

INVESTIGATION ON THE CAUSES AND  
METHOD IN MINIMIZING THE BUILDING  
DEFECTS

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I/We\* hereby declare that I/We\* have checked this thesis/project\* and in my/our\* opinion, this thesis/project\* is adequate in terms of scope and quality for the award of the Bachelor Degree of Civil Engineering

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BUILDING DEFECTS

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## ABSTRAK

Kecacatan pembinaan adalah kecacatan reka bentuk yang berlaku pada bangunan yang boleh mengurangkan nilai dan mendatangkan bahaya kepada pengguna. Kecacatan reka bentuk boleh diklasifikasikan sebagai kekurangan ke arah reka bentuk bangunan, mutu kerja, bahan dan sub-permukaan tanah. Isu umum yang berkaitan dengan pembinaan boleh berlaku terhadap bangunan lama mahupun baru. Terdapat banyak kes terhadap kecacatan berlaku secara berterusan walaupun pembangunan teknologi pembinaan semakin meningkat pada masa kini. Oleh itu, matlamat penyelidikan ini adalah untuk mengenal pasti jenis cacatan bangunan, mengkaji faktor-faktor penyebab yang menyumbang kepada kerja-kerja kecacatan dan menganalisis kaedah dalam meminimumkan kecacatan kerja-kerja pembinaan. Metodologi kajian ini dijalankan dengan mengagihkan soal selidik kepada pihak yang terlibat di tapak terutamanya penyelia tapak, kontraktor dan jurutera seramai 52 responden. Soal selidik berstruktur terbahagi kepada empat unsur iaitu asas, struktur, bukan struktur dan bumbung untuk meningkatkan kajian kes dalam mencari faktor penyebab utama yang menyumbang kepada setiap elemen dan kaedah yang dapat meminimumkan kecacatan yang berkaitan. Pengumpulan data akan dianalisis menggunakan kaedah Relatif Penting Indeks (RII). Hasil penyelidikan ini, faktor penyebab yang menyumbang kepada kecacatan adalah keadaan tanah yang lemah, pemadatan yang tidak mencukupi untuk bancuhan konkrit baru, mutu kerja yang kurang berkualiti yang menyumbang kepada permukaan plaster yang kasar dan rembesan air dan kebocoran di bawah bumbung. Selain itu, kaedah untuk meminimumkan kecacatan ialah dengan menggunakan gred konkrit yang bersesuaian untuk elemen asas dan struktur, menggunakan cat dan primer yang betul serta pemasangan bumbung yang betul untuk bumbung berbentuk nada. Pada asasnya, sebarang kaedah yang telah digunakan boleh dijadikan panduan untuk meminimumkan berlakunya kecacatan menjadi lebih teruk dan menjadi kebimbangan, ia mesti mempunyai pengawasan dan penyelenggaraan yang baik dari penyelia teknikal juga. Oleh itu, amalan ini boleh membantu industri pembinaan untuk memperbaiki kecacatan dan meminimumkan kejadian yang dapat memuaskan pelanggan.

## **ABSTRACT**

Construction defects is a design flaw that occur on building that reduce the value of it and sometimes, may be hazard to life. The design flaw can be classified as any deficiency towards design building, workmanship, materials and sub-surface. It is common issue that associated with construction and can be happen either for an old or new building development. Numerous cases towards defects happen continuously in spite of the construction technology development nowadays. Hence, this research objectives are to investigate the type of defects work, study the causes factors that contribute to the defects works and analyze the method in minimizing the defects on building. The methodology of this study conducted by distributing the questionnaire to the party involved on site mainly site supervisor, contractor, developer and engineer estimating around 52 respondents. The structured questionnaire is divided into four elements which are foundation, structural, non-structural and roof to enhance the case study in searching the most causes factor contribute to each elements and methods which can minimize the associated defects. The data collection will be analyzed by using Relative Important Index (RII) method. The finding of this research, the causes factor that contribute to the defects are poor soil conditions, insufficient compaction for fresh concrete, poor workmanship that contribute to rough surface of plaster and water seepage and leakage underside of the roof. Moreover, the method to minimize the defects are using suitable concrete grade for foundation and structural elements., using proper paint and primer and having proper installation of roof tiles for pitched roof. Basically, any method applied on site can be as a guideline to minimize the occurrence of the defects from becoming more worst and to be concern, it must have good supervision and maintenance from the technical supervisor as well. Thus, this practice may help for construction industry to have an improvement towards defects and minimize the occurrence of it which can satisfy the customer.

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## **LIST OF ABBREVIATIONS**

EDU	Engineering Document Unit
QLASSIC	Quality Assessment System in Construction
QAQC	Quality Assurance and Quality Control
ISO	International Organization for Standardization
RII	Relative Importance Index
CCC	Certificate of Completion and Compliance

## **CHAPTER 1**

### **INTRODUCTION**

#### **1.1 Introduction**

In construction industry, the contractors are always concerned to finish the task in the shortest time in order to minimize the financial burden. The drag of time will increase the maintenance and operational cost. In accordance to that, they might not aware as consuming the shortest time for the structure to be completed will definitely increase the defect works on building. The building is a valuable physical asset that requires good maintenance to reduce the defects. Construction defects can be visible to the eye or concealed deep within structure (Gatlin, 2013). Defects might create hazards to the society which can lead to serious or any fatal injuries.

The defects occur depend on many factors that contribute to it either structural or non-structural defects. Structural defect means any defect in a structural element of a building that is attributable to defective design, defective or faulty workmanship or defective material and sometimes any combination of these (Bakri and Mydin, 2014). Non-structural defects are defects which happen to the non-structural elements of the buildings, for an example, the facade, floor finishes, doors, windows and rainwater downpipes goods (Tan and Mydin, 2013).

#### **1.2 Background study**

In Malaysia, construction industry can be known as major productive sector since the construction started in the early 1990s with the development of mammoth projects (Abdul Razak et al, 2010). High rise building in Malaysia for an example, Kuala Lumpur City Centre (KLCC) or Kuala Lumpur Tower are remarkable for its dynamic structures. Every year, civil and structural engineers and other professional consultants help to improvise the quality regarding the development of construction building. However, the

qualities provided in construction project sometimes do not meet any satisfaction towards the society. In spite of the development, construction industry is dealing with one major problem which is building defects (Jaspal and Kamaldeep, 2017). The building is a valuable physical asset that requires good maintenance to reduce the defects. As stated in New Straits Times on 28th February 2015, the clock tower of Teluk Intan, Perak started to tilt following two massive floods in 1889 and 1895 due to its soft structure and the weight of the water tank make it leaning towards southwest.

The construction defects can appear in many ways. Building defects can be the result of design error by the architect, a manufacturing flaw, defective materials, improper use or installation of materials, lack of adherence to the design by the contractor, or any combination of them (Ahzahar et al, 2011). Thus, it is impossible to achieve zero defects of the structures although the design professional is responsible to produce well-coordinated design as well as construction documents because nothing built is ever perfect (Gatlin, 2013). In addition, all structured building is expected to have the lifespan before it can be expired completely.

Defects on building may take several years to be happen. Bad impacts may arise and give problems to the developer or other authorities such as the overhead cost, disruption in time management and also the resources of material and machine involved for the projects to be completed. Defects also might create hazards to the society which can lead to serious or any fatal injuries. As stated in The Star Online on 30 June 2018, The Highland Towers area, once a prime land, was left abandoned after one of its three condominium blocks collapsed on Dec 11, 1993, in a major landslide that claimed 48 lives. Frankly, defective works in building can lead to the complete failure of a structure and safety of human life. Moreover, the overwhelming number of defects in building may sometimes minimize the value of its property and the standard quality of building can be low. Therefore, it is essential to identify common contribution factors of structural defects and failures in construction project in order to minimize the effect to building and indirectly it will prolong the life span of the building (Ahzahar et al, 2011).

### **1.3 Problem statement**

Defects on building can contribute to such a failure for the overall building to sustain its life as buildings have a finite useful life and wear and tear are inevitable

(Gatlin, 2013). Structural engineers are always striving to overcome the issues of defects in building but it is completely difficult to be resolved. These matters are very crucial mainly for construction industry as the problems related to defects do not appear to be minimized although technology in building are becoming more advance across the centuries. The circumstances when facing the issues on defects is how the structural engineers able to rectify the problems arise while spending on the least amount of money.

As we know, the construction defects happen due to the lack in the construction progress, the materials or systems that are used or the design on a project which results in a building failure and substantially can causes the damage towards human or property. The exposure of defects will lead to unsatisfactory of customer that may influence the good reputation of developers and contractors involved. It will also lead to the delay of achieving the Certificate of Completion and Compliance (CCC) from the public authorities which will drag the period of completion as stated in the Sale and Purchase agreement between the developer and the buyer. Therefore, the progress of completion of the project might be disturbed. Hence, in order to avoid any issues that might occur regarding the building defects in overall construction project, therefore, this research project will identify the causing factors that contribute to it and analyze the method that can be applied on building construction in order to minimize the defects works.

#### **1.4 Objectives**

The aim will be achieved through these objectives:

- a) To study the type of defects work, occur in the housing premise
- b) To identify the causes factors that contribute to the defects
- c) To analyse the method in minimizing the defects on building

#### **1.5 Scope of research**

The scope of research is focusing on the defects that occurs in the district of Kuantan, Pahang. Related with the objectives to conduct the study, the scope of research are:

- i) The study will be conducted on several housing premises in Kuantan district, Pahang



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