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# DEFECT ON HIGH RISE GOVERNMENT OFFICE BUILDINGS IN KELANTAN

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## **Abstract:**

Malaysia is one of the developing countries where many projects are being implemented especially in the construction industry. The construction industry is getting more modern, advanced and growing day by day. Despite that, problems such as building defects still occur. Defect is sometimes used as synonym with failure but the preferred meaning is to indicate only a deviation from some standard that may, but will not necessarily, result in failure. There are many types of defects that can be found in the construction industry in Malaysia. The types of defect can be grouped by the element such as external wall, internal wall, column, door, window, roof, ceiling, floor, and others. The aim of this study is to investigate the causes and effects of defect on high rise government office buildings in Kelantan. This study uses questionnaires to collect data from the respondents. The result shows that the majority of respondents agreed that crack is the most occurring type of defect in government office buildings in Kelantan. Amongst the main reasons that causes defects are poor workmanship and poor maintenance. This creates dissatisfaction to occupants in the building and affects their productivity and performance. As a conclusion, it is imperative that the personnel who are in charge of the maintenance of these buildings should take precaution to ensure that these defects could be minimized.

**Keywords:** Causes of Defect; Effect of Defect; High Rise Building; Government Office Building.

## **1.0 INTRODUCTION**

Defects on building can occur based on unpredicted factors and causes. High rise buildings can be defined as buildings that are seven storeys or more in height and are also referred to as tall buildings. High rise buildings can also be defined as buildings that are 35 meters high and are equipped with elevators or lifts for occupants to use to reach their destination. A 'tall building' is a multi-storey structure in which most occupants depend on elevators (lifts) to reach their destinations. The most prominent tall buildings are called 'high-rise buildings' in most countries and 'tower blocks' in Britain and some European countries (Dupré et al., 2009).

There have been a great number of building defects reported in Malaysia by mass media and the impact of construction works on the physical condition and the surrounding of the building. Crack, for example, is a common type of defect, and it normally occurs mainly on old buildings. The identified common causes of such cracks are different thickness of plastering on those structures and insufficient bonding element that holds bricks to the column or beams (Suffian, 2013).

Building defect can be caused by several factors. Based on literature review, there are many causes of defect to building such as weather, construction material, corruption, faulty design, maintenance and others. According to Ali et al., (2013) defect occur when there are growth of fungi in the building, especially after a flood. Poor maintenance after a flood is one of the major causes of building defects as it results in a high number of growing fungi.

Building maintenance constantly affects everyone's life because users' comfort and productivity is relative to the performance of the building they live, learn, conduct research and work in or around (Olanrewaju, et al., 2010). Kama (2004) as cited by Mohd Fauzi et al., (2012) defined that dissatisfaction is the feeling arisen when the performance is not achieved with the standard. Hence, the objectives of this



research are, i) to identify the type of defects that occurs on high rise government office building in Kelantan, ii) to investigate the main causes of these defect, and iii) to determine the effects of building defect to users.

## **2.0 LITERATURE REVIEW**

### **2.1 Definitions of defect**

Based on Oxford English Dictionary, defect is “a shortcoming or falling short in the performance of a building element”. Defect also can also be defined as a circumstance where one or more components that do not play out its or their expected capacity. Patent defect is defect that may be discovered by normal examination or testing for example cracks to plaster, defective door and leakages in ceiling. Latent defects are mean defect that are not discovered by normal examination or testing for example structural defects which may appear a few years after completion (Abdullah, 2009).

### **2.2 Definition of high rise building**

High-rise buildings are multistory buildings sufficiently tall to require the utilization of an arrangement of mechanical vertical transportation, for example, lifts. According to Yatim (2009) defined a high-rise building as a building taller than 75 ft. (23 meters) in height.

### **2.3 Types of building defect**

Based on Wahab and Hamid (2011), defects occur in a variety of types and are commonly occurred in building components such as roof, floor, ceiling, wall, toilet, door and windows. In the construction industry, there are various types of building defect in the main structure of building. The most common defects that can be found are crack, dampness, fungi growth, and plaster crack.

### **2.4 Causes of building defect.**

Most defects cases were found to be the result of: misinterpretation of drawings and specifications; use of superseded drawings and specifications; poor communication with the architect/engineer, subcontractors and material suppliers; poor coordination of subcontracted work; ambiguous instructions or unqualified operators/workers; and, inadequate supervision and verification on site (Sommerville, 2007). Bad workmanship hassle in site usually has been a highlight is the media especially through newspaper and the result of terrible workmanship and low high-quality of materials getting used which has been diagnosed as fundamental reasons of defects arise in construction projects when developing new buildings (Abdul Razak et al, 2010).

### **2.5 Effect of defect**

There are several effects to the building occupants such as uncomfortable living condition, harmful to their health, increasing the expenditure in term of repairing the problems caused by the defects and et cetera. According to Bashir (2002) as cited in Mohd Fauzi et al., (2012), the impact of defects is tremendous to the occupants, whether they are owners or tenants of the house. This statement is supported by a number of health studies which have found that the dilapidated and deteriorated house will affect the mental and health of the occupants. Building maintenance constantly affects everyone’s life because users’ comfort and productivity is relative to the performance of the building they live, learn, conduct research and work in or around (Olanrewaju, et al., 2010). As an addition, the effects of defects to the building occupier also causes a feeling dissatisfaction among occupants. According to Sommerville (2007) study also notes that there have been an increasing number of house buyers who are unhappy with their new houses as the levels of defects also increase. In addition, according to Ng. et al. (2011) as cited by Mohd Fauzi et al., (2012) said that occupant’s satisfaction will be affected by the level of defects.

### 3.0 METHODOLOGY

In order to achieve the objectives of the study primary data collected were used to achieve the objective of this research. By this method, it will ensure that the data and information derived for the study are useful, relevant, and beneficial and would facilitate the analysis.

#### 3.1 Research design

There are a variety of data gathering techniques used to describe a research, and structured questionnaires were used to provide reliable data in order to accomplish the objectives of this study.

#### 3.2 Data collection technique and procedures - Questionnaire

Ideally, in order to determine and establish the objectives of the study, the data and information were collected through in-depth literature review and questionnaire survey. In this study, self-administered questionnaire were engaged as the primary data collection method. The first respondents are the maintenance staffs that are classified under the maintenance of building in government office building in Kelantan. They are those who are responsible to assist in improving and manage the performance of the building by minimizing the defect occurrence to increase the life span of the buildings. The second respondents are non-maintenance staff. They are targeted because of they were classified as the user of the building and they are expose to the defects. The reasons why the government buildings in Kelantan were chosen is because there is no previous studies were carried out on this specific type of building especially in Kelantan. The questionnaire was designed based on three research objectives where the aim of the research is to investigate the defect to high rise government office building in Kelantan.

### 4.0 ANALYSIS AND FINDINGS

The analysis of this case study was with regard to the causes of building defect and effect of building defect to users. 270 questionnaires were distributed and only 82 questionnaires were returned. The accumulated data will be keyed in into statistical software, the Statistical Package for Social Science (SPSS) version 23.0. The data obtained from the study were analysed and measured using computerised program by the frequency occurrence, and converted into percentage and easily read table representing the opinion of the occupants for better understanding. The frequency for the type and the causes of defects that occur on high rise government office building were analysed by using two-point scale (dichotomous question) which is 'yes' or 'no' and multiple choice answers respectively. The findings of the survey are presented under the appropriate headings as follow.

#### 4.1 Types of defect

Table 1 shows that the highest number of respondent who say 'yes' for type of defect that occur on high rise government office building in Kelantan is crack. The highest frequency with the total of 79 out of 82 respondents with the percentage of 14.8% agreed that the most defects that occur in the building is crack followed by defective plaster rendering. The least occurrence defect is blemishes with the total number of 28 out of 82 (5.2%) respondents. As with previous research done, crack remains the most likely type of defects occurring in high rise buildings.

Table 1: Types of defect that occur on high rise government office building in Kelantan

No.	TYPES	PERCENTAGE (%)	FREQUENCY (n)
1	Crack	14.8%	79
2	Peeling paint	11.6%	62
3	Roof leaks	8.4%	45
4	Dampness	10.3%	55
5	Corrosion of reinforced steel	8.4%	45
6	Erosion of mortar joint	6.7%	36
7	Blemishes (Honeycomb)	5.2%	28
8	Growth of fungus	11.8%	63
9	Defective plaster rendering	12.9%	69

10	Window defect	9.9%	53
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#### 4.2 Causes of defect

Table 2 shows the summary of this second objective. It shows that the highest responses from the respondents for all nine (9) causes of defect are poor workmanship where the total response is 297. In addition, among all ten (10) types of defects, crack has the highest response where the respondents agreed with the given statement.

Table 2: Causes of defects that occur on high rise government office building in Kelantan.

Types Causes	Crack	Peeling paint	Roof leaks	Dampness	Corrosion of reinforced steel	Erosion of mortar joint	Blemishes (Honeycomb)	Growth of fungus	Defective plaster rendering	Window defect	Total
Poor Workmanship	52	24	38	20	20	33	35	16	23	36	297
Faulty Design	12	19	29	9	9	16	5	7	4	23	133
Faulty Material	20	26	22	22	19	23	20	23	16	8	199
User activity	17	12	3	19	3	2	12	19	15	22	124
Faulty Construction	19	6	20	9	17	28	6	8	10	16	139
Poor Maintenance	28	30	27	26	17	13	31	37	31	25	265
Climatic condition	12	20	20	36	25	13	10	33	23	3	195
Location of building	2	11	5	16	6	3	11	20	13	6	93
Corruption	2	0	6	0	2	2	2	2	5	6	27
<b>Total</b>	<b>164</b>	<b>148</b>	<b>170</b>	<b>157</b>	<b>118</b>	<b>133</b>	<b>132</b>	<b>165</b>	<b>140</b>	<b>145</b>	

The total of 52 out of 82 respondents agreed that crack occur due to poor workmanship during construction stage. Other than that, the lowest total of response from all nine (9) causes of defects is corruption which has the total of 27 responses. Furthermore, there were two (2) types of defects which are peeling paint and dampness. None of the respondents agreed with the statement. This has proved in the previous studies, where defects occur when there was poor in workmanship. However, for corruption the defect rarely happen due to that matter.

#### 4.3 Effect of defect to user

Table 3: Effects of building defects to users

Types Effects	crack	Peeling paint	Roof leaks	Dampness	Corrosion of reinforced steel	Erosion of mortar joint	Blemishes (Honeycomb)	Growth of fungus	Defective plaster rendering	Window defect	Total
Mental	9	13	9	12	6	14	5	14	17	6	105
Health	10	18	20	39	22	20	27	43	20	18	237
Productivity and performance	34	21	36	33	16	19	20	28	20	28	255
Dissatisfaction among occupants	54	57	45	48	46	48	44	51	48	45	486
Death	8	0	0	3	13	10	3	9	3	8	57
<b>Total</b>	<b>115</b>	<b>109</b>	<b>110</b>	<b>135</b>	<b>103</b>	<b>111</b>	<b>99</b>	<b>145</b>	<b>108</b>	<b>105</b>	

Table 3 shows a summary for types of defects and effect of defect toward occupants. The highest respondents that agreed with type of defect that occur in the government building is peeling paint where

the effect toward the occupants is dissatisfaction among the occupants with the total of 57 out of 82 respondents. Other than that, from all the ten (10) types of defects that occur in the government building give the highest effect towards the occupant where the dissatisfaction among the occupant has the highest response compare with the four (4) other effects which is in total of 486 responses. Furthermore, the lowest response among all effects toward the occupants that cause the occurrence of the ten (10) types of defects is death where the total of response is 57. From the literature review, due to all types of defects occur in the building, effect that most likely happen toward the occupants is dissatisfaction among occupants.

## 5.0 CONCLUSION

There are many types of defects that occur to buildings in Malaysia. The defects are caused by a number of factors such as poor workmanship, poor maintenance, and faulty material in descending order. The four most type of defects that occurred in high rise government office building in Kelantan, as perceived by the maintenance staff and the users are cracks, defective plaster rendering, growth of fungus and peeling paint, in descending order. This can be effect toward the satisfaction occupants in the building. Defected buildings with no proper maintenance will cause a higher number of damages and failures as well as disrupting the performance and requirements of that certain building. Hence, precaution steps must be taken to minimize the defects that occur to the office buildings in Kelantan especially in the government building category. To ensure that this type of defect would not be occur in the future projects, a recommendation on finding a solution to avoid the causes of defect should be done to minimize the effect of defects among the occupants.

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