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ENVIRONMENT**

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THE FAULTY OF ARCHITECTURAL DESIGN IN RESIDENTIAL HOUSING AT PERAK TENGAH

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ABSTRACT

The building defect is caused by improper construction of a specific building structure. Building defect is also defined as any issue that lowers the value of a residential building and, if ignored provides risk to the building occupants. Building defects also an issue that most buildings confront, independent of building construction techniques or age, but it all involves the causes and conditions that cause the defects to occur. The main objective of this research is to determine the faulty of architectural design that can cause the defect. The application of suitable research methodologies is critical to achieving the objectives of this research. This research uses qualitative methods which are observation in three case studies and interviews with the occupants who lived inside the case study area. Building Assessment Rating System (BARIS) is used to analysis the data and compare all three case studies. Finally, the researcher finds the overall building rating to calculate findings. By identifying and correcting issues with design and using recommended methods, designers and builders can work together to improve the overall safety and quality of constructed buildings for occupants.

Keywords: *building defects, architectural design, residential house*

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INTRODUCTION

A building is a place where people accommodate and work together or for an organisation to conduct its work (Seeley, 1987; Olanrewaju & Abdul-Aziz, 2015). Building defects are one of the major building problems that significantly need attention (Bakri and Mydin et al., 2013). Defects and damage to the building are defined as the failure of the ability of the building to deliver services as expected (Ali & Au-Yong, 2019). Inefficiency in handling defects or damaged buildings systematically causes various effects and negative impacts on users and is also the owner of the building (Ali and Au-Yong, 2019).

Architectural design is a field that focuses on addressing and satisfying the needs and expectations of creating living environments via the use of certain tools and, most importantly, creativity. As a result, supports the fact that architecture is only a technological endeavour, the goal is to integrate the technological and the aesthetic.

Similarly, it combines design, defined as the creative process, with architecture, which is centred on the production and presentation of technical solutions. Architectural design explores the ideals and formal aspects of works through spatial experiences by combining both disciplines.

LITERATURE REVIEW

Building Defects

Building defects can lead to significant negative impacts on the cost, duration, and resources of a construction project, as well as affect the safety of building occupants. The major contributing causes of building defects include low-quality materials, poor workmanship, weaknesses in design, and lack of maintenance (Ahzahar et al., 2011). Building defects are defined as failures or inadequacies in a building's function, performance, and statutory or user requirements, which may express themselves within the structure, fabric, services, or other facilities of the affected building (Ali & Au-yong, 2019). To prevent building defects, it is essential to identify common contributing factors and address them appropriately.

Building Design

Building defects can have serious implications on the overall success of construction projects. They can result in increased costs, and longer project durations, and pose safety risks to building occupants. These defects can be caused by a range of factors, including poor workmanship, low-quality materials, design weaknesses, and lack of maintenance. Examples of building defects include dampness, cracked walls, and peeling paint, which can negatively impact the learning environment in schools. To prevent building defects, it is crucial to identify contributing factors and address them

effectively by planning and managing the design process more efficiently. This involves gathering adequate information and ensuring accurate construction documentation.




Architecture

Architecture is a combination of engineering, mechanics and art (Manickam et al., 2022). Architecture is a field of study that blends art, science, and technology to produce useful and visually appealing buildings and structures. It includes the design and construction of structures using a variety of materials such as wood, concrete, steel, and glass, as well as the organising and handling of construction projects. The objective of architecture is to design environments that fit the requirements and expectations of its users while also taking sustainability, safety, and accessibility into consideration. It is a necessary part of modern life and plays an important role in defining the built environment.

METHODOLOGY

The data for this study were collected using two methods: the interviews and observation at the case study. This research is to compare the designs in each different building. However, there are few limitations on the case study areas which are certain spaces such as roof space, interior spaces and foundation were not been able to be inspected due to the safety measures. As for the case studies, 3 buildings premises in the Perak Tengah district have been selected to be used as case studies which are a ‘kampung’ house, a single storey house and a double storey terrace house.

Table 1: Selected Case Studies in Perak Tengah

Case Study 1	Case Study 2	Case Study 3
 <p>Figure 1.1 Case Study 1</p>	 <p>Figure 1.2 Case Study 2</p>	 <p>Figure 1.3 Case Study 3</p>
Type of building design: Malay Wooden House Location of the building: Bota Kiri	Type of building design: Single-Storey Terrace House Location of the building: Bandar Seri Iskandar (SIDEK)	Type of building design: Double-Storey Terrace House Location of the building: Bandar Universiti Seri Iskandar Year of completion:

Year of completion: 1980	Year of completion: 2001	2004
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Observation will be applied to inspect the case study area. Furthermore, as a result, this method may be able to obtain more thorough information. This is to approve the evidence of defects that have developed in the Perak Tengah region as a result of the architectural design. Interview process also will be held with the chosen candidates from the case study area. To collect more information, about the experience and comfort of the people in the building against the building's defects will be asked.

Data Collection

Data collection starts with a summary of the respondents participating, followed by demographic information. In the first data analysis, descriptive analyses were performed on every result. Data acquired through interviews and observation is assessed using tables and charts. The collected data will be examined. The goal of this research is to discover if architectural design may be blamed for building defects.

Primary Data

Qualitative method is used to identify the surroundings and the condition of the building. One of the methods to get data easily and accurately is through observation at the case study area. Observation is the primary data that can help the researcher in identifying the actual condition of the case study through visual and physical observation to make it easier for the researcher to analyze the data

Secondary Data

Interview is used as secondary data for this research. The interview contains several questions for selected residents in the selected case study area to support primary data, namely observation.

The interview questions were made based on the research objective, which is to identify whether faulty architectural design can result in building defects in a building. In addition, help from journals, internet publications and databases is also needed to create questions to interview the people involved

DISCUSSION

For observation, the researcher has prepared a table to analyze the types of defects found in the three case studies. In the table there are the types of defects that exist, the Building Assessment Rating System (BARIS) to determine the condition of the defect that occurs.

BARIS Assessment is the total score from 'Condition' multiply by 'Priority' to get the matrix score of the defect. BARIS Assessment consists of 3 colours based on the condition of the defect affected. Green for rating that is from 1 to 4 which represents as 'Plan Maintenance', Yellow for rating that is from 5 to 12 which represents 'Condition Monitoring' and Red for rating that is from 13 to 20 which represents 'Serious Attention'. BARIS also helps to find the overall building rating to determine the condition of the building whether it is Good, Fair or Poor.

Table 2: BARIS Assessment for Case Study 1

CASE STUDY 1						
No.	Defect Description	Possible Causes	Condition	Priority	Matrix	Colour
1	Stain mark on roof trusses	Leakage on the zinc roof	3	3	9	Yellow
2	Rotten on roof trusses	Insect attack	4	3	12	Yellow
3	Minor crack on wall	Excessive load	3	3	9	Yellow
4	Rotten timber door frame	Dampness from the hole on the roof	4	3	12	Yellow
5	Hole on roof	Low quality material	3	2	6	Yellow
6	Torn roof	Expose on weather	2	3	6	Yellow
Total Marks [d] (\sum of c)						54
Numbers of Defects [e]						6
Total Score (d/e)						9
Overall Building Rating						Fair

Table 3: BARIS Assessment for Case Study 2

CASE STUDY 2						
No.	Defect Description	Possible Causes	Condition	Priority	Matrix	Colour

1	Rusted roof flashing on roof area	Chemical reaction	3	3	9	Yellow
2	Peeling of paint on column	Poor workmanship	3	2	6	Yellow
3	Discoloration on fascia board	Exposed to weather	2	2	4	Green
4	Crack of cement floor	Excessive load	4	3	16	Red
5	Rusted on fence	Chemical reaction	3	3	9	Yellow
6	Broken fascia board on roof area	Animal attack	4	3	12	Yellow
Total Marks [d] (\sum of c)						56
Numbers of Defects [e]						6
Total Score (d/e)						9.3
Overall Building Rating						Fair

Table 4: BARIS Assessment for Case Study 3

CASE STUDY 3						
No.	Defect Description	Possible Causes	Condition	Priority	Matrix	Colour
1	Missing ceiling under the flat roof	Water ponding on the flat roof	4	4	16	Red
2	Crack on wall	Excessive load	3	2	6	Yellow
3	Mold growth on flat roof	Water flowing in the flat roof	3	3	9	Yellow
4	Porous on the cement area	Poor workmanship	3	3	9	Yellow
5	Mold growth on wall	Exposed to water ponding	4	2	8	Yellow

6	Peeling of paint on wall	Low quality of material	2	2	4	
Total Marks [d] (\sum of c)						52
Numbers of Defects [e]						6
Total Score (d/e)						8.6
Overall Building Rating						Fair

Based on data obtained from observation in 3 selected case study, it was founded that there are many defects that the majority of defects are caused by unsystematic and inappropriate roof design according to the types of residential buildings.

For interview, it was found that the interviewee was able to answer the questions intended to answer the objectives of this research. They also know about what defects are and also know about the presence of defects around them. In addition, it was found that one of the causes of the condition of the house is not in good condition as a result of the lack of awareness about maintenance in their house.

CONCLUSION

In conclusion, this research has highlighted the factors in architectural design that lead to building defects. The data collection uses both quantitative and qualitative method to collect data at the case study area. Through the analysis of three case studies in Perak Tengah area, it has been observed that faulty architectural design is a significant contributor to these defects. By implementing recommended techniques and emphasizing proper maintenance practices, they can ensure that buildings are constructed to the highest standards.

RECOMMEDATION

For architectural design, it is essential to set up an in-depth assessment of architectural designs with teams of specialists to detect any defects and design weaknesses firstly. Next is to employ post-construction evaluations detect to correct any issues that may occur after the building. Thirdly is by choosing high-quality materials that are suitable for the intended building usage. Other than that is Encourage continuing education and training for architects and designers to keep updated with the most current changes in the construction sector and the last one is to integrate sustainable design concepts into architectural practises.

For building defects, it is essential to apply a preventative maintenance plan to prevent damage that occurs with time and implement an extensive quality control process that includes frequent inspections, evaluation, and confirmation of materials and technique

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