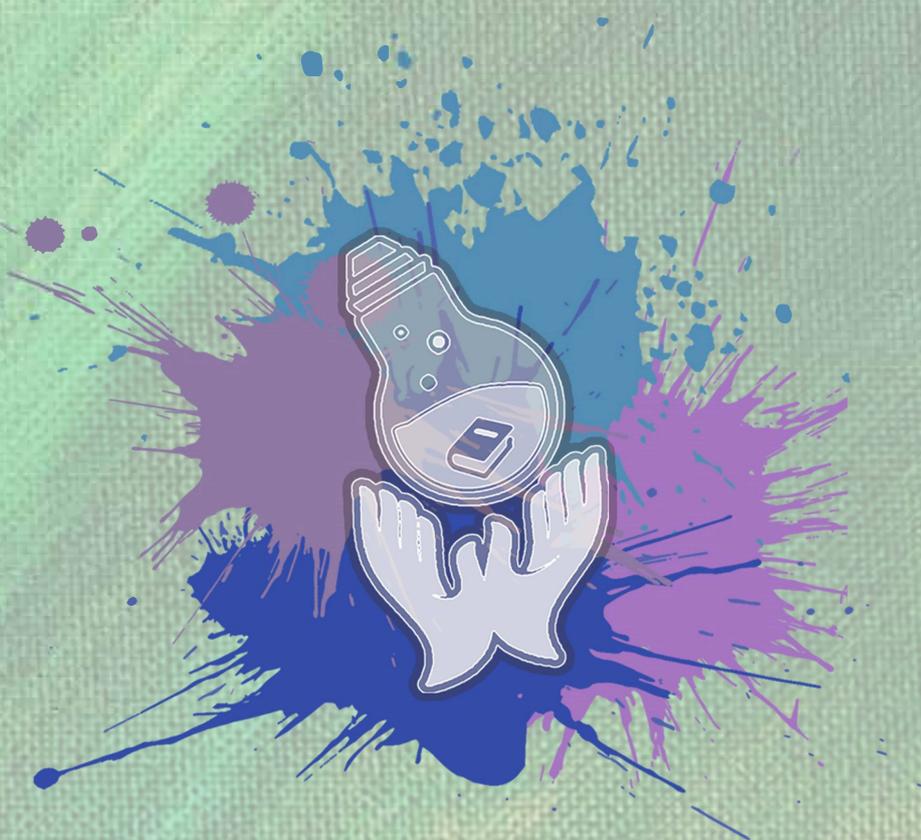




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STUDY OF PASSIVE DESIGN USED IN PERAK TRADITIONAL MALAY HOUSE (PMTH) TO ACHIEVE THERMAL COMFORT

Husna Liyana Binti Sabaruddin¹ and Ahmad Faiz Bin Hassan Naziri²

^{1 2} Department of Building Surveying, Faculty of Architecture, Planning and Surveying, Universiti Teknologi MARA, Perak Branch, Seri Iskandar Campus, 32610 Seri Iskandar, Perak
Email: husnliyana79@gmail.com¹, ahmad702@uitm.edu.my²

Abstract:

The purpose of this study is to investigate the application of passive design used in Perak Traditional Malay house (PMTH). The problem statement is the design element used in Perak Traditional Malay house implied the passive design element for thermal comfort. This research is going to identify the passive design element used in the selected PMTH. This research is conducted in various sources such as article, books or by the observation on the design element. Finally, this research gives an experience on how to make a space that will response with passive design element to achieve thermal comfort.

Keywords:

Passive design of Perak traditional Malay house; design element; thermal comfort; traditional house

1.0 INTRODUCTION

The traditional Perak house known also as “Rumah Kutai is slowly diminishing and replaced by new dwelling scheme in the typology of Malaysia. With the need to document a concise architectural record to prove their existence, the research introduces a typological outline of the house. This is by establishing a formal category and to understand the “Kutai” language in their architectural expression: form and meaning. An initial study by previous researcher Yuan (1991) need to be continue and with further elaboration and investigation. The research is focused on the design element used in PMTH that had been one of the passive design elements that achieve thermal comfort. This research paper focuses on how the application of design element of PMTH helps to improve thermal comfort and reduce solar heat gain in PMTH.

2.0 LITERATURE REVIEW

Passive design strategies or elements mostly refer to natural elements, sunlight, heat or light a building. The passive design approach can include the structure of the building itself, including building orientation, window placement, skylight installation, insulation and building materials, or specific elements of a building. Traditional Malay house is famous for its passive design element. For this study, to prove the effectiveness of passive design elements towards Malaysia climate the study of PMTH is a good example of Traditional Malay house. The climate of Malaysia referring to Yuan (1991, p. 68) can be classified as warm-humid equatorial, characterized by high temperatures and humidity. This problem causes climatic stress in Malaysia which is high temperatures, solar radiation, sun glare, humidity. All these factors need to be considered to achieve thermal comfort (Yuan, 1991, p. 71).

According to Yuan (1991), Malaysian architects nowadays uses Malay traditional house as a study paradigm for its excellent interpretation of environmental design, design versatility and building systems. Malay house designed need to accommodate the Malaysia climate in relation to considerations of tropical architecture. Malay Traditional house is famous with its natural ventilation because of its built form and spatial design that allow ventilation across and throughout the house. The planning of the house takes many ways that make Malay Traditional House suitable in Malaysia climate. An example of Malay Traditional house that will be studied is Perak Traditional Malay house “Rumah Kutai”. “Rumah Kutai” are mostly located along Perak River which can easily be found in the Central District, Lower Perak and Kuala Kangsar and mostly had been built between years 1840s to 1940s (Ariffin, 2016). Selected PMTH will be studied to identify the benefit of its design element to achieve the thermal comfort.

There's a lot of passive design elements that PMTH share with Traditional Malay House elements. Firstly, Traditional Malay house is raised in floor construction which an ideal solution for coping with ground dampness in the hot and humid tropical climate. Openness of Traditional Malay House is the main important thing to build house. The house is divided into areas, rather than rooms, for various social and household activities. Then, the absence of portion or solid ceiling height, walls separating the three main area which is veranda, main house and kitchen which seems to merge naturally with environment (Wan Hashim, 2011). With this study, PMTH will be compared to define the passive design elements for each house and focusing more on sustainable features present rather than cultural influences. "Rumah Kutai" has the same design with a few variations in materials and ornamentation depending on the owner's wealth. Some of PMTH passive design elements that can be applied is from its layout, orientation, cross ventilation, roof space ventilation, ventilation at body level, materials, and vegetation. All these elements will be used during the site visit and observation process.

To conclude, the research will be compared from all selected "Rumah Kutai" to identify which design element that effectives to catch thermal comfort. This research will give more knowledge about PMTH design and will raise awareness to society that passive design element can be used in Malaysia house that has climatic problem.

3.0 METHODOLOGY

The research data has been collected from online resources materials and by observation. Toward the subject which is by site visit to the selected PMTH. The research is conducted with the aim to get more understanding of how its passive design element are implemented in order to achieve thermal comfort. In order to gain a deeper understanding on how these house working through the passive design element, various aspects are investigated in depth by personal observation which include its contextual surrounding, its orientation and spatial arrangement .The observation will be done by selecting certain "Kutai" house around Perak that is defined by the age of house which is 60's or 70's years above. This is because to test the passive design element that had been applied in that era which had been developed earlier by the people in that era. From the personal experience through the house and the surrounding will gain more adaptation to the site and to strengthen the credibility of the research, photographs are self-captured, and the data will be analysed. After that, from the analyse data, a comparison will be made to select the best house that achieve thermal comfort.

4.0 ANALYSIS AND FINDINGS

Selected "Rumah Kutai" had been listed according to its condition and characteristics that meet the equirement. The data analysis will be focus on the house condition whether it achieve the target of thermal comfort with a guidelines of passive design element which will resemble the literature review.

Characteristic of thermal comfort	Types of Kutai house		
	<i>Rumah che Intan, Padang Tenggara</i>	<i>Rumah kompleks, Pasir Salak</i>	<i>Rumah Surau, Padang Tenggara</i>
			
Contextual Response	x	x x xx	x x x x
Shading Devices	x x x	x x x	x x x
Bulit Form	x x x x	x x x x x	x x x
Orientation	x x x x	x x x x	x x x
Ventilation	x x x	x x x x x	x x x x

Figure 1: The Comparison of Data collected and Data Analysis

X = define the rating of the thermal comfort requirements

From the analysis, a table of comparison conducted to explain the thermal comfort of the selected house that implies thermal comfort and passive design. The rating will be given as many stars the selected house is the most efficient and follow the requirements of passive design to achieve thermal comfort. This method creates new alternative to find description of thermal comfort Conditions for a more environmental friendly design that suits Malaysia climates.

5.0 CONCLUSION

There are still many actors that may contribute in enhancing the thermal comfort. While at the same time, the design element that implied in PMTH give a lot of advantages to build a house with good thermal comfort. This research gives an experience on how to identify those elements. The elements that had been done by the previous builder has pro's and con's that can take it as a way that can be used and improved.

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