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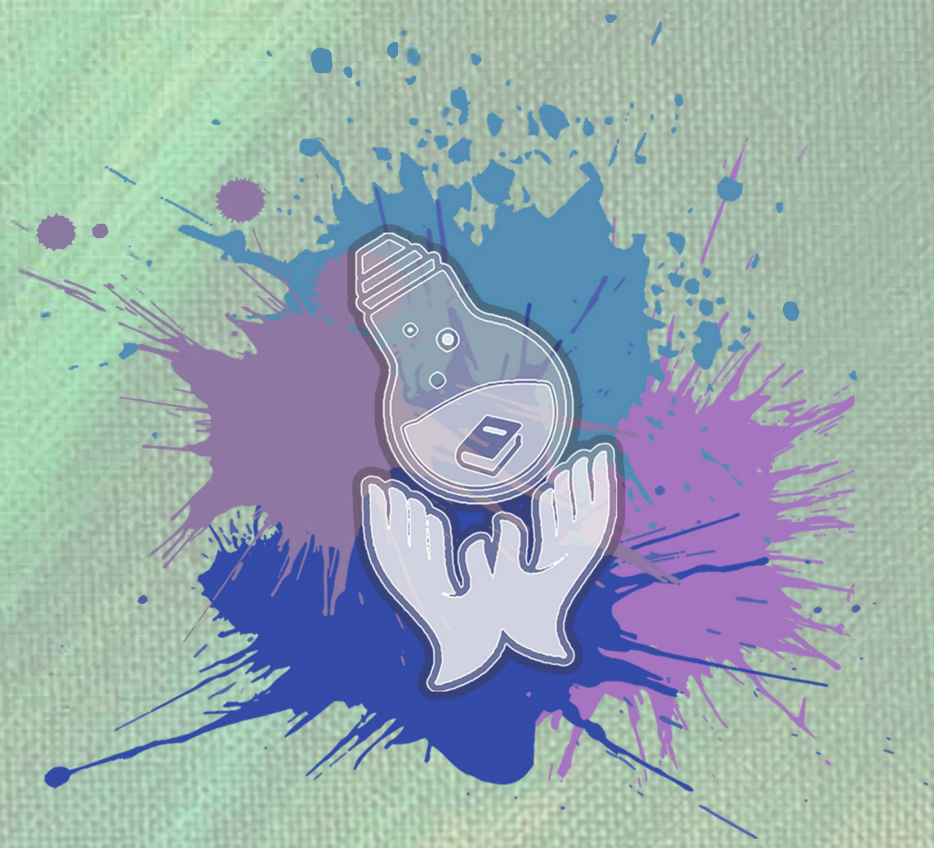

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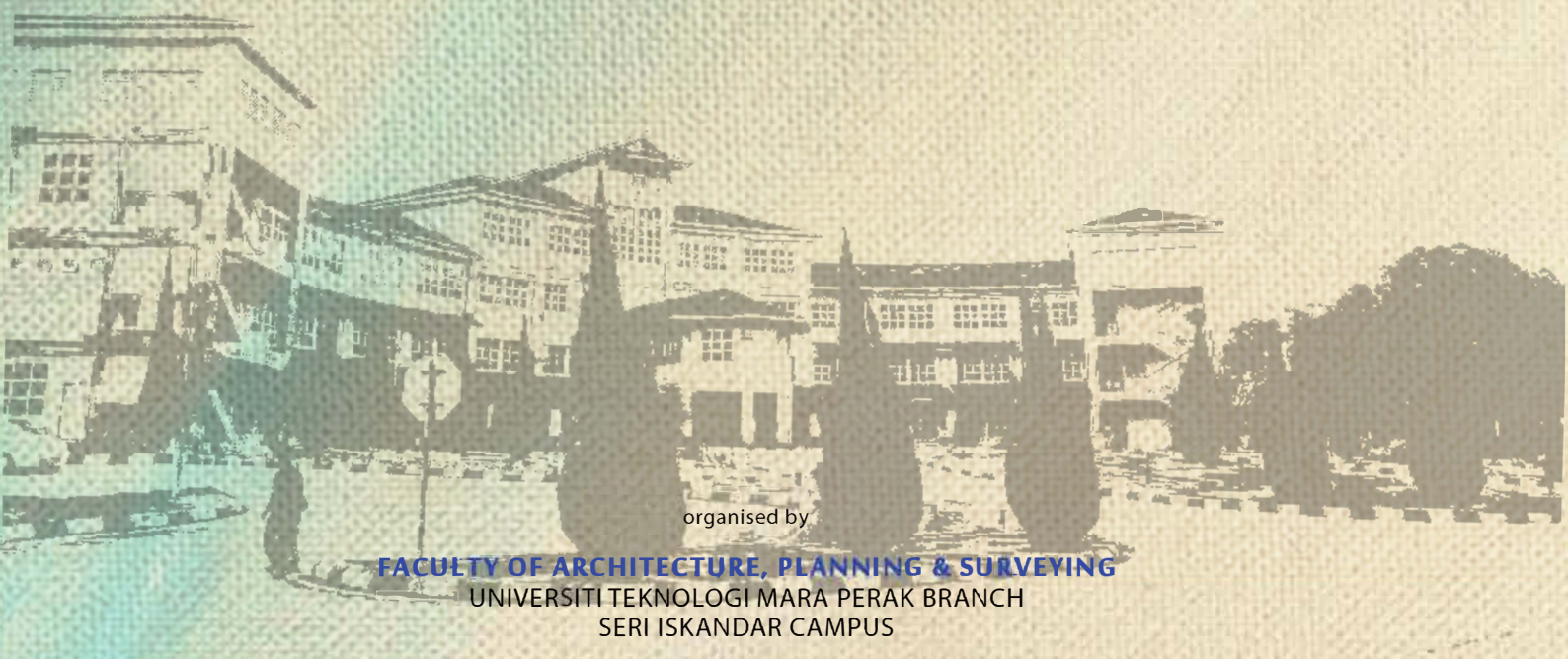

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COMPARATIVE STUDY ON THERMAL COMFORT BETWEEN MALAY TRADITIONAL HOUSE AND MODERN BUNGALOW HOUSE IN PERAK

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Abstract:
In this era modernization and urbanization, are exposed by modern building and construction. Thermal comfort is a great influence on health and satisfaction of occupants in indoors living. Thermal comfort is defined as the state of mind that expresses satisfaction with the surrounding environment. Malaysia is a tropical country characterized as warm and humid every year. In most of the survey study, most people spend 80 percent of their lives indoor especially in home. This study examines the level of the thermal comfort in Malay traditional house and modern bungalow house in Malaysia. This study proceeds to analyze the detailed field data collected, with a view to identify the good thermal comfort between these houses. The case study of two Malay traditional houses in this research are located in Batu 14 ¾ Kampung Telok Bekong, Bota, whereas the modern bungalow houses are located Seri Iskandar Perak.

Keywords:
Thermal comfort; traditional house; modern house; comparative study; quality life.

1.0 INTRODUCTION

Thermal comfort has no absolutely standard. In fact, it is not surprising because human can live in a range of climates from tropics to high latitudes. According to ASHRAE, the definition of thermal comfort is "that the condition of mind which expresses satisfaction with the thermal environment" (ISO 7330). Those characteristics of thermal environment which affect a person's heat loss or gain (R shanthi priya, M C sundarraja, & S, 2012).According to (Shafii, 2012) building materials factor as well as the walls and the roof affect the situation. The aim of this study is to identify the best thermal comfort (the best or comparative) between traditional Malay house and modern bungalow house.

2.0 LITERATURE REVIEW

The range of ideal thermal comfort is between 24°C-30°C (ASHRAE Standard 55-2004). Therefore, an environment for human which has little wind movement can affect occupants in indoor thermal comfort in housing. Two main factors that affects comfort and health of occupants living inside of housing without good ventilation system is high air temperature and relative humidity (Sookhchaiya, Monyakul, & Thepa, 2010).

2.1 THERMAL COMFORT REQUIREMENTS

There are six primary factors that directly affect thermal comfort that can be grouped in two categories: first is personal factors such as clothing insulation and metabolism/activity level because there are characteristics of the occupants. The environmental factor which is condition of the thermal environment such as mean radiant temperature, air temperature, air velocity/wind speed and lastly relative humidity.

2.1.1 Mean radiant temperature

The radiant temperature is related to the amount of radiant heat transferred from a surface the material to be a factor, and it depends on the material's ability to absorb or emit heat, or its emissivity

2.1.2 Relative humidity

The relative humidity of air can be defined as absolute humidity which is the amount of moisture actually present in unit mass or unit volume of air. Humidity means the state or quality of being humid (Simion et. al., 2015).

2.1.3 Wind Speed

Wind speed is the average speed of the wind over a 10-minute period at a height of 10 meters above the surface. The lower the temperature, the higher the wind speed which is can cause the cooling effect of the wind. Air velocities can be defined as the average air speed that determines the amount of air flowing through a point in the duct per unit of time by location and time**.**

3.0 METHODOLOGY

Case study was chosen from traditional Malay House and Modern Bungalow house in Perak. Both houses have different common features and functions. The data taken are chosen from range of traditional passively cooled according to criteria of houses such as the layout design, size of houses, ventilation type, and physical of houses such as material, height and orientation. In this study, the climate aspects of temperature, humidity, wind speed and air velocity were measured in Traditional Malay House and Modern Bungalow house from 8 am to;12.00 pm to 02.00 pm; and 05.00 pm to 07.00 pm for five days. The questionnaire surveys on the occupant comfort in houses were undertaken for both owners of the house. The data findings and measurement used to make a comparative data between both types of Traditional Malay house and Modern Bungalow house. Analysis the result and compare with ASHRAE standard to find out the thermal comfort in different type of both houses. The comparative thermal performance evaluation was made on the basis of climatic measurement between Traditional Malay House and Modern Bungalow House.

4.0 ANALYSIS AND FINDINGS

The finding of the research shows that there is considerable different thermal performance of indoor climate in traditional Malay house and modern bungalow house.

Table 1: Indoor Design ConditionSource: (Malaysia Standard, 2010)

Recommended Design DB Temperature	**23°C -26°C (73.4 °F – 78.8°F)**
Minimum DB Temperature	22°C
Recommended Design RH	55%-70%
Recommended Air Movement	0.15m/s – 0.50m/s
Maximum Air Movement	0.7m/s

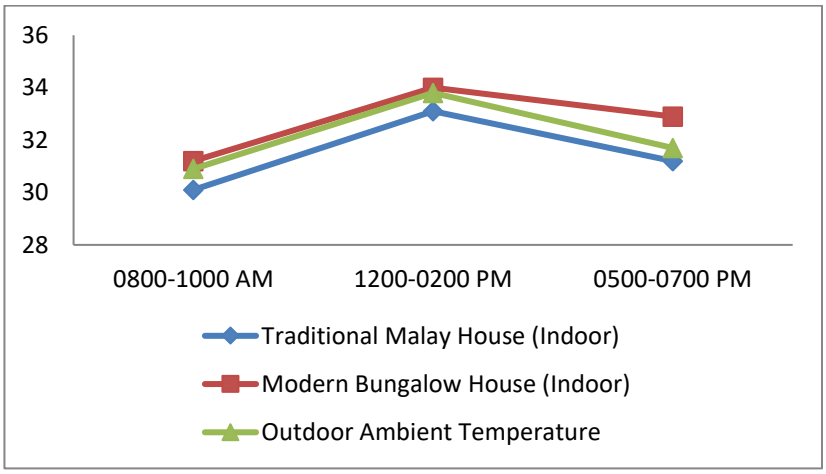

Figure 1: Relationship between bedroom air temperature vs time – Traditional Malay House and Modern Bungalow House

The result of air temperature measurement in living room area of each house was shown. Figure 1 shows the comparison of air temperature versus time in indoor area for traditinal malay house and modern bungalow house. In the morning period from 08.00 am to 10.00 am the indoor environment traditional Malay house more comfortable and cooler than condition in modern bungalow house without any devices. Then, the interval of 12.00 pm to 02.00 pm the condition of indoor environments of the modern bungalow House is warmer compared to indoor climate in traditional Malay house. The findings of this study shows that the traditional Malay house have good thermal comfort compared to the modern bungalow house.

5.0 CONCLUSION

In this study, indoor thermal comfort of traditional malay house and modern bungalow house were analyzed using three approaches such as field study, calculation and measurement. This research is subjected to field observation with focuses on satisfaction of occupants about thermal comfort? responses during daytime of both vernacular houses. The result shows the maximum comfortable temperature (feel comfortable) in the period of daytime is 28c with calm air of relative humidity and air velocity.

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