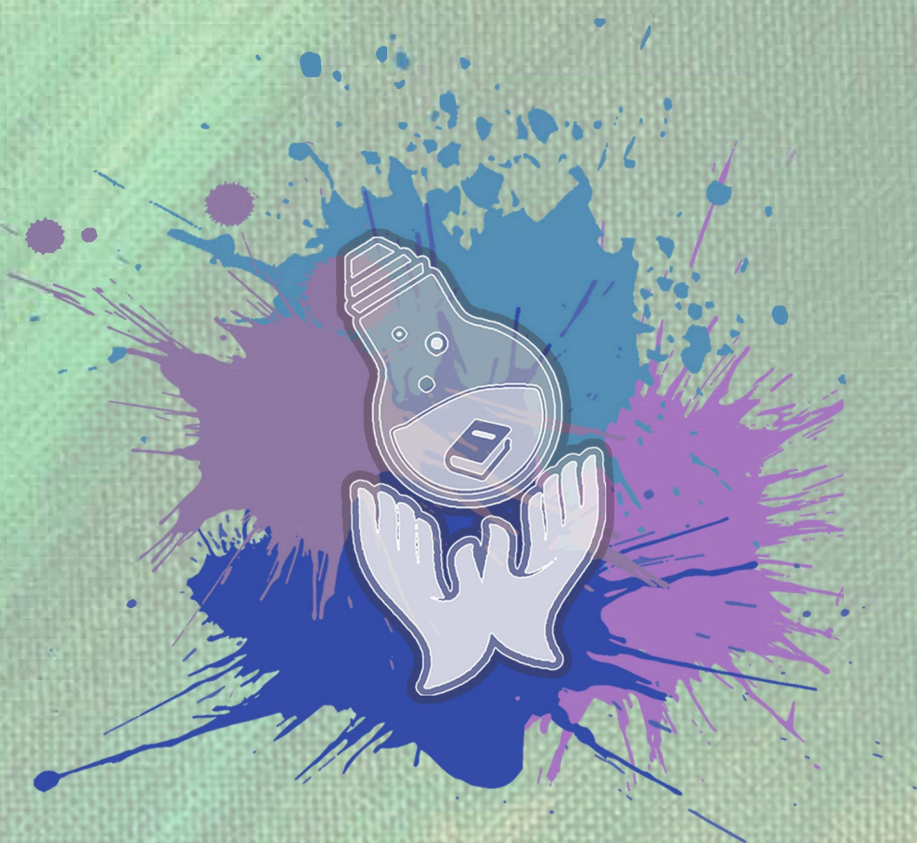




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QUALITY CONTROL FOR OFFSITE CONSTRUCTION: LONG DISTANCE TRANSPORTATION IMPACT

Raja Anis Syafinas Binti Raja Muhammad¹ and Noor Sahidah Binti Samsudin²

^{1,2} Department of Building, Faculty of Architecture, Planning and Surveying,
Universiti Teknologi MARA, Perak Branch, Seri Iskandar Campus, 32610 Seri Iskandar, Perak
Email: rajanisyaafinas@yahoo.com¹

Abstract:

This paper focused on precast component defects that may occur to the long-distance transportation to the site construction field. Nowadays, the Industrialized Building System (IBS) in Malaysia is rapid growth in the number in a perfect tune. Besides, the Government of Malaysia itself puts great effort through this system in construction industry. Nevertheless, most of the stakeholders still have negative perceptions in IBS and are unable to foresee the benefits of this approach. Feedback from the past experiences associated using IBS component panels tense to approach such a joint failure, water leaking, poor qualities and cost overrun. To maintain the quality of the IBS products this action must be conceded. Hence, the information that be collect is to identify the problems factors regarding the issues of the defects on precast components especially on the shipping transportation of panels to the site and also to determine the current used supporter system for the element of precast arrangement on the truck. In addition, solution on reducing the impact causes on the precast components is through the innovation idea on padding or impact and vibration absorber or cushion system is needed. Simultaneously, enhancing and giving a better perception towards IBS will create a better understanding and demand for IBS adoption in construction industry.

Keywords:

Industrialized Building System (IBS); Factor of Pavement Damaged; Defect Precast Occur.

1.0 INTRODUCTION

The Malaysian Government has put a great effort of usage industrialized building system (IBS) in the construction industry. Besides, the Malaysian government and practitioner have introduced the Industrialized Building System (IBS) to Malaysian construction industry which it is covers pre-assembly, prefabrication, Modern Method of Construction (MMC), Off-site Manufacturing (OSM), Off-site Production (OSP) and Off-site Construction (OSC) (zatul Laili Jabar et al, 2018). According to Construction Industry Development Board (CIDB), there are six classifications of IBS. One of the most common used IBS' component is precast construction system. Comparing with the conventional construction, precast construction system has the main advantages of higher productivity, less workload and less complex work, with the improved quality of precast. IBS is a construction process that uses standardised building components installation. Furthermore, manufacturing facilities or factories have stringent quality assessment/ quality control (QA/QC) programs with the independent inspection and testing protocols that promote a superior quality of precast components. Nonetheless, most of the stakeholders still hold many negative perceptions towards IBS and still hold many negative perceptions towards its applicability. Unsuccessful past experiences associated with using IBS component panels tense to approach such as joint failure, water leaking, poor qualities and cost overrun also contribute to the reluctance to adopt IBS practices (Yunus, et. al n.d). According to Ismail, et. al, 2017 the 'mySMS' and 'E-Aduan' system was the technology used in managing the complaint at the PC building. The reports mostly used at the PC building provided not enough data and explanations such as structure and facility type, defect description, location and visual inspection to categories in details that could help the maintenance to conduct effective execution on the defect.

2.0 LITERATURE REVIEW

Through the literature review that has been gain it is shows that the quality product, speed of construction, and cost saving are the main emphases given in the building construction industry in

Malaysia. The panels are often transported using various machines such as cranes, tractors, trucks, or other similar devices. The transportation of Such panels can be time consuming and complicated, often resulting in damage to the panels (United States Patent No. US 8,978,343 B1, 2015) .The quality precast components transportation is the main aspect to be consider because the product must be delivered from the precast manufacture to the site construction. Transportation is known as crucial to society, and the demand for transportation is strongly linked to economic development. So, it must be in a good condition structural the similar result that have been through by quality assurance and quality control (QA/QC) inspection at the manufacturer. This have been mentioned by Shi et. al, 2018 building inspection plays a critical role in the quality assurance and quality control (QA/QC) of building construction projects. The quality control supervisor will be examined by the Department for their ability to perform the above functions in accordance with the Department's procedure. This examination will usually be written and oral. In this case, accoding to Yunus, et al studies there are two technical quality criteria that been identified in construction process stage, namely 1) defects and damages and 2) constructability. Defect and damages will reduce structural performance of the IBS elements and accordingly increase the maintenance and operation cost. Moreover, IBS components element are delivered to the construction site to be assembled into structure to function as expected in design.

3.0 METHODOLOGY

3.1 Desk Study

The information and findings data collection through the desk study to found out the statement analysis result about the distance transportation truck delivery of precast components that can give affected in a major or minor defect of the precast panels structural during time to delivered to the final destination. Moreover, result data through desk study the defect can be confirmed whether the factor that occurs on the precast component is either the road condition damage problem surface, or the vibration impact by the truck itself or the weakness of the current supporter system that used on the arrangement.

3.2 Observation

The observation is takes part to identify the most current method and system supporter for handling and delivered process that been used for the arrangement of the precast panels that landed on the truck at the manufacture of precast production and the agency transport of the heavy truck what are the special guide or system that been used to delivered the precast to final destination in a time and smooth shipping. Meanwhile, the behaviour of the driver and safeguard who are in-charged to guide from the back of the truck that transport the panel are they take focus on the overall of the quality arrangement procedure regarding shipping precast components guidelines and also the rules while on the road to other vehicles.

3.3 Interview Session

In other hand, the interview session will be interviewing the QA/QC manufacture, the professional driver, safeguard of the control panel on the road that responsible to gives a signal to the front truck driver if any happen, the police traffic and others that involved to managed flow transportation procedure guidelines. Next, the interview session will be collected through the contractor, QA/QC on-site that ordered the precast panel. What are the comments of the method, support system of preventing the precast damaged occur and also on precast panel structural or other complain from their sides regarding the quality structural after the components are arrived? The data will be collected is relevant because it is from the right parties' organization that managed the precast elements. The researcher question can be confirmed what the biggest issue about precast transportation are.

4.0 ANALYSIS AND FINDINGS

Based on analyses that have been made by Czech et al, 2016 simultaneous comparative analysis of the impact of all factors undertaken on the level of road vibrations propagated on road paved with cobble stones, concrete pavement, and gravel-hardened dirt road. The result of all these condition types of road paved caused by the soil conditions defect that occurred the transverse cracks along the entire width of the roadway, visible gaps in top layers of crack fillings, on the surface of the concrete slabs slight visible transverse damage, many chippings in edges of the slabs near sloping fractures, inconsistent texture and

considerable wrongdoings in the pavement pattern, visible gaps in filling of individual cobbles mostly in the middle part. These results can be confirmed that the highest defect impact on precast components can be occur through long-distance transportation of precast components due to the vibrations impact based on pavement response and the dynamic characteristics of active interruptions when considering on factor of pavement damage. According to Selamat et al, 2019 pavements may encounter by heavy vehicle load has contributed significantly to high stresses causing pavements damage. Those studies also addressed that the overload vehicles have imposed significant influence on the reduction of pavement service life. The primary condition that the load reached within 2.59 years under overload condition. This result revealed that the pavement condition service experienced about 7 years reduction of service life due to overloaded heavy vehicles showed in Figure 4.1.

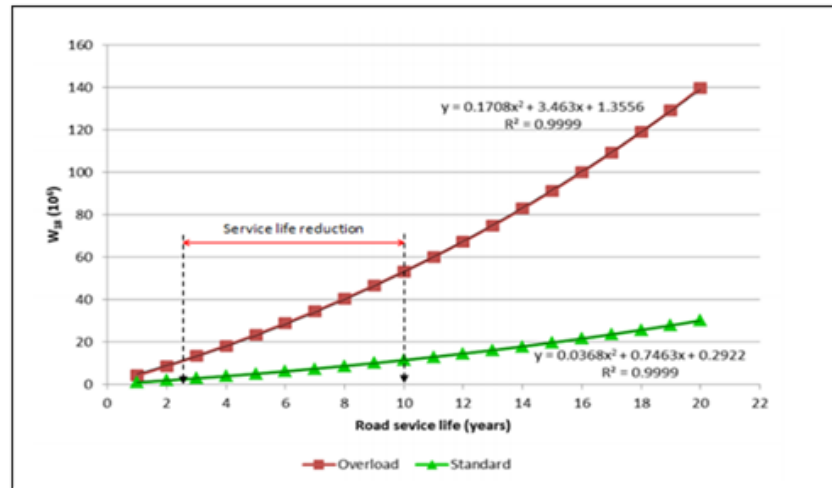


Figure 4.1: Relationship between traffic load and service life on standard and overloaded conditions
Source: Selamat et al (2019).

5.0 CONCLUSION

To concluded, the precast components defect especially on cracking defect can be recognized to the activity of the vibration occur during the transportation. Besides, this vibration happened due to the impact condition damaged surface road. The impaction of all factors undertaken in this researcher examples on the level of road vibrations propagated based on road paved. Precast is a rigid element structure that can easily cause defect if there is a minor defect on the surface structural element and it will give the bad perceptions towards IBS to the user and stakeholders. Through this problem it can be confirm that if the transportation of precast components in a long distance or either in a short distance delivery will cause risks of defect is highest occurred to the structural. Moreover, the used of supporter system to prevent the precast components from damaged, but it is still the defect occur during the transportation delivered. The cracking, joint failure, damaged on edges, chippings defect will cause leaking, mould on the surface which can is the major problem. Lastly, with this innovation ideas will reduce the highest impaction of the defect occur on the precast component for example defect on cracking, damaged at the edges, chipping, breaks, and undue stress.

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