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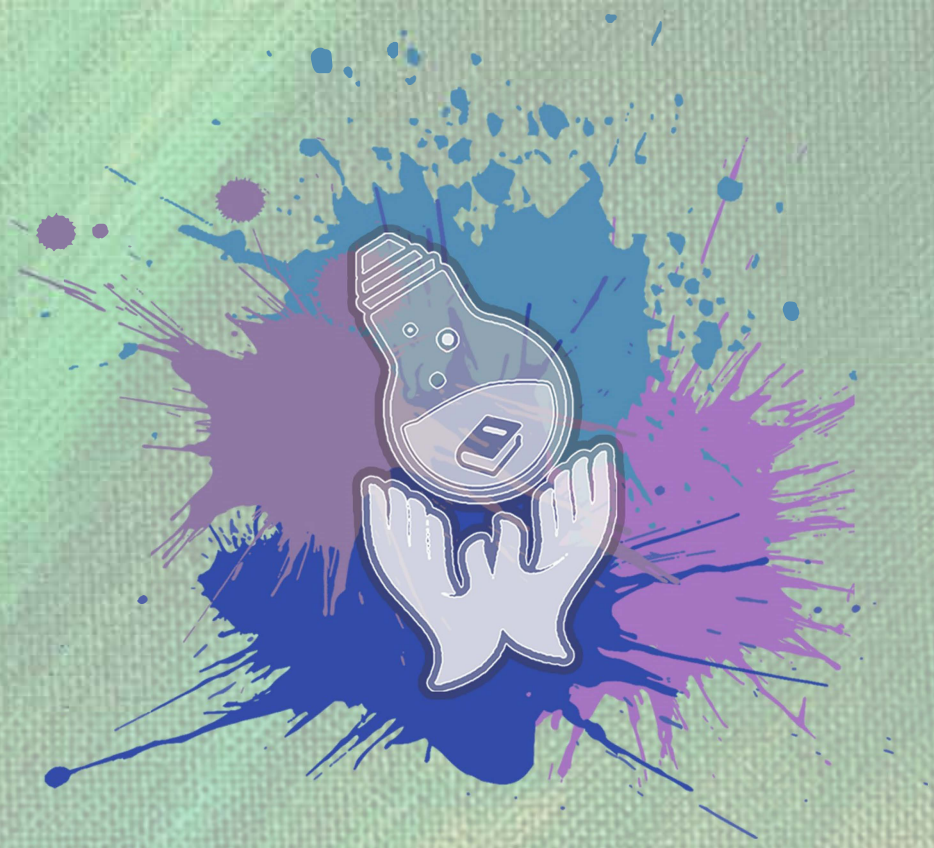

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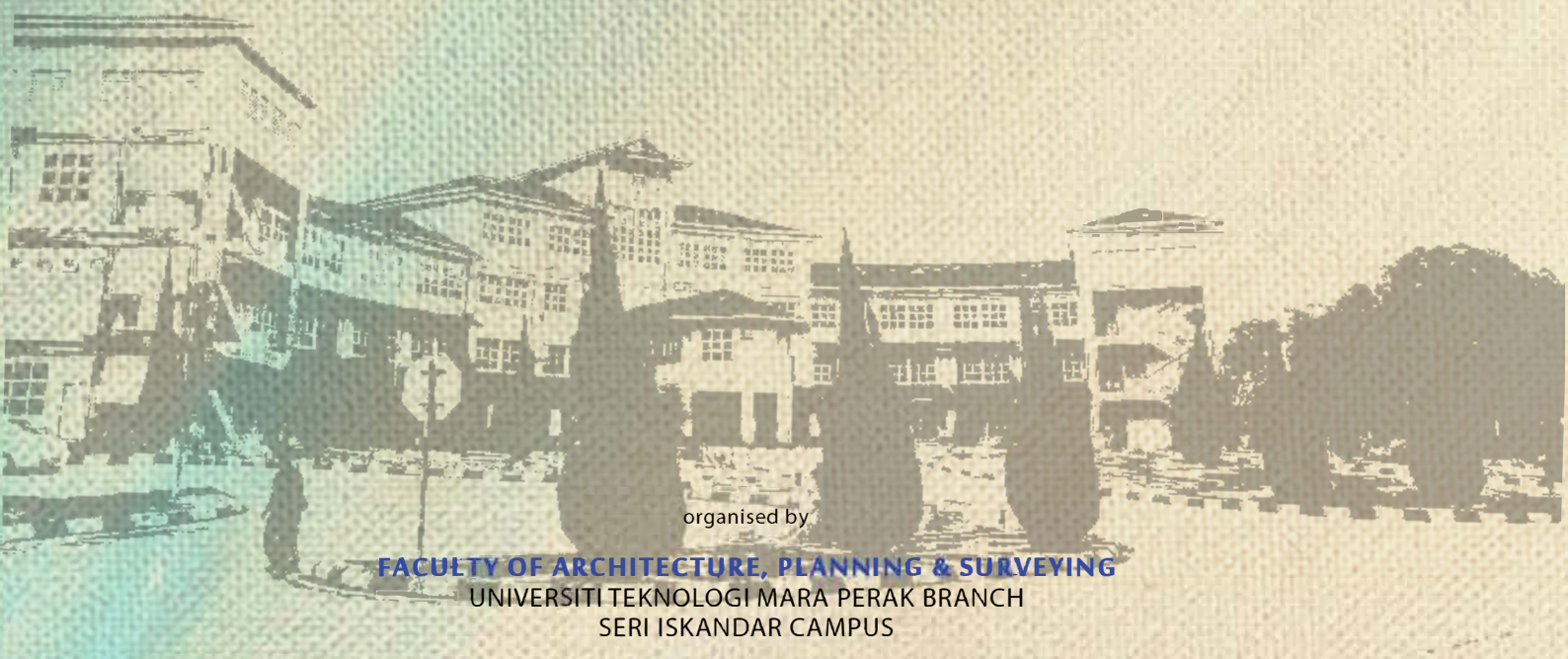

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ANALYSIS ON THE RELATIONSHIP BETWEEN THERMAL COMFORT AND CUSTOMERS' SATISFACTION IN MALAYSIAN SHOPPING COMPLEX USING MULTIPLE LINEAR REGRESSION

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Abstract:
The climatic changes based on the increase in total annual energy consumption used. Therefore, the proportion of building also effects on the customers' satisfaction on thermal comfort in the shopping complex itself. The objective of this paper is to analyse the relationship between thermal comfort and customers' satisfaction in the shopping complex. The research methodology used in this study is a quantitative method by using a questionnaire survey. The respondents of this study are customers within the chosen shopping complex. The data collected were evaluated in chosen Penang's shopping complex. The data collected to achieve the objective and the analysis of data were obtained by SPSS version 23. The most dominant factor that influences thermal comfort is Heat transfer. It is hoped that this study will be a benefit to the public and to be view on improving the shopping complex in term of thermal comfort.

Keywords:
Shopping Complex; Customers' Satisfaction; Thermal Comfort

1.0 INTRODUCTION

Shopping complex is a great place to enjoy yourself and relax. It mainly provides the best shopping stores, gathering area, entertainment, performances, and product launches According to Isenburg (2017), based on International Council of Shopping Centers classifies shopping complex into eight basic types: neighborhood center, community center, regional center, superregional center, outlet center, dead malls, vertical malls and atrium malls. Customer satisfaction is a critical issue for both customers and shopping mall management. According to Anselmsson (2006), customer satisfaction with a shopping center may be viewed as an individual's emotional reaction to a personal evaluation of the total set of experiences encountered at the shopping center. It is an important marketing concept within the shopping complex, for example, the long-dominant of marketing literature, stated that 'the key to achieving organizational goals consists in determining the needs and wants of target markets and delivering the desired satisfactions more effectively and efficiently than competitors' (Anselmsson, 2006).

Based on the case study in Anselmsson, (2006) stated that, the thermal comfort is the second most important source of satisfaction. In this study, thermal comfort is a factor which rather motivates people to stay longer and purchase more. Besides, according to on case study by Halid *et al.* (2009), results of the study indicated that in hot-humid tropical climates, air-conditioned levels top glazed atrium suffers high temperature on the top floor causing great discomfort to the occupants. It can be responsibly referring to that occupants' satisfaction has an important influence on their thermal sensation and satisfaction. Therefore, to achieve the customers' satisfaction when they are in the shopping complex, thermal comfort is important to be acquired for customers' satisfaction in the shopping complex.

2.0 LITERATURE REVIEW

2.1 Thermal Comfort

The term "comfort" means satisfaction of to some degree, so it addresses psychological satisfaction as much as physiological satisfaction. According to Hou (2016) and Najafabadi (2013), thermal comfort is not a state condition, but rather a state of mind which affect human performance and involving many inputs influenced by the physical and physiological state on what they feel. Nowadays, according to Hou (2016), people spend most of their time indoors, therefore the indoor environment has a great impact on occupants. There is the number of studies has been done on thermal comfort to improve energy consumption in the buildings. However, the different in diversified space of the buildings creates different thermal comfort to the fully occupied spaces. Human comfort has been generally influenced by environmental factors. As mentioned by Esther and Sagada (2014) and Al *et al.* (2016), some factors are important in influencing the thermal comfort issue in a building. Based on Al *et al.* (2016) thermal comfort is influenced by environmental parameters, which are including air temperature, heat transfer, air humidity and air movement. Therefore, thermal comfort has been accepted as one of the most critical aspects of the indoor environment quality.

2.1.1 Air Temperature

The air temperature is clearly reflected the thermal condition of the space Therefore, Esther and Sagada (2014) stated that the temperature and relative humidity are the two local climatic factors that affect indoor comfort while building envelop, orientation, shading, glazing type and size, vegetation, thermal mass are the dependent design parameters that contribute to the thermal comfort in the buildings.

2.1.2 Heat Transfer

Enescu (2017) states that, the heat transfer is the changes of the temperature with the same amount of thermal radiation with a human and the surroundings of the human. Besides, according to Halid *et al.* (2009) and Enescu (2017), the contribution of the relatively high proportion of solar radiation energy that absorbed by the atrium envelope will increase the heat transfer of the internal surfaces, which lead to the rise in temperature inside the building.

2.1.3 Relatively Humidity

The relative humidity effect is considered to affect thermal comfort, perception of indoor air quality, the health of the occupants and energy consumption. Besides, the recommended relative humidity ranges concerning thermal comfort for the human is between 30–60%, if the relative humidity higher than 70 %, it will affect thermal discomfort for humans (Enescu, 2017).

2.1.4 Air Movement

The suitable air flow can help to maintain people's thermal comfort in warm seasons during a long-term stay in the indoor environment. The cooling effect of the air movement can raise the indoor set temperature to a certain degree, therefore effectively reduce a building's energy consumption.

2.2 Research Framework and Hypothesis

The research framework on the hypothesis of the relationship between Thermal Comfort and Customers' Satisfaction is displayed in Figure 1.

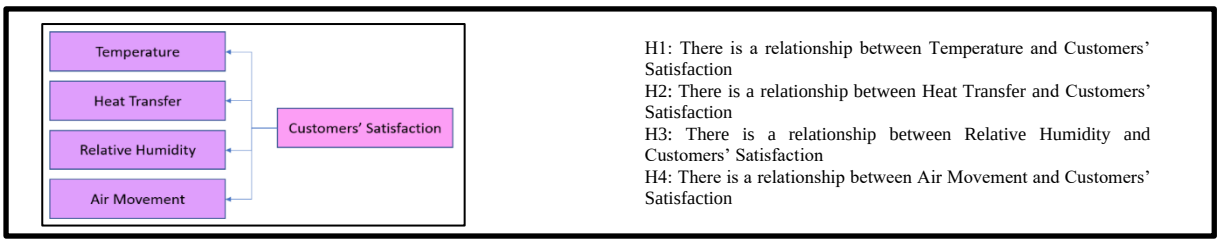

Figure 1: Research Framework, Adapted from (Tharim *et. al.*,2018)

3.0 METHODOLOGY

For this study, the scope area of the research is at the shopping complex in Malaysia, and the focused respondents in this study are the customer in Penang Island's shopping complex. There are two numbers of shopping complex involved in this study. The set of questionnaires was distributed to 300 participants. 176 sets from 300 sets of questionnaires were received to determine the customers' satisfaction in the shopping complex.

4.0 ANALYSIS AND FINDINGS

Data were analysed by using Statistical Package for Social Science software (SPSS) Version 23 on the focus building.

4.1 Demographic Profile

The descriptive analysis was run for the demographic profile, which is for gender, age and weather. Percentage data were collected for gender and most of the respondents were female with 55.1% and approximately 44.9% for male. In this study, almost 43.2% were below 21 years old. The second group of respondents were between 21-35 years old which consist of 36.4 % of respondents. For those aged 36-51 years old, around 17.6% of participants participated and the smallest percentage was 2.8% for respondents above 51 years old. Lastly, the highest percentage data for weather were, very warm were 48.3%, followed by warm were 31.8%, neutral was 18.2% and lastly cool was 1.7%.

4.2 Hypothesis Analysis

Multiple Linear Regression were employed in the data analysis to run the hypothesis analysis.

Table 1: Hypothesis Analysis of Thermal Comfort and Customers' Satisfaction

HYPOTHESIS	t	Sig.	B	HYPOTHESIS FINDING
Temperature – Customers' Satisfaction	1.323	0.188	0.138	Non-Supported
Heat Transfer – Customers' Satisfaction	17.79	0.000	0.859	Supported
Relative Humidity – Customers' Satisfaction	1.322	0.188	0.146	Non-Supported
Air Movement – Customers' Satisfaction	0.199	0.045	0.199	Supported

*** R2** adjusted value 0.658 (model)

* **P Value** <0.05

Analysis:

a) 65.80% (model) customers' satisfaction is influenced by model variable, 34.20% is influenced by the external factors.
b) Table 1.0 indicates that, Heat Transfer and Air Movement has a potential relationship with customers' satisfaction in the shopping complex. (Hypothesis H2 and H4 was supported)
c) Beta Value in Table 1.0 shows that the most dominant variable is heat transfer and followed by air movement.

5.0 CONCLUSION

Model fit to predict the dependence variable. Therefore, it can be summarized that in order to increase customers' satisfaction in the shopping complex, proper consideration needs to be addressed on heat transfer and air movement in the building.

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