The building performance of Palembang’s traditional houses

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Abstract. As one of old city in Indonesia, Palembang has some traditional houses at its old area. The houses are still occupied by modern people. The modern lifestyle threatens the authenticity of the houses as the occupants tend to change them. They change the design of the house to get the performance of the building to be in line with their activities and lifestyle. Paper aims to know the building performance traditional houses in Palembang. To achieve the aim, paper examined the natural lighting performance of three types of traditional houses in accommodating the visual comfort for current activities. The analysis of performance was done through the simulation of lighting performance. The result shows that the houses have different ability to accommodate the visual comfort. Paper shows that the changes need to be done to accommodate the current need of natural illumination. In order to maintain the authenticity, the change can be done by adding openings at building skin and roof.

1. Introduction

Traditional buildings are the local genius of past people. The architecture of them is a result of deep thought and analysis to respond the climate as well as lifestyle. As on old city, the traditional houses still exist and are easily to be found in Palembang. The houses are still used for daily activities. The current occupants tend to live in the house based in their current lifestyle. The modern lifestyle threatens the authenticity of the houses as the occupants tend to change them. Current occupants have different demand as compared to the past ones. They change the design of the house to get the performance of the building to be in line with their need, privacy and lifestyle [1]. As user, the occupant has ability to change the physical of building for controlling the room usage, adjusting the desired building performance in term of lighting, visibility, temperature and noise level [2,3] This intervention is addressing the comfort, satisfaction and desired energy consumption for current occupants.[4] At the same time, those changes are avoiding the physical change on the traditional buildings for the reason of heritage [5,6]. Therefore, the ability of the houses in accommodating the current lifestyle is questioning for the purpose of heritage. One of way to understand it is by examining the building performance. Paper aims to know the building performance traditional houses in Palembang. To achieve the aim, paper examines the natural lighting performance in accommodating the visual comfort for current activities

2. The performance of traditional building for visual comfort.

The building performance is represented by physical comfort. There are three types of physical comfort; visual, thermal and auditory. The visual comfort is the ability of building in performing the proper illumination on the surface inside the room. The thermal comfort relates to the temperature as well as humidity inside the room. The auditory comfort shows by the level of decibel that reach the sound barrier
that is not annoying the user’s hearing [7]. The three comforts determine the action of the occupant toward the house, whether to change the design or add the tools to meet the satisfied comfort level.

Traditional building has ability to provide the physical comfort in terms of thermal and visual demand. The space order, building orientation, numbers and position of openings, and material can create a good thermal comfort in traditional building [8,9,10]. For visual comfort, the basic form, space order and position of ventilation have contribution for receiving the maximum natural day lighting and lead to the low energy building practice [11,12,13]. Among the three comforts, the visual comfort is the one that can represent the performance of the old building in accommodating current context. The visual comfort allows the study to compare the performance between past and current context by examine the illumination level demand based in past and present activities. By comparing the illumination need between to context, the ability of old building to accommodate current context can be examined.

Traditional houses in Palembang consist of at least of four typologies, namely Limas, Gudang, Panggung Cina and Rakit. The high architectural and historical value represent the diversity of culture in Palembang. Each of typology represents the occupant in past time. The Limas usually used by the Malay Palembang ethnic, representative or member of royal or distinguished family. The Gudang usually was used by common Malay Palembang people, some of big trader used the gudang house a place for living and restore the trading commodity. The Panggung Cina was used for Chinese people who married and lived with locals. The Rakit was used for non-indigenous people who were prohibited staying on land. [14,15,16]. These typologies had been existed before the era of Sriwijaya. In current era, the occupants of these traditional houses can be different from the ones in the past. Some of houses are sold to non-family member. However, those old buildings are easily found at Musi riverside area as the old settlement in Palembang.

3. Methodology
The observed traditional building was located near Musi riverside settlement. Each of typologies was represented by one house. The limas house belongs to Mrs Cek. It is located at Kelurahan 5 Ulu District. The house is facing northwest. The Gudang house belongs to Mr. Ahmad, located at 9/10 Ulu District. It is facing south east. The Panggung Cina belongs to Mr Tan. It is located at 28 Ilir District. The house is facing north east. The houses are in good condition and still occupied. All of the houses are more than 50 years old. Data collection was done by field observation and measuring the dimension of the house, especially openings and plan. The qualitative analysis of visual comfort was done by inputting data measurement to software.

4. Result and Discussion
The results of data running represent the calculation of day lighting performance. Day lighting condition depends on the dimension of the rooms, number of openings, position or placement of the openings [7]. The day lighting performance shows the ability of traditional building to accommodate the current activities. In order to know it, the result of analysis was compared to the illuminance demand for visual work [17] as shown in table 1. The value of daylight factor was conversed to the illuminance value.

| Visual Work                                                      | Illuminance (lux) |
|-----------------------------------------------------------------|-------------------|
| Common seeing                                                   | 100               |
| Rough work, big details                                         | 200               |
| Common work, moderate detail                                    | 400               |
| Hard work, small details, such as drawing and sewing using machine | 600               |
| Hard work, small detail, longer time such as assembling small things, sewing using hand | 900               |
| Very hard work, tiny details such as jewellery crafting          | 1300-200          |
| Extremely hard work, very tiny detail such as repairing watch    | 2000-3000         |

Source: Satwiko, 2008
The calculation day light factor was made for overcast condition in clear sky at 12.00 noon, with design sky luminance 10.000 lux and window cleanness 0.9 in August 2018. The result of software calculation is represented in figure 1 for Limas, figure 2 for Gudang and figure 3 for Panggung Cina.

Figure 1. The visual comfort of Limas 5 Ulu

Figure 1 shows the plan, visual comfort and photo of Limas 5 Ulu. The result of calculation is represented by the colour. The yellow colour indicates the high value of visual comfort. The blue colour indicates the low value one. The Limas 5 Ulu has a transparent void on its roof. Therefore, the visual comfort at living room is magenta, indicated a relatively high value of illumination. For bedrooms, the visual comfort is relatively low, indicates by blue colour.

Figure 2. The visual comfort of Gudang 10 Ulu

Figure 2 show the plan, visual comfort and photo of Gudang 10 Ulu. The analysis shows the different result of visual comfort compare to Limas 5 Ulu. TGudang has no skylight like Limas 5 Ulu. The house has so many windows. Therefore, the orange and magenta colour is at the living room, indicates the high value of illumination. Same as Limas 5 Ulu, Gudang 10 Ulu also has low illumination in its bedroom.
The high value is found near the windows. Figure 3 show the plan, visual comfort and photo of Panggung Cina 28 Ilir. The analysis shows the different result of visual comfort compare to the two previous ones. Panggung Cina also has no skylight like Limas 5 Ulu. Even the house has so many windows; the value of visual comfort is relatively low. The house has wider dimension compare to the other two. Therefore, most of room has blue colour indicates the low illumination.

![Visual comfort of Panggung Cina 28 Ilir.](image)

**Figure 3.** Visual comfort of Panggung Cina 28 Ilir.

The visual comfort value identifies the ability of traditional house in accommodating the current activities. Based on the standard of illumination [18], the visual comfort of limas was evaluated. The result shows the differences performance for each room in each house type. All of three houses have low visual comfort for the bedroom. This indicates the need of additional lighting in the day. Panggung Cina has lowest visual comfort for family room. Limas 5 Ulu has the highest visual comfort at its living room. Table 2 shows the daylight performance of the rooms.

| Object          | Rooms and Activities                        | Daylight level (lux) |
|-----------------|---------------------------------------------|----------------------|
| Limas 5 Ulu     | Living room; common seeing; big detail       | 200                  |
|                 | Bedroom; common seeing, study and take a rest| 400 – 500            |
|                 | Family room; common work, family gathering   | 400                  |
|                 | Service, Dining room: common work, eating and cooking | 500                  |

|                 | Standard | Calculation |
|                 |          |             |
|                 | 1648-3268| 28          |
|                 | 28-838   | 858         |
5. Conclusion
From the analysis of visual comfort, the traditional building can accommodate the current activities in general, such as the one with common seeing, rough detail and other common works. For detailed activities such as sewing by hand, studying, or drawing a detail picture, the room of the traditional house must complemented by artificial lighting. Unfortunately, the bedroom needs more lighting than other room as the detailed activities such as studying is conducted in it. The lesson from Limas 5 Ulu gives more visual comfort by having a skylight. This effort allows the improvement on building performance in accommodating more detailed activities in the room. In order to maintain the authenticity of traditional building, the change can be done by adding openings at building skin and roof.

Acknowledgments
Some part of data on this paper are funded by The Grant of Unggulan Kompetitif 2018. Author wishes to thank Lembaga Penelitian Pengabdian Masyarakat Universitas Sriwijaya for financial support.

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