step of the adaptation process is the identification of the physical and non-physical elements surrounding the new habitat, followed by the interpretation, organization and transformation of the elements. The next step is the assimilation and accommodations of certain element(s) deemed vital for the adaptation process. Therefore, we can conclude that *Rumah Kapitan* is a product of a process of adaptation, through which it has achieved equilibrium by the acculturation of the adopted local elements and the elements of the migrants' native cultures.

ENDNOTES

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