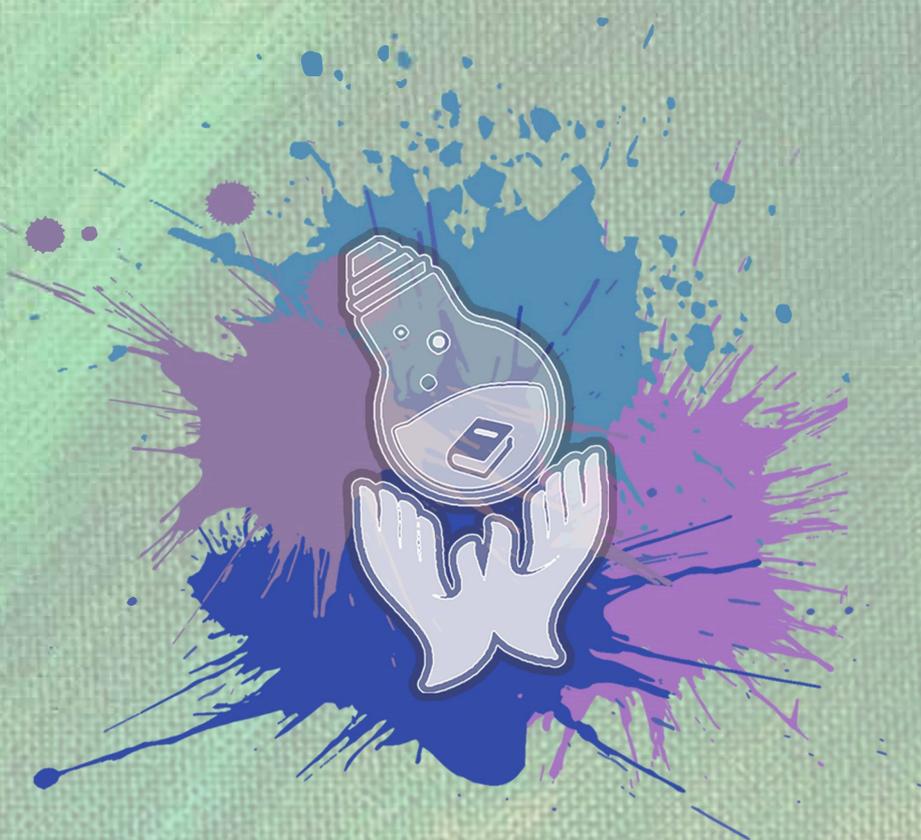




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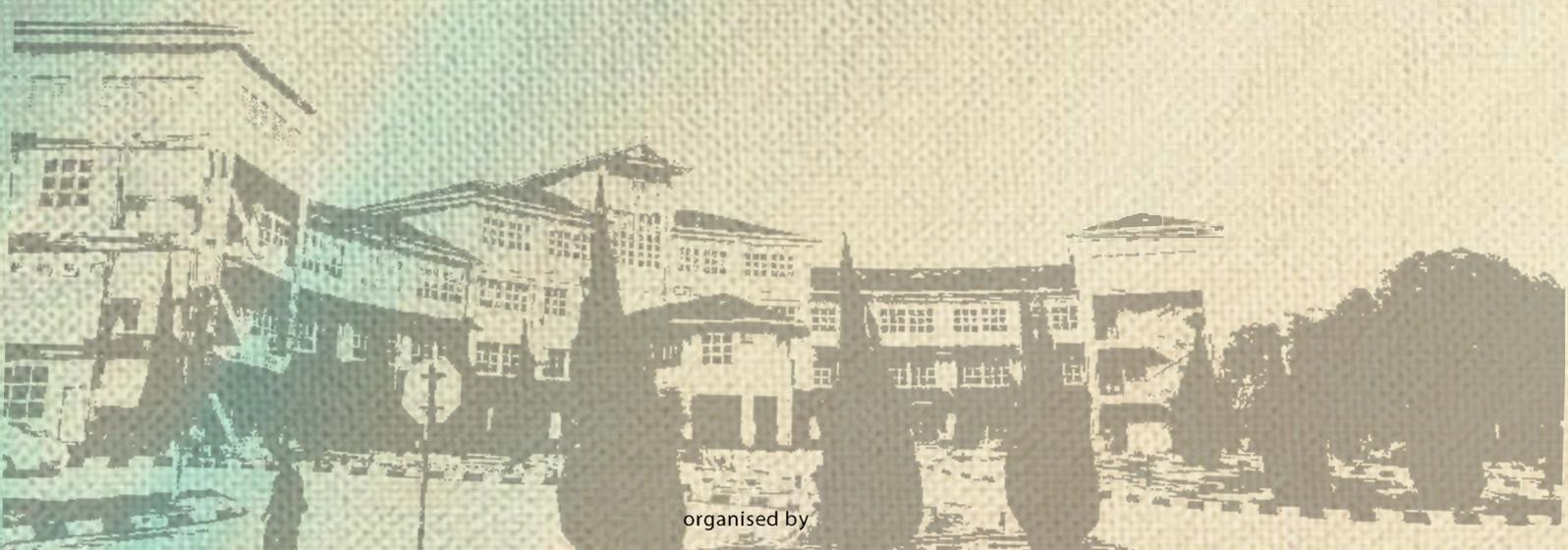


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SERI ISKANDAR CAMPUS

CHALLENGES IN INSTALLING INTERLOCKING BRICK SYSTEM FOR RESIDENTIAL BUILDING IN PERAK STATE

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Abstract:

This paper intends to discuss the methods of construction for the interlocking bricks system in Perak. This study also discussing the challenges and barriers in installing interlocking brick system in residential development. Qualitative methods are applied by recording structured interviews for construction of interlocking brick system and the benefits of owning this construction method system house in Perak area.

Keywords:

Challenges and Barriers; Industrialized Building System; Interlocking Bricks System; Residential Development; Methods of Construction

1.0 INTRODUCTION

Construction Industry Development Board in Malaysia defines IBS as a construction technique in which components are manufactured in a controlled environment (on or off site), transported, positioned and assembled into a structure with minimal additional site works. (Abedi, Fathi, & Mirasa, 2011).

Researchers in Malaysia (Nawi, Lee, & Nor, 2011) finds that many small contractors are reluctant to adopt IBS system and prefer to continue using the conventional method of construction. This is due to the small contractors are only familiar with the old methods and they think that these old technologies are suit well with small scale projects causing them to unwilling to switch to mechanized based system. Furthermore, these small contractors are lacking financial backup and are not able to set up their own manufacturing plants as it involves very high capital investment. These problems have causing the popularity of all IBS systems in Malaysia to be very low and unrecognized by the public.

Mohamad, Zawawi, and Nekooie (2009) also mentioned that lack of knowledge in structural analysis and design of pre-fabricated components among civil engineers and those related to construction discourages further the implementation of IBS system. Unlike steel structures, the subject of IBS design is normally not delivered to undergraduate students in many universities in Malaysia. As a result, lots of junior engineers are not really familiar with the structural designs concept of IBS system as compared to the conventional system.

2.0 LITERATURE REVIEW

2.1 Types of Industrialized Building System

Based on (CIDB, 2016), there are six main IBS groups identified as being popularly used in Malaysia, there are six main IBS groups identified as being popularly used in Malaysia which are Pre-Cast Concrete Framing, Panel and Box System, Steel Formwork System, Steel Framing System, Timber Framing System, Blockwork System, and Innovative System. Interlocking Brick System are categories as Blockwork System in the Industrialized Building System.

2.2 Selection Criteria of Industrialized Building System

Abdullah and Egbu (2010) has mentioned that criteria and decision-making for IBS can be divided into few perspectives which are structure and material's design, site orientation, health and safety, client's perspective, environmental issues and sustainability, and organizational issues.

2.3 Method of Construction for Interlocking Brick System

According to Syahman (2014), concept of the interlocking bricks is based on the following principles which are the brick are shaped with projecting parts, which fit exactly into depressions in the bricks placed above such that they are automatically aligned horizontally and vertically, thus bricklaying is possible without any special masonry skills. Each brick has vertical holes, which serve two purpose. First, is to reduce the weight of the bricks. Second, to insert steel rods for reinforcement and to pour liquid mortar (grout) into the holes, which run through the full height of the wall and resulting of increasing its stability.

2.3.1 Construction of Raft Foundation

Normally for Interlocking Brick System are suited with raft foundation because of the slab can be spread out under the entire building or at least a larger part of it which lowers the contact pressure compared to the other foundation.

2.3.2 Construction of Floor Slab

For the floor slab, it is important to connecting rebar set (Y12) vertically in the foundation ties into the horizontal beam of raft foundation and upward vertically to the placement of bricks for sturdier and can flowing the loads of the building itself to the ground.

2.3.3 First Layer Brick

When laying the first layer of bricks in the mortar bed, care must take that the bricks are perfectly horizontal and in a straight line or at right angles at the corners of the building. All the groove of the first layer bricks must fit perfectly to the vertical steel bar that has been set up at the floor slab to ensure the function of the steel bars as the reinforcement for the wall.

2.3.4 Second Layer Brick

For the second layer, it is recommended to use Beam Brick 2 above the first layer bricks. The function of using the Beam Brick 2 is to emplace horizontal steel bar (Y12 or Y10) along of the second layer bricks at the surrounding of the building. At the point of where the vertical and horizontal steel bars meet, use mild steel (R6) to tie the crossing point of those two steel bars. It is to ensure the loads of the building is spread firmly to the ground.

2.3.5 Brick laying for stack that are not related with usage of Beam Brick

After second layer stack completely being arranged perfectly, arrange up to 10 layers of bricks or until second last layer before the placement of the window and above the lintels until the last layer before ring beam. Place until all the stacked layers are perfectly fit with all the vertical steel bars from the floor slab and in the straight line. After that, fill the grout holes of the interlocking bricks with liquid mortar (1 part of cement to 3 parts of sand to 1 part of water).

2.3.6 Bricklaying for opening (door and window) and last layer of brick for the building

It is advisable to place the U Brick types of Interlocking Brick around of the building at window sill height, to install a ring beam. It should also be placed directly above doors and windows to install lintels, and directly below the roof (all the 3 to 4 layers below the roof) to finish the walls with ring beams.

2.3.7 Interlocking Brick as Vertical Column

To build the interlocking brick column, steel bars need to be installed and attached vertically from the footing of the column to the height of the column. Then, laying the bricks at the surrounding of the steel bars in rectangular or square shape depends on the design of the column. The bricklaying and liquid mortar filling method for column also the same as bricklaying for wall construction of interlocking bricks.

3.0 METHODOLOGY

3.1 Qualitative Data: Interviews

The total of 15 interviews done was intended to investigate and identify the scenario that has happen in residential development in terms of applying interlocking bricks system to their methods of construction. The interviews will be divided into two categories, which is the first category will be conducted to the contractors or developer and the other category will be focusing at the owners of the interlocking bricks system house. Several questions of the structured interviews will be conducted for the purpose of re-affirmation and consolidation at some convergence of findings.

3.2 Case Study

For the case study of the research, three occupied interlocking brick system residential buildings will be selected to identify comparison for each building in terms of construction time period, cost of construction, usage of building materials and usage of labour workers.

4.0 ANALYSIS AND FINDINGS

4.1 Challenges in Implementation of Interlocking Brick System for Residential Building

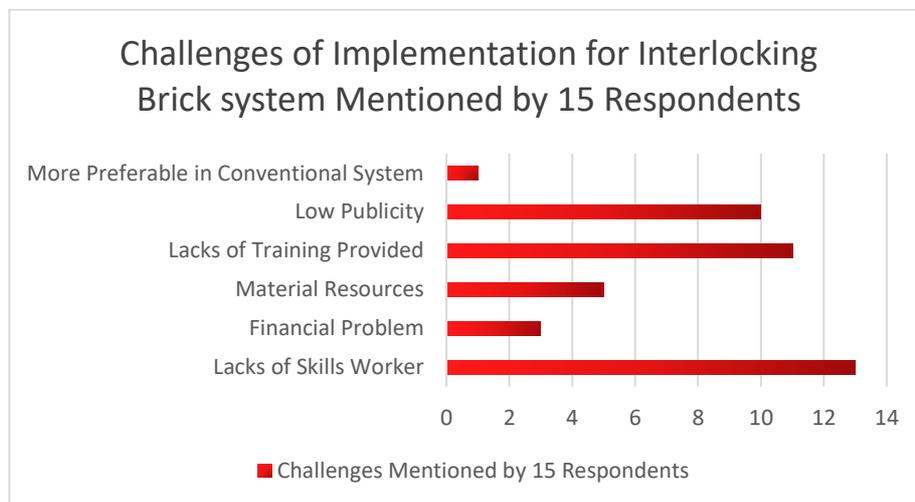


Figure 1: Several challenges that has been mentioned by 15 respondents

From the observation and interviews that has been conducted, majority respondents has mentioned that lacks of skilled worker, low publicity, and lacks of training provided for Interlocking Brick System are the highest challenges and barriers for the implementation of this system in nowadays construction industry.

5.0 CONCLUSION

It is recommended that CIDB, government and other private organizations to provide more training programs for construction of interlocking brick system in construction industry to serve more skilled worker and to attract small scale contractor to involve in this system projects. It's also recommended that all contractors that involved in Interlocking Brick System projects to ensure all the work done for the construction are being built by using all the guideline and methods of construction that has been made for this system to avoid any problems and defects that might affects the public to avoiding interlocking brick system to their buildings.

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