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Defining Issue of Thermal Comfort Control through Urban Mosque Façade Design

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Abstract

Urban mosques should be provided with an acceptable thermal comfort for worshippers to feel comfortable and relaxed to attain a feeling of tranquility, peace and serenity. This paper aim is to define the issues related to thermal comfort control through urban mosque facade design to achieve the quality of life. The methodology for the study is an analytical review to define theoretical framework related to the key areas. The results indicated that healthy indoor living, quality of life in the urban environment, energy consumption and implementation of passive design strategies are the issues governing thermal comfort through the design of facade for urban mosque.

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Keywords: Façade design; thermal comfort; urban mosque

1. Introduction

The prominence of the masjid (mosque in English) for the Muslim community in Malaysia calls for the provision of thermally comfortable environment for worshippers using the building. A. Hussin et al. (2014) identified that inappropriate thermal comfort in mosques leads to the unsuitable thermal environment for the worshippers and the

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functions held inside the buildings. Abdou et al. (2002) and Ibrahim et al. (2014) also stated that prayers in mosques need to feel comfortable and relaxed to attain a feeling of tranquility, peace and serenity. Hence, providing cooling and thermal comfort to the worshippers by installing air conditioning (A/C) system in mosques in Malaysia has become common practice. The trend of using air conditioning will increase the electricity consumption that leads to the increase in carbon emission. Thus, thermal comfort should be investigated thoroughly to reduce energy requirements in mosques.

Mosque is an important building typology for Muslim; as a place for worshipping and multi-functional community space that involve occupancy. This building typology develops and evolves rapidly to meet the needs of the users and community. As part of the religious institution in Malaysia, the mosques that are located in urban areas act as landmarks and focal points for the public activities (Nizarudin, 2014). The mosques in the urban area that provide a thermally comfortable space for worshippers is vital to comply with urban environment conditions. Moreover, Ibrahim et al. (2014) also claimed that thermal comfort consideration is very important in most buildings involving people occupancy. Besides, a thermally comfortable indoor condition is essential for a healthy indoor living environment and quality of life in the urban environment (Jamaludin et al., 2015). Hence, this paper will address the issues related to thermal comfort control in urban mosques in Malaysia and determine issues related to the urban mosque, façade design, and thermal comfort and to analyse relationship between urban mosque, facade design and thermal comfort with quality of life (QoL).

Buildings in Malaysia received more heat due its location that is near the equator. The researchers identified that heat surplus cause's discomfort to the occupants in the tropical climate because of higher solar and terrestrial radiations reaching the building envelopes. This finding shows that building envelopes play the important role in giving comfort to the occupants. Liping and Hien (2006) also agreed that the impact of building envelope designs is significant on the indoor thermal environment, especially for naturally ventilated buildings. Nevertheless, Ghaffarian et al. (2012) defined that one of the main constitutes of building envelope is facade that acts as a boundary between external and internal environments. The facade considerably impacts the environmental conditions of indoor spaces, the thermal performance of buildings and subsequently the user's satisfaction. Therefore, the building facade designs should respond the local climate to improve thermal comfort conditions, taking urban mosque as a typology for case study to investigate thermal comfort.

2. Literature review

2.1. Understanding urban mosques in urban environment: Malaysian context

"Urban Masjid or Urban Mosque refers to the representative religious edifice constructed by Muslims who reside primarily within urban locales in the western countries; often described as an Islamic centre (markaz), it is where the faithful gather to engage in communal worship, spiritual retreat, matrimony, education, and other significant socio-cultural activities"

(Kahera et al., 2009)

The definition by Kahera is presented in figure 1 which reflects to the western environment. Hence, to adopt the given definition by Kahera et al. (2009), the attributes for urban mosque for Malaysian context is analysed as figure 2. The functional attributes of urban mosques are very important in sustaining an Islamic quality of lifestyle in urban environment.