

**THE EFFECT OF SUNROOF TOWARDS THERMAL COMFORT OF A DINING AREA IN A  
RESTAURANT IN MALAYSIA**

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## **ABSTRACT**

This research is an attempt to study and investigate the effects of sunroofs on thermal comfort in a dining area of restaurants in Ipoh, Malaysia. The main issue is how sunroof affects the comfort of the occupants in the restaurants and what are the possible methods to achieve thermal comfort by air temperature and air velocity. In this research, only three methods will be used to obtain the data to achieve the research objectives. These methods include observations, questionnaires, and anemometer readings. The two restaurants chosen to conduct this research are Plan B and Burps and Giggles, both located in Ipoh. The restaurants are distanced not more than a few meters, just next to each other.

In this research, it is discussed that sunroof affects the quality of thermal comfort in a space. Based on the data obtained, the average temperature for a naturally ventilated space under a sunroof on a normal day is around 30°C to 32°C. This is considered to be uncomfortable where the optimum level of air temperature to achieve thermal comfort is somewhere around 24°C to 28°C. However, thermal comfort still can be achieved if air movement is introduced into the space. Therefore, it can be concluded that sunroof really affect the indoor air temperature of a space and will likely cause discomfort to some individuals if not controlled.

However, the use of sunroof in Malaysia can still be practical but has to be well controlled to decrease the effect it has on the indoor air temperature. On the other hand, sunroof will likely improves the quality of the space when sun heat is not present.

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# CHAPTER 1: INTRODUCTION

## 1.1 Problem Statement

*The energy admitted to a building by the passage of solar radiation through the windows is of greater intensity than that admitted as a result of sunlight striking an opaque wall. Radiation has a great and immediate effect on people directly in its path but a lesser and delayed effect on people who are shaded from the direct rays [Smith 1989]. The effects of solar radiation on the human TC are also greatly determined by overall seasonal environment conditions. Solar thermal gains in buildings are desirable during wintertime, but problematic in summer, since they may cause overheating and thermal discomfort [Santamouris et.al 1996]*

Based on the above statements, it is undeniably true that openings in a building will result in gaining solar radiation thus increasing the indoor temperature of the spaces affected. However, the effect of solar radiations on the human thermal comfort is determined by the overall seasonal environment condition. Located near the equator, Malaysia has a climate of hot and humid throughout the year. Having an average rainfall of 250 centimeters and an average temperature of 27°C yearly, it can be a problem to the users as it may cause thermal discomfort in the dining area in the restaurants. The temperature affected by the solar radiation might be uncomfortable for a dining area especially during the day when the sun is at the highest point. The focus of this study is to measure the temperature of the dining area at different time intervals and give suggestions / strategies based on the findings.