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FACULTY OF ARCHITECTURE,  
PLANNING AND SURVEYING

FULL PAPER  
PROCEEDING



3<sup>RD</sup> UNDERGRADUATE  
**S E M I N A R**  
BUILT ENVIRONMENT & TECHNOLOGY

SEPTEMBER  
**2018**

ISBN 978-967-5741-67-8

FACULTY OF ARCHITECTURE, PLANNING & SURVEYING  
UNIVERSITI TEKNOLOGI MARA PERAK BRANCH  
SERI ISKANDAR CAMPUS

UiTM PERAK @ *Seri Iskandar*

# EXPLORATION OF CAUSE CONTRIBUTING DEFECT AT HIGH-RISE RESIDENTIAL BUILDING IN KLANG VALLEY – A LITERATURE REVIEW

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## **Abstract:**

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. Most of the building defects due to human factors were caused solely by forgetfulness and carelessness, lack of knowledge, and a very small percentage were intentional. As for workmanship defects, lack of motivation dominated costs, but the presence of risks directly increased the chance of defects. Hence, it is very important to identify the root of the problems and then must find out the possible solution to solve it. About 20 research papers published within the past 10 years are used in abstracting all the relevant literatures, analysing and coming out with the findings on what are the indicators to be identified and considered as factors of these issue can create an awareness for everyone who are involved in the building's management and maintenance including the building users.

**Keywords:** Building Defects; Indicators; Factors

## **1.0 INTRODUCTION**

Building defects in a construction contribute to a higher impact to the economical wise in the country. A quick awareness should be given to people to realize that some approach and implementation of certain ideas are needed to solve this issue. Delivering a good quality building for a country without any defects is not a simple task because building deformity can exist from new building or the old ones. Imperfection inside new building maybe due to rebelliousness with the Construction Regulation and distributed worthy resilience's and standards guidelines to all parties involved in construction. Then the more established structures, or working out of guarantee period, may not follow these standards but rather should be judged against the standard at the season of development or repair (Omar Bakri & Othuman Mydin., 2014). In addition, imperfections and disintegration are basic issue in any fabricated structures. Nonetheless, different imperfections are more typical in an old structure. As in BS 3811 (CODE of Practice, British Standard 1984) abandons are characterized as the weakening of building highlights and administration to unacceptable quality level of prerequisite of the clients (Omar Bakri & Othuman Mydin., 2014).

Building defects also lessen property estimation, making enormous misfortunes the proprietors (Adi Irfan et al., 2015). The value of a property depends on the condition of the building. Defects too can cause distress and debilitate the wellbeing of building clients. Due to this, structures should be kept up appropriately to guarantee the safety of the users. In this respect, the best approach is through preventive maintenance, which is routinely performed while the building is still in great condition. This approach works on the rule that counteractive action is superior to cure (Adi Irfan et al., 2015).

Regular kind of building defects included: structural defects bringing about splits or fall; imperfect or broken electrical wiring or lighting, blemished or flawed pipes, deficient seepage framework defective ventilation, cooling or warming systems, insufficient protection or sound sealing, likewise lacking fire insurance concealment frameworks. In addition, dry decay, wood spoil, shape, parasite, or termite or vermin invasion may be the consequence of a building absconds (Omar Bakri & Othuman



Mydin., 2014). These are the common defects which can be found in any high rise building as well as at the low rise building.

Preventive support works can be upgraded by recognizing the reasons for building defects such as by identifying the root of the problem (Adi Irfan et al., 2015). According to Adi Irfan et al. (2015), imperfection has its own particular elements, such as human, condition, and building materials that they may use and when the problem is identified as well as the solution for the defects can be handled easily by the building maintenance team. Therefore, the objective of this paper is to enhance the existing knowledge towards causes of building defect by identifying the factors contributing to the causes that happen.

## 2.0 LITERATURE REVIEW

Klang Valley is an area in Peninsula Malaysia, which involves the capital city of Malaysia, Kuala Lumpur, as well as encompassing rural areas. This is also known as the Kuala Lumpur conurbation. It is the quickest developing region in Malaysia and has a population of around 7.2 million and zone of around 3,200 Km<sup>2</sup> (Abdul-Rahman et al., 2014). According to Abdul-Rahman et al., (2014) an announcement by the Ministry of Finance's Valuation and Property Service Department, stating that currently over 45% of houses are developed in Malaysia and are situated in the Klang Valley. Because of the significance of moderate lodging in this quickly developing area, the purpose of this examination is to recognize the sorts and reasons for habitually happening development deserts inside the reasonable lodging in the Klang Valley, Malaysia (Abdul-Rahman et al., 2014).

Reasonable housing at Klang Valley area is characterized as proper housing units of which the development is as per guidelines adhere to the code of training uncommonly made for ease houses as expressed in CIS 1: 1998 and CIS 2:1998, which were distributed by Construction Industry Development Board Malaysia (CIDB). Following the characterized of local development in Malaysia, a minimal effort house is a living unit with an offering cost running from RM 25,000 to RM 42,000 in view of the estimation of land created. In addition, moderate lodging could be a patio, separated house or level with least outline determinations of a developed territory between 600-750 square feet, inclusive of a family room, a feasting region, a kitchen, a restroom, three rooms, a washing and a drying region (Abdul-Rahman et al., 2014).

A research was carried out by Abdul-Rahman et al., (2014) on most common defects on affordable housing in Klang Valley. The research focused on determining the type of defects that mostly occurred in landed residential types of property. Therefore, this study looked at defects at High-Rise building because until now the defects at high-rise building remain questionable. Most of the time the defect happening which was identified is imperfection installation of piping which lead to leaking. Next, the issue which was commonly reported from previous study were the aggregate failure of water supply framework and other critical defects issues highlighted was defective entryway handle (Abdul-Rahman et al., 2014).

According to Akande et al. (2016), building collapse or failure occurs due to a few reasons such as absence of town planning inspection, monitoring of sites and bad designing of a project. Most of the time town planning staffs is not doing the job properly. As a town planning staff they have to inspect and monitor progress on the site. When they have a constant inspection the authority may know what is going on at the site. Unfortunately, these problems only are made known when the building collapse or failed. This issue should be taken under guarantee for the town planning staffs to do their given job properly. They should keep on updating on what is going in the site and do proper work in handling the defects at the early stage. Other than that bad designing also does influence the quality of a building. Besides that, defect too can happen due to calculation. In addition, wrong calculation on the load to the building, inaccurate data, and improper choice of materials also can cause faulty designing. The engineers should be more responsible when collecting the data and calculating the strength of the building. This can make the building to bear the load longer time and more stable. Meanwhile according to Ali et al. (2011), conformity with expectations is also one of the main factors for building failure. A construction project

can consider as success when the quality of the project have achieved. These expectations have been designated as zero defects as the objective in the early stage of construction. In the nutshell all the parties should not be too confident on the projects outcome before the constructing ends.

According to Akande et al. (2016), clients' penchant to cut corner and corruption and greed also can be the factors for a building to collapse or fail. These factors normally happen due to client's irresponsibility. Clients have penchant to cut corner by not employing qualified professional workers to produce documents and skilled workers to do specialized works. To obtain the quality of the building client must spend some money to employ skilled workers to do professional works. He further mentioned that corruption and greed must also be given attention as to avoid building failure. Many of the contractors, professional in building industries even the government are selfish at times. This is because many contractors use substandard materials to cut cost so that they will have extra money for their personal use. There are certain instances where some government officers that were sent to site for inspection collect bribe and approved all the materials or on going works even when all is not right. All these factors should be highlighted and controlled because they may lead to building failure such as using substandard materials or the greedy government officer. To prevent all these problems everyone who is involved in the construction industry should be more responsible on their given work. If everyone does their work properly and honestly these factors can be prevented easily.

In addition, other factors are substandard materials and high cost of building materials (Akande et al., 2016). Substandard materials are the materials, which are below the standard. Using low quality materials is one of the major causes of building or structural failure. Thus, using substandard material should be taken into consideration as to avoid building structure. Site supervisor or the quantity surveyor should be more aware on this among the contractors to avoid these problems from occurring. Furthermore, Akande et al. (2016) also mentioned that high cost building materials in the market being a reason behind these building failures. Price of the materials can be increased or decreased on a day-to-day basis. Many developers are using low quality materials which would be cheaper in the market to make sure the price never exceed the budget. This less quality of materials is very harmful and may eventually leads to building failure.

Moreover, as cited by Akande et al. (2016), there are other factors that lead to this building collapse which are inefficient workmanship and incompetence of contractors or craftsmen. Inefficient and fraudulent labours in a construction can contribute to the low quality of work. Many contractors hire foreign workers to construct building. Most of the foreign workers do not have a high level education qualification. They also have poor skill in reading the drawing. Besides, they also face difficulty in communicating with the contractors. These can cause misunderstanding between the contractors and foreign labours. In a nutshell, it would lead to faulty constructing in any job given. Akande et al. (2016) also stated that low capability or ability of a contractor in performing work can cause building collapse. When a contractor bit the tender, they must make sure they are capable to do the job. In addition, experience also plays a very important role. When the contractor is not capable to do a job it may lead to low quality of craftsmen. They also must be confident to take action when they need to do so at the right time.

Other factors are extra ordinary loads and unexpected failure mode (Akande et al. 2016) A building carries loads such as live load and dead loads. Live loads will be the residents or user of a building, tables, chairs etc. The live loads can be changed according to the time; while the dead load will be the walls, roof, partitions and other finishes. These loads are permanent. Every building will have its own capability to carry the loads. When the loads exceed the capability this is when the building fail. To make sure the building can carry the loads the foundation must be strong. As stated by Akande et al. (2016) unexpected failure mood cannot be prevented from happening. It may happen due to poor weather condition. Heavy rains, strong wind, hot sunlight and etc are the examples of poor weather condition. All these factors cannot be stopped from happening.

Last but not least Akande et al. (2016) also mentioned that lack of maintenance is one of the main reasons of building failure. Maintenance for a building is very important guarantee to keep the building

safe. Many property owners are not giving importance on the maintenance of a building. This will reduce the lifetime of the building. Building maintenance is also very important to maintain the value of the property. According to Ali et al. (2010), delay in reporting problem will cause building failure. When a problem or defects occur in a building, the building user must report to the building maintenance so that it can take fast action to repair defects. As said by our leaders it is better safe than sorry. They must take an action before it would be too late to repair the defects. Delay in reporting the problem also may lead to high cost in maintenance work. Higher maintenance cost due to negligent through time also is one of the factors of building failure. The government has given instruction to building maintenance team to carry out maintenance work at the early stage so that the cost for maintenance is low and the risk for the building collapse also will be low. However, less attention is given to the maintenance work by the building owner. To reduce the maintenance cost and to maintain the quality of the building, maintenance work must be carried out at a very early stage itself.

### 3.0 METHODOLOGY

20 selected papers publications from Scopus and google scholar platform had been used to justify and analyze the obtained information in regards with factors contributing to factors that cause defects at building. The publications were selected within the timeline from 2011 until 2017 with 20 relevant research papers selected. From the 20 papers, only 10 authors were considered to be analysed based on the factors that cause defects.

### 4.0 ANALYSIS AND FINDINGS

This section represent the findings from analysis and reviewing process of relevant literatures on the components of main factors, which lead to causes of defects happening in building particularly for residential types of project. The publications were selected within the timeline from 2011 until 2017 with 20 relevant research papers selected. Figure 1 shows years to number of publication as shown in Figure 1.

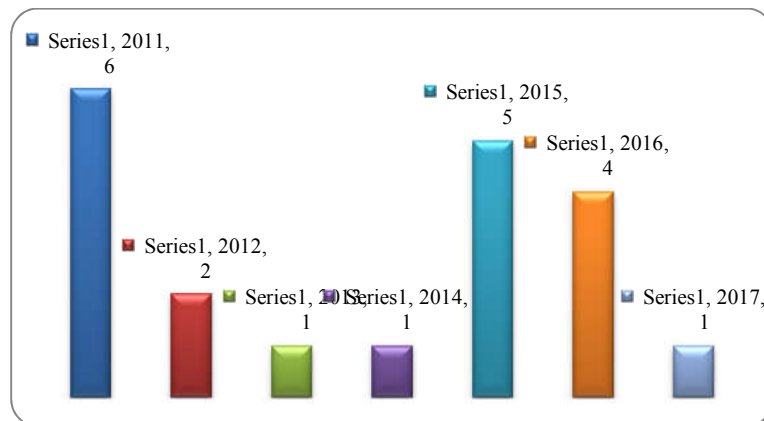


Figure 1: Numbers of referred paper publication from 2011 to 2017

Table 1 shows the factors that causes defect in a residential building. There are 14 factors that have been listed and cited as well as analysed based on 10 authors by considering the paper published within the year interval of 2011 to 2017. By referring to Table 1 below, the highest time referred for factors causes of defect goes to lack experience of labours. This factor is the highest main factor which contributed to the defect happening to building. The number of times referred to for these factors are 9 times. This is followed by faulty of design with 7 times that being referred to, unsuitable design as well as poor supervision having 6 times being referred to. In the design stage as well as management and proper arrangement should be taken as a serious consideration too. Unable to design well may contribute a defect in later right after the completion of the construction itself. The other factor that shares the same reading of 5 times being referred to are as follow: lack of communication, unsuitable construction equipment,

poor weather condition and land movement. The factors highlighted here its more to the factors which relate to the condition of the site project itself. Again, it comes to managing the project itself. With improper management during construction may cause a defect later.

Table 1: Factors Causes of Defect

No.	Factors Causes of Defect	Ali et al. (2011)	Omar Bakri N.N et al., (2013)	Adi Irfan et al., (2015)	Mahajan (2016)	Ahzahar (2011)	Thamilarasu.v (2017)	Abdul-Rahman et al., (2014)	Othman et al. (2015)	Nuzaihan et al. (2016)	Akande et al. (2016)	Mahajen (2016)
1	Poor project management	✓	✓	✓								3
2	Complicated role of sub-contractors	✓		✓	✓						✓	4
3	Lack experience of labours	✓	✓	✓	✓		✓	✓	✓	✓	✓	9
4	Lack of communication	✓		✓	✓			✓		✓		5
5	Unsuitable construction equipment's	✓	✓	✓	✓					✓		5
6	Poor weather condition	✓	✓	✓		✓				✓		5
7	Limited time	✓		✓								2
8	Limited cost	✓		✓		✓						3
9	Land movement		✓	✓		✓			✓		✓	5
10	Faulty design		✓	✓		✓		✓	✓	✓	✓	7
11	Unsuitable design		✓	✓	✓	✓				✓	✓	6
12	Poor supervision			✓	✓	✓		✓	✓		✓	6
13	Low maintenance		✓	✓		✓		✓				4
14	Corruption					✓						1

## 5.0 CONCLUSION

As a conclusion there are many types of defects can be found in a building such as internal defects or external defects. There are many reasons why defects occur in a building. One of the major reasons why a building has defect is poor workmanship during the constructing processes. The contractors should have given more attention during the construction stage. Other than that, the usage of low quality materials may contribute to the reasons of the defects. Therefore, from this study the defects can be avoided if there was a good supervision or monitoring on the contractor's irresponsibility such as using low quality material by the site supervisors. In addition, they need to carefully examining and creating an awareness that is not only limited to the building maintenance but to the house owner as well. Thus, the purpose of this paper is to identify the factors of building collapse or failure. All of these factors should be taken into consideration from all professionals who are involved in construction industry and property owner in order to prevent and minimize the defects on upcoming new buildings.

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