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SUSTAINABLE BUILT ENVIRONMENT

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INDOOR ENVIRONMENTAL CONDITION IN MUSOLLA AT SHOPPING COMPLEXES IN PERAK

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ABSTRACT

This paper focuses on improving indoor environmental quality (IEQ) in musollas located within shopping complexes in Perak, Malaysia. IEQ plays a vital role in ensuring occupants' health, well-being, and comfort. Factors such as lighting, air quality, humidity, and thermal conditions significantly impact IEQ. Poor indoor conditions can lead to increased allergy and asthma symptoms, infectious diseases spread, and sick building syndrome (SBS). The study aims to identify key elements affecting IEQ and recommend strategies for enhancement. The research uses multiple approaches, combining face-to-face interviews using paper surveys and online surveys through Google Forms to gather data from respondents, including shopping complex workers, sellers of food courts, civil servants, private sector workers, and students who use musollas. Literature reviews highlight the importance of indoor air quality (IAQ), thermal, visual, and acoustic comfort in creating a serene prayer environment. The study identifies challenges specific to musolla spaces and emphasizes the significance of low VOC materials for improved IEQ. Additionally, the report delves into the issues concerning IEQ, such as allergen exposure and moisture problems, and proposes solutions to reduce allergy and asthma symptoms. The findings contribute valuable insights to enhance IEQ in musollas, ensuring a healthier, more comfortable, and spiritually uplifting prayer space for building occupants in shopping complexes.

Keywords: *"Indoor, environmental, condition, musolla, comfort"*

INTRODUCTION

Good indoor environmental quality (IEQ) is crucial for every room, especially frequently used spaces like musollas, to ensure the health and well-being of occupants (NIOSH, 2013). Variables such as lighting, air quality, and dampness levels significantly influence IEQ. Poor indoor conditions can lead to increased allergy and asthma symptoms due to indoor air pollutants, including those associated with dampness and mold (NIOSH, 2013). Infectious diseases can also spread through the air, and symptoms of sick building syndrome (SBS) can occur. Indoor air quality (IAQ) focuses on harmful air pollutants, while thermal comfort quality addresses factors affecting occupants' comfort (Brainvendra Widi Dionova & et al., 2020). The indoor thermal air condition is an essential component of IEQ, and modifying relative humidity or temperature can improve it (Van Tran et al., 2020). Elevated indoor pollutant levels and poor environmental conditions can have significant health effects on building occupants, leading to healthcare expenses and lost productivity (Ministry of Human Resources, 2022). The construction industry has an ethical responsibility to provide healthy environments that foster well-being and growth for people and workers (Igor Mujan Aleksandar & et al., 2019).

INDOOR ENVIRONMENTAL QUALITY (IEQ)

Examining indoor environmental conditions in musollas located in shopping complexes in Perak, Malaysia, with a specific focus on factors impacting indoor environmental quality (IEQ) (Li et al., 2020). Analysis of existing research identifies key elements affecting IEQ, including temperature, humidity, air quality, lighting, and noise. Musollas' unique needs require attention to acoustics and physical design to create a serene prayer environment. Understanding these factors informs strategies to improve IEQ in musollas, contributing to building occupants' well-being and satisfaction and ensuring a comfortable prayer space in shopping complexes (Li et al., 2020; WHO, 2021).

Factors of indoor environmental quality (IEQ)

This literature review focuses on factors influencing indoor environmental conditions in musolla spaces within shopping complexes in Perak, Malaysia. It covers various aspects such as building design, ventilation systems, building materials, occupancy patterns, and maintenance practices (Salama et al., 2018; Li et al., 2019; Rameezdeen et al., 2014; Licina et al., 2021). Understanding these factors is crucial for identifying challenges specific to musolla spaces. The review emphasizes the importance of indoor air quality, especially for vulnerable populations (EPA), and highlights the significance of low-VOC materials for improved IEQ (Rameezdeen et al., 2014). By analyzing these factors, the study aims to provide insights into strategies for creating healthier and more comfortable musolla environments, considering the interactions and interdependence of

various IEQ elements (Afful et al., 2022). Overall, it emphasizes the importance of indoor environmental quality in musolla spaces for the well-being and satisfaction of building occupants in shopping complexes.

Indoor air quality (IAQ)

Indoor air quality (IAQ) is a vital aspect of indoor environmental quality (IEQ) impacting occupants' health and well-being in various settings (Li et al., 2022). Poor IAQ, caused by indoor pollutants like VOCs, formaldehyde, and biological contaminants, can lead to respiratory issues and other health problems (Li et al., 2022; Sailor et al., 2021). Proper ventilation is essential for maintaining good IAQ by reducing indoor pollutants through adequate fresh air circulation (Zhang et al., 2019; Sailor et al., 2021). Building codes now mandate IAQ control and ventilation rates, emphasizing the importance of IAQ improvements (Li et al., 2022). Regular IAQ testing and monitoring help identify issues and implement necessary corrective actions (Sailor et al., 2021). Optimal IAQ promotes occupants' health, productivity, and comfort (D'Orazio et al., 2020). To ensure healthier and more comfortable indoor spaces, efforts to enhance IAQ regulations and policies are crucial (Li et al., 2022).

Thermal comfort

Thermal comfort is a crucial component of Indoor Environmental Quality (IEQ) that significantly affects occupants' happiness and health (Li et al., 2021). It depends on factors such as surrounding temperature, humidity levels, air velocity, and radiant temperature (Zhang et al., 2019). Maintaining a comfortable temperature range and optimum humidity levels between 40% and 60% are essential for occupant comfort and well-being (Li et al., 2021). Adequate air movement can improve comfort, but excessive air velocities can cause discomfort (Li et al., 2021). Proper building design and HVAC systems play a vital role in addressing thermal comfort by controlling heat transfer and maintaining comfortable temperature and humidity levels (D'Orazio et al., 2020). By ensuring thermal comfort, indoor spaces can enhance occupants' satisfaction, productivity, and overall well-being (Li et al., 2021).

Visual comfort

Visual comfort is a vital aspect of Indoor Environmental Quality (IEQ) with a significant impact on occupants' feelings and functionality within indoor spaces (Nabil et al., 2022). Achieving visual comfort involves proper lighting with adequate illumination levels suitable for the activities undertaken (Nabil et al., 2022). Natural daylighting is highly desirable as it enhances well-being, productivity, and happiness (Hou et al., 2021). Careful planning and management of artificial lighting, considering color temperature and rendering, can create a comfortable and aesthetically pleasing environment (Nabil et al., 2022). Glare management is crucial to reduce discomfort caused by excessive brightness or contrast (Cheung et al., 2020). Aesthetically pleasing design elements, such as color schemes and textures, also contribute to visual comfort (Nabil et al., 2022).

Regular maintenance of lighting systems is essential, and occupant feedback can provide insights into visual comfort (Cheung et al., 2020). Ultimately, achieving visual comfort improves occupants' mood, productivity, and overall contentment in indoor spaces.

Acoustic comfort

Acoustic comfort is a critical aspect of Indoor Environmental Quality (IEQ) that profoundly impacts the well-being and satisfaction of building occupants (Hong et al., 2019). Excessive noise levels can lead to stress, reduced focus, communication difficulties, and decreased productivity (Hong et al., 2019). It may also result in tiredness, disturbed sleep, and adverse health effects like cardiovascular issues. To ensure acoustic comfort, sound insulation is essential to reduce noise transmission from external sources and within the building (Poulsen et al., 2020). Internal noise reduction, such as using quieter equipment and proper maintenance, is crucial. Strategic space planning and layout design can minimize disturbances and enhance acoustic conditions (Poulsen et al., 2020). Additionally, using sound-absorbing materials and finishes in indoor spaces can reduce sound reflections and reverberations, improving overall acoustic quality (Cheung et al., 2020). Regular monitoring and noise evaluations help identify problem areas and guide effective actions for enhancing acoustic comfort (Poulsen et al., 2020). Overall, improving acoustic comfort in indoor environments leads to reduced stress, improved focus, and increased enjoyment for building occupants.

Issues concerning on indoor environmental quality (IEQ)

Poor indoor environmental conditions in prayer rooms can lead to increased symptoms of sick building syndrome, which can cause headaches, fatigue, and difficulty concentrating. The issue is that thermal indoor air conditions are important components of indoor environmental quality (IEQ) for two reasons associated with poor IEQ that can be rectified simply by modifying relative humidity or temperature. Additionally, building materials in high-temperature buildings can be highly released (Van Tran et al., 2020). Moreover, people can also develop respiratory issues and infections when humidity levels are above or below the recommended range of 30% to 60%. High humidity levels above 60% can cause discomfort, mold growth, and other health issues, while low humidity levels below 30% can cause dryness, respiratory problems, and other health issues. Therefore, it is essential to maintain a suitable humidity range in indoor environments, including musolla, for the comfort and well-being of occupants. The concentrations of indoor pollutants that indicate people are at risk for illness are unknown, and it is difficult to identify the contaminants that oversee conditions that may be associated with buildings (NIOSH, 2013). Therefore, the air quality condition in the musolla can be a focus of research on how to determine the factors of IEQ condition and to know about the issues or problems that occurred while the workers at the shopping complexes used the musolla. Approximately 6% of Americans have asthma, and around 20% have allergies to environmental allergens (Fisk, 2000). Indoor air allergens, including dust mites, pets, fungus, insects, and pollen, can trigger allergy and

asthma symptoms (Fisk, 2000). Cigarette smoke in the vicinity can also worsen asthma symptoms (Fisk, 2000). Homes or schools with mold or moisture issues are associated with a higher risk of respiratory symptoms related to asthma, while exposure to ambient tobacco smoke, often due to parental smoking, can lead to 20% to 40% worse asthma symptoms (Fisk, 2000). Addressing moisture problems, reducing indoor smoking, and keeping cats outside of allergic individuals' houses are expected to significantly reduce asthma and allergy symptoms (Fisk, 2000). However, research on the effectiveness of these and other therapies is limited, and there are few experimental studies evaluating the impact of changes in building conditions on allergy and asthma symptoms (Fisk, 2000). Overall, addressing indoor air quality, allergen exposure, and building conditions is essential in reducing allergy and asthma symptoms and promoting better health and well-being for building occupants (Fisk, 2000).

RESEARCH METHODOLOGY

This study used quantitative methods to collect and analyze data. Surveys and measurements were conducted in musolla spaces within shopping complexes to assess indoor conditions. Statistical analysis was then used to find correlations between factors like air quality, lighting, temperature, and acoustics, based on visitors' perceptions. This approach allowed for a comprehensive understanding of how indoor conditions impact the musolla experience. The research methodology for the study on indoor environmental conditions for musolla at shopping complexes in Perak employs a quantitative approach using a questionnaire to gather data from 243 respondents. The questionnaire is structured into four sections, covering demographic information, factors affecting musolla conditions, issues related to musolla conditions, and suggestions for improvement. The Likert scale is used to measure respondents' attitudes towards these factors. The research objectives include identifying contributing factors, exploring issues affecting users, and proposing recommendations for improvement. The study follows a comprehensive research outline, including a literature review, theoretical framework, problem statement, research design, data collection, and analysis. It will utilize a mixed method strategy, combining in-person interviews through paper surveys and online surveys using Google Forms to collect data. In-person interviews will be conducted at the musolla of three shopping complexes, where respondents will be handed paper survey sheets, allowing direct communication and addressing any concerns. This approach accommodates respondents with limited internet access or a preference for traditional methods. Google Forms will be used for online surveys, and data from paper surveys will be transferred to the digital platform, enabling broader reach and convenience for respondents who prefer digital participation. Both methods offer advantages, with in-person interviews encouraging intimate communication and online surveys automating data collection. The mixed-method approach aims to enhance data collection efficiency, reliability, and validity, providing valuable insights into the indoor environmental conditions in musolla at shopping complexes in Perak. This study may not cover non-musolla users' experiences. Their views might differ. Still, the study's

focus on shopping complex workers, food court sellers, civil servants, private sector workers, and students helps us understand musolla indoor conditions. It can guide comfort and well-being improvements.

Data Analysis And Findings

The data analysis for this study is divided into four main sections, each focusing on specific aspects related to indoor environmental conditions in musolla within three different locations: AEON Mall Manjung, Mydin Mall Meru Raya, and Billion Shopping Centre Seri Iskandar. The four sections of analysis are as follows:

Section A: Analysis of demographic information

In Section A, the analysis focused on the demographics and visit frequency of respondents at three different Musolla locations which are AEON Mall Manjung, Mydin Mall Meru Raya, and Billion Shopping Centre Seri Iskandar.

Figure 1: Analysis of Respondents' Age

Regarding the age distribution, the highest number of respondents in both AEON Mall Manjung and Mydin Mall Meru Raya fell in the 25 to 34 years old category, comprising 42% and 38% of respondents, respectively. However, at Billion Shopping Centre Seri Iskandar, the highest number of respondents was in the 18 to 24 years old category, accounting for 50%.

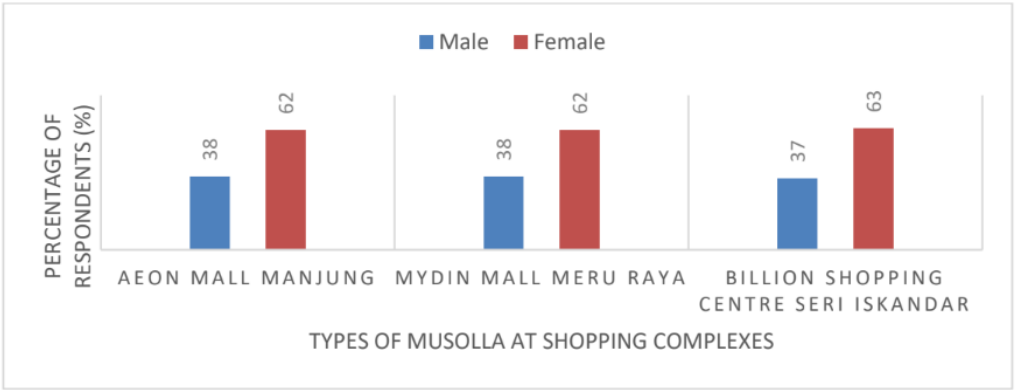

Figure 2: Analysis of Respondents' Gender

In terms of gender distribution, the analysis revealed that at AEON Mall Manjung and Mydin Mall Meru Raya, 62% of respondents were female, while 38% were male. At Billion Shopping Centre Seri Iskandar, the percentage of female respondents was even higher at 63%, with males accounting for 37%. This suggests that these musolla facilities attract more female visitors than male visitors.

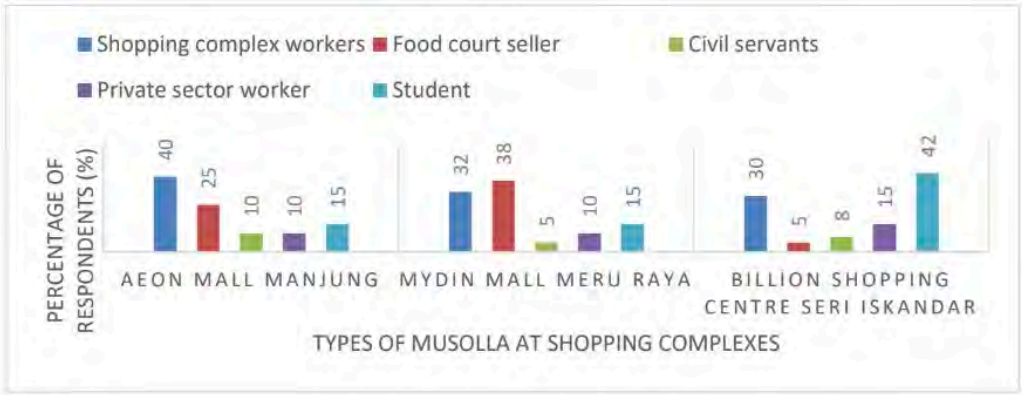

Figure 3: Analysis of Respondents' Occupation

Furthermore, regarding respondents' occupation, the majority of respondents at AEON Mall Manjung identified as shopping complex workers (40%), followed by food court sellers (25%), students (15%), civil servants (10%), and private sector workers (10%). Similarly, at Mydin Mall Meru Raya, the largest occupational category was food court sellers (38%), followed by workers at shopping centers (32%), students (15%), private sector workers (10%), and civil servants (5%). Meanwhile, at Billion Shopping Centre

Seri Iskandar, the highest percentage were students (42%), followed by shopping complex workers (30%), private sector workers (15%), civil servants (8%), and food court sellers (5%).

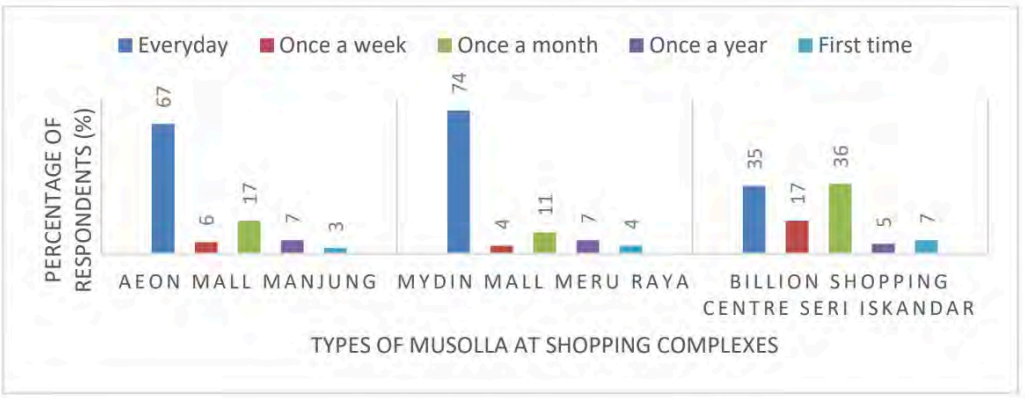

Figure 4: Analysis of Frequency of Musolla Visits

Regarding the frequency of Musolla visits, the data showed that 67% of respondents at AEON Mall Manjung use the Musolla every day, while Mydin Mall Meru Raya had the highest percentage of daily visitors at 74%. On the other hand, Billion Shopping Centre Seri Iskandar had 36% of respondents visiting the Musolla once a month. This information can be valuable for improving indoor environmental conditions for frequent users and tailoring the Musolla facilities to accommodate their needs.

Overall, the analysis provides insights into respondents' demographics and visit patterns at these Musolla locations, which can inform decision-making for improving the facilities and enhancing the worship experience for visitors.

Section B: Analysis of factors that contribute to an indoor environmental condition in musolla

In this analysis, researchers surveyed 243 participants from three different Musolla locations: AEON Mall Manjung, Mydin Mall Meru Raya, and Billion Shopping Centre Seri Iskandar. The survey aimed to understand how visitors perceive and experience the indoor environmental conditions in these prayer spaces. The respondents were asked to rate their opinions on various factors using a scale from "Strongly Disagree" to "Strongly Agree."

The first factor examined was indoor air quality, which was considered crucial for visitors' comfort and health. The majority of respondents from AEON Mall Manjung (91.4%) and Mydin Mall Meru Raya (90.1%) strongly agreed with this statement, while 69.1% of respondents from Billion Shopping Centre Seri Iskandar also recognized its importance.

Next, the analysis looked at the impact of temperature and humidity levels on visitors' prayer behavior and mood. Again, a significant percentage of respondents from AEON Mall Manjung (81.5%) and Mydin Mall Meru Raya (82.7%) strongly agreed that these factors influenced their prayer experience, with 59.3% of respondents from Billion Shopping Centre Seri Iskandar sharing the same sentiment.

The study also explored the role of ventilation rate and air distribution in musolla. The majority of respondents from AEON Mall Manjung (85.2%) and Mydin Mall Meru Raya (80.2%) strongly agreed that these factors affected their thermal comfort and indoor air quality. Similarly, 54.3% of respondents from Billion Shopping Centre Seri Iskandar recognized their significance in this aspect.

Furthermore, respondents' perceptions of lighting quality and energy efficiency were analyzed. A large percentage of visitors from AEON Mall Manjung (84%) and Mydin Mall Meru Raya (80.2%) strongly agreed that lighting played a significant role in their task performance, mood, health, satisfaction, and comfort. Likewise, 51.9% of respondents from Billion Shopping Centre Seri Iskandar acknowledged the impact of lighting on these factors.

The study also delved into the importance of sound insulation and noise levels. The majority of respondents from AEON Mall Manjung (84%) and Mydin Mall Meru Raya (76.5%) strongly agreed that sound insulation affected the usability and effectiveness of the musolla, with 53.1% of respondents from Billion Shopping Centre Seri Iskandar sharing the same view.

Lastly, the analysis looked at the significance of evaluating and monitoring indoor environmental conditions in musolla. A high percentage of respondents from AEON Mall Manjung (88.9%) recognized its importance, with 81.5% of respondents from Mydin Mall Meru Raya agreeing. For Billion Shopping Centre Seri Iskandar, 64.2% of respondents strongly agreed, while 28.4% expressed agreement.

Overall, the findings highlighted the importance of indoor environmental conditions in musolla spaces and the positive perception of sustainable and energy-efficient strategies to enhance visitors' experiences during prayer sessions. The results suggest that prioritizing factors such as air quality, temperature, lighting, and sound insulation can significantly contribute to creating a more comfortable and pleasant environment for prayer and reflection.

Section C: Analysis of issues concerning indoor environmental condition that affect people in musolla

The analysis of issues concerning indoor environmental conditions in Musolla (prayer rooms) revealed several findings based on respondents' experiences at three different locations: AEON Mall Manjung, Mydin Mall Meru Raya, and Billion Shopping Centre Seri Iskandar.

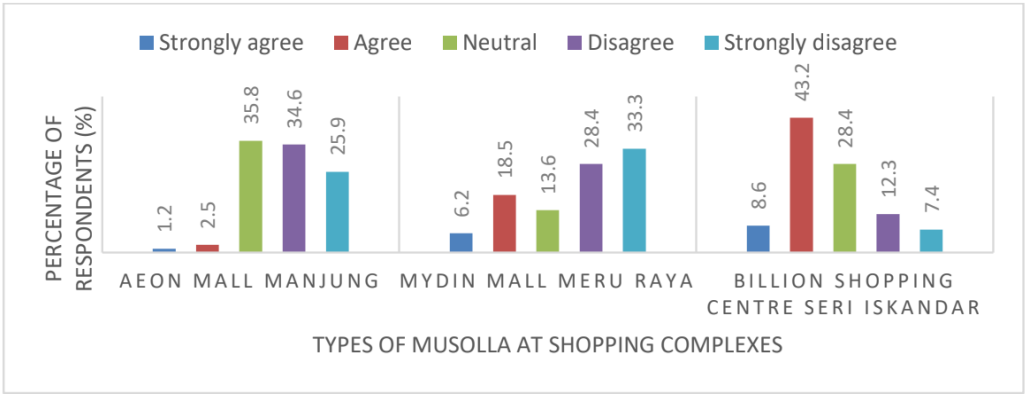

Figure 5: Analysis of Allergic Reactions among Respondents

Allergic Reactions: The prevalence of allergic reactions varied across the locations, with AEON Mall Manjung having the lowest percentage (3.7%) of respondents experiencing allergies. Mydin Mall Meru Raya had a slightly higher percentage (14%) of individuals reporting allergies, while Billion Shopping Centre Seri Iskandar had the highest percentage (51.9%). The differences in indoor air quality, allergens, or other environmental factors might contribute to these variations.

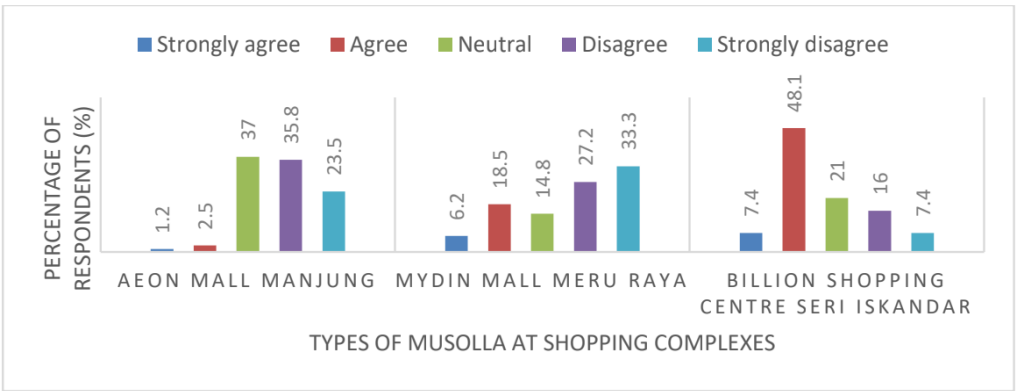

Figure 6: Analysis of Respiratory Problems among Respondents

Respiratory Problems: Participants reported experiencing respiratory issues in varying degrees at different locations. AEON Mall Manjung had the lowest percentage (2.5%) of respondents experiencing asthma, coughing, or respiratory problems, while Mydin Mall Meru Raya had a slightly higher percentage (24.7%). Billion Shopping Centre Seri Iskandar showed a higher prevalence (55.5%) of respiratory issues among participants.

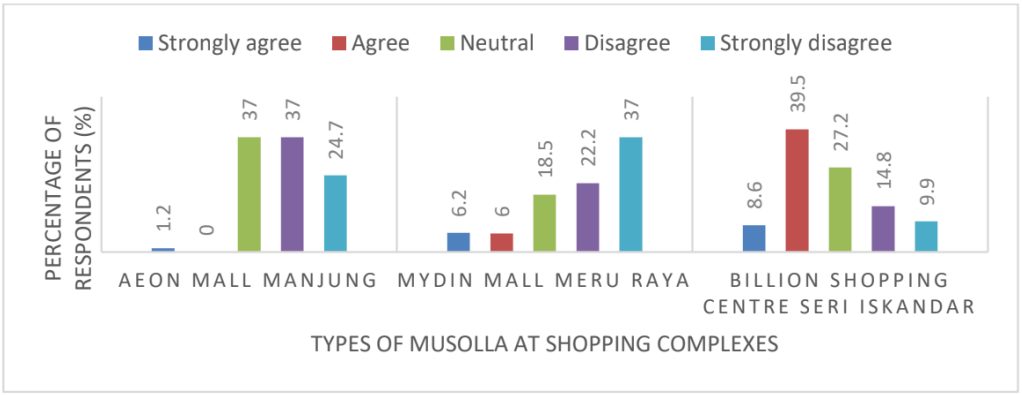

Figure 7: Analysis of Headaches among Respondents

Headaches: The occurrence of headaches varied across the locations, with Mydin Mall Meru Raya having the highest percentage (22.2%) of respondents experiencing headaches. AEON Mall Manjung had the lowest percentage (1.2%) of individuals reporting headaches, while Billion Shopping Centre Seri Iskandar had a moderate percentage (48.1%).

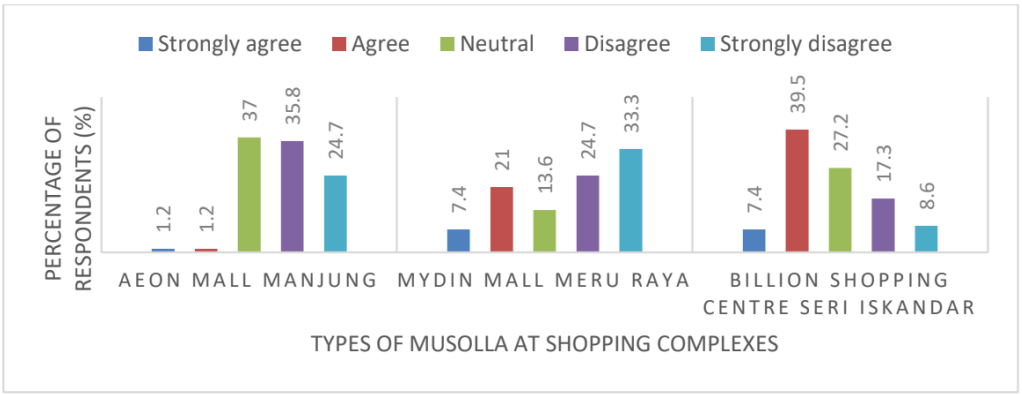

Figure 8: Analysis of Eye Discomfort among Respondents

Eye Discomfort: The prevalence of eye-related discomfort differed across the locations, with Billion Shopping Centre Seri Iskandar having the highest percentage (39.5%) of respondents experiencing itching, burning, or irritation of the eyes. Mydin Mall Meru Raya had a relatively higher percentage (28.4%), while AEON Mall Manjung had the lowest percentage (24.7%).

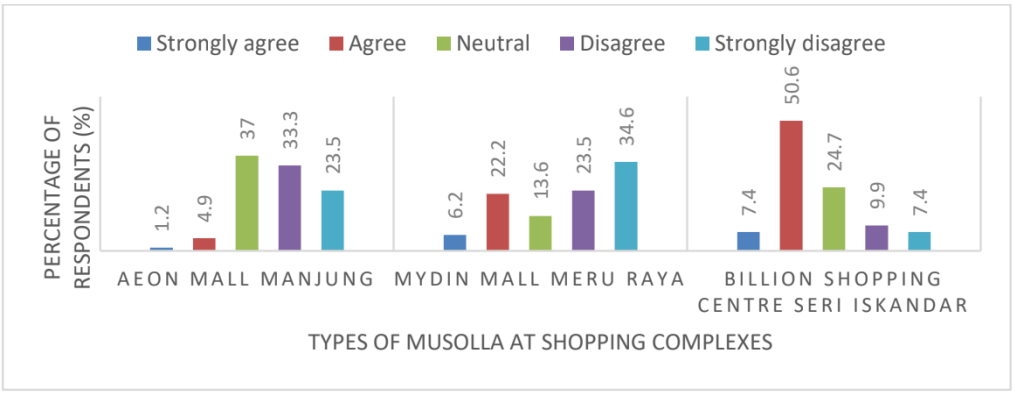

Figure 9: Analysis of Nasal Symptoms among Respondents

Nasal Symptoms: Nasal symptoms, such as an irritated, stuffy, or runny nose, were reported by a small percentage of participants across all locations. Billion Shopping Centre Seri Iskandar had the highest percentage (50.6%) of individuals experiencing nasal symptoms, while AEON Mall Manjung had the lowest percentage (4.9%).

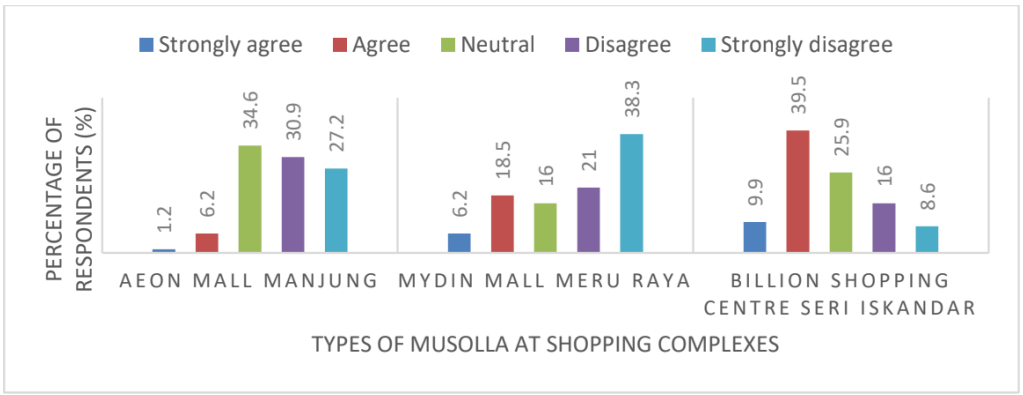

Figure 10: Analysis of Skin Discomfort among Respondents

Skin Discomfort: Participants reported experiencing skin-related symptoms to varying degrees. Billion Shopping Centre Seri Iskandar had the highest percentage (39.5%) of respondents experiencing dry hands, itching, or red skin. AEON Mall Manjung had the lowest percentage (6.2%) of individuals reporting skin-related discomfort.

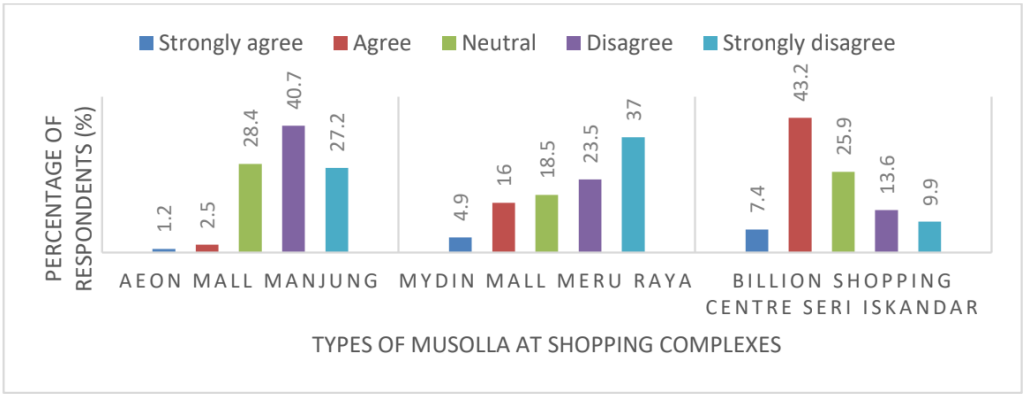

Figure 11: Analysis of Nausea and Dizziness among Respondents

Nausea and Dizziness: The prevalence of nausea or dizziness experienced by participants differed across the locations. AEON Mall Manjung had the lowest percentage (2.5%) of individuals experiencing these symptoms, while Billion Shopping Centre Seri Iskandar had the highest percentage (50.6%).

These findings suggest that indoor environmental conditions in musollas can significantly impact visitors' comfort and health. The variations observed in the prevalence of different symptoms across the locations emphasize the need for further investigation and targeted measures to address specific issues. Improving air quality, ventilation, cleanliness, and other factors may help create a more comfortable and health-supportive environment in musolla spaces.

Section D: Analysis of suggestion for the improvements in musolla

The analysis of suggestions for improvements in Musolla spaces (prayer rooms) revealed valuable insights from respondents at three different locations: AEON Mall Manjung, Mydin Mall Meru Raya, and Billion Shopping Centre Seri Iskandar.

- Install Proper Ventilation Systems: The suggestion to install proper ventilation systems received overwhelming support from participants at all three locations. At AEON Mall Manjung, 97.6% of respondents agreed, while Mydin Mall Meru Raya and Billion Shopping Centre Seri Iskandar received positive responses from 96.3% and 93.8% of participants, respectively. Proper ventilation is essential for maintaining good indoor air quality, reducing pollutants, and providing a comfortable and healthy environment for prayer and reflection.

- Use Natural Lighting and Daylighting: Utilizing natural lighting and daylighting to reduce energy consumption and improve occupant comfort garnered positive responses, with 96.3% of respondents at AEON Mall Manjung, 93.4% at Mydin Mall Meru Raya, and 70.4% at Billion Shopping Centre Seri Iskandar supporting

the idea. These strategies not only conserve energy but also create a pleasant and inviting atmosphere in the musolla spaces.

- Maintain a Comfortable Temperature Range: The effectiveness of heating, ventilation, and air conditioning (HVAC) systems in maintaining a comfortable temperature range was recognized by respondents. At AEON Mall Manjung, 85% agreed, while Mydin Mall Meru Raya and Billion Shopping Centre Seri Iskandar received positive responses from 70% and 95% of participants, respectively. A well-regulated temperature is crucial for enhancing the prayer experience and ensuring visitor comfort.

- Conduct Regular Maintenance: The importance of conducting regular maintenance to keep the musolla spaces clean and well-maintained received widespread support from respondents. At all three locations, over 95% of participants either strongly agreed or agreed with the significance of regular maintenance. This reflects the commitment of the management to creating a clean and inviting atmosphere for prayer and reflection.

- Use Materials with Good Sound Insulation Properties: The use of materials with good sound insulation properties to reduce noise levels and provide a peaceful environment for worshippers garnered positive feedback. Over 90% of respondents at AEON Mall Manjung, Mydin Mall Meru Raya, and Billion Shopping Centre Seri Iskandar recognized the importance of sound management practices for an undisturbed prayer experience.

- Use Indoor Plants: Incorporating indoor plants to improve air quality and add a natural element to the musolla space received positive responses from the majority of participants. At AEON Mall Manjung, 90.1% agreed, while Mydin Mall Meru Raya and Billion Shopping Centre Seri Iskandar received positive feedback from 96% and 72.8% of respondents, respectively. Indoor plants can enhance air quality and create a refreshing and inviting atmosphere for worshippers.

- Use Low-VOC Paints and Building Materials: Using low-VOC paints, adhesives, and building materials to reduce harmful chemical emissions into the air was recognized as beneficial by respondents. At all three locations, over 85% of participants either strongly agreed or agreed with the importance of implementing low-VOC materials to improve indoor air quality and ensure a healthy environment for worshippers.

In conclusion, the analysis highlights the importance of implementing various measures to enhance the indoor environmental conditions in musolla spaces. Installing proper ventilation, utilizing natural lighting, maintaining a comfortable temperature range, conducting regular maintenance, using sound insulation materials, incorporating indoor plants, and adopting eco-friendly building materials all

contribute to creating a comfortable, inviting, and healthy space for prayer and reflection. Respondents from all three locations demonstrated a positive response to these improvement suggestions, indicating the significance of prioritizing indoor environmental quality for the well-being and positive experience of musolla users.

CONCLUSION

The study focused on the Indoor Environmental Conditions in Musolla of Shopping Complexes in Perak. Through a quantitative research approach, the factors influencing indoor environmental quality (IEQ) were examined. The findings emphasized the importance of ventilation systems, thermal comfort, visual comfort, and acoustic comfort in improving IEQ. Recommendations were provided, such as improving air circulation, controlling pollutant sources, optimizing temperature control systems, maximizing natural daylighting, and enhancing sound insulation. Implementing these recommendations can significantly enhance the IEQ in musollas, providing occupants with a comfortable and pleasant environment for prayer. It is crucial to consider local regulations, adapt the recommendations, and gather occupant feedback to ensure effectiveness. The research contributes to the understanding of IEQ and offers valuable insights for facilities managers to improve indoor environmental conditions. Further studies can explore the long-term effects and cost-effectiveness of interventions, ultimately benefiting the well-being of musolla users and the community as a whole.

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Sekian, terima kasih.

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