

## THE OCCURRENCE OF BUILDING DEFECTS DURING DEFECT LIABILITY PERIOD (DLP)

N. H. Che Hasim, A. Akhavan Tabassi\*

School of Housing, Building and Planning, Universiti Sains Malaysia,  
11800, Penang, Malaysia

**Article history**  
Received  
21 June 2014  
Received in revised form  
15 June 2015  
Accepted  
1 July 2015

\*Corresponding author  
akhavan@usm.my

### Graphical abstract



### Abstract

Malaysia is a developing country with various projects and it can generate new economy and can also provide benefit to firms and protection to the residents. However, there are some firms have acted unprofessionally by not using the correct specification. Therefore, there have been many complaints about defects on the home purchased, in terms of quality of work and materials used. Defects liability period (DLP) is a term that the contractor is obliged to remedy the defects occurs in this period. The research presented in this paper aims to broaden previous research on defects by analyzing the defects during DLP, which usually lasts 12 months after the handover period, and aimed to identify the common contribution cause of defects to buildings. The data were obtained from site observation and questionnaire from various players in the construction industry of Malaysia. The finding of this study can be used for future references and can improve the effectiveness of managing defects in the future of the industry.

**Keywords:** Building construction, defect, defect liability period, Malaysia

### Abstrak

Malaysia adalah sebuah negara yang membangun dengan pelbagai projek dan ia boleh menjana ekonomi baru dan juga boleh memberi manfaat kepada firma dan perlindungan kepada penduduk. Walau bagaimanapun, terdapat beberapa syarikat telah bertindak tidak profesional tanpa menggunakan spesifikasi yang betul di dalam pembinaan. Oleh itu, terdapat banyak aduan mengenai kecacatan pada rumah yang dibeli, sama ada dari segi mutu kerja dan bahan yang digunakan. Tempoh tanggungan kecacatan (DLP) adalah istilah kepada kontraktor bagi bertanggungjawab untuk membetulkan kecacatan berlaku dalam tempoh ini. Kajian yang dibentangkan dalam kertas kerja ini bertujuan untuk meluaskan penyelidikan sebelum ini mengenai kecacatan dengan menganalisis kecacatan semasa DLP, yang biasanya selama 12 bulan selepas tempoh penyerahan, dan bertujuan untuk mengenal pasti jenis dan punca kecacatan kepada bangunan. Data yang diperolehi daripada pemerhatian dan soal selidik dari pelbagai bidang dalam industri pembinaan Malaysia. Dapatan kajian ini boleh digunakan untuk rujukan masa depan dan dapat meningkatkan keberkesanan pengurusan kecacatan di masa hadapan industri.

**Kata kunci:** Binaan bangunan, kecacatan, tempoh tanggunga kecacatan, Malaysia

© 2015 Penerbit UTM Press. All rights reserved

### 1.0 INTRODUCTION

Defects in buildings give a negative impact on the value of a construction project and a bad perspective towards the responsible developer of the projects, especially residential projects. In terms of

building construction generally there are several parties involved in the decision making of the designer or consultant, contractor or builder and owner. One or all of them might become the source or causes of defects or damage to the building. Among the source of failure of the building are

irregular direction from the project management, lack of information, frequent changing of results, inefficient monitoring and perfunctory also affects damage and defects in the building. [1]

## 2.0 DEFECTS IN BUILDING CONSTRUCTION

A defect is a shortfall in performance and appearance occurring at any time in the life of the product, the element or building in which it occurs. It is also a departure and creation from design requirements where these were not themselves at fault. A defect shall be interpreted as a fault in an element, material or component of a building [2].

### 2.1 Types of Building Defects

The types of defects can be classified as minor and major groups. The major defects are divided into defects by design deficiencies, material deficiencies, construction deficiencies and subsurface deficiencies [3].

- i. Design Deficiencies are the defect which occurs because of the professional teams like engineer and architect did not perform their works properly.
- ii. Material Deficiencies for example window leaks problems can cause failure or performance when using weak materials.
- iii. Construction Deficiencies which is one of the causes of defect occur because of poor quality of workmanship thus defects will appear in the long term.
- iv. Subsurface Deficiencies usually refer to the stability of foundation, especially to house located on hills.

The causes of defect are divided into natural phenomena, design errors, workmanship errors, faulty materials, procedural errors, failure to maintain properly and abuse or misuse of the building. It is important to recognize the cause of defect for further remedy. Moreover, the types of failure and the consequences of failures due to design faults, failed due to poor workmanship, faulty materials, procedures as failure inducers and poor maintenance. [4]

### 2.2 Defect Liability Period (DLP)

Construction contracts generally stipulate a period after Practical Completion in which the contractor has the obligation to rectify all defects 'discovered', for a period depending on an agreement with the developer and is usually at least 24 month, in order to verify that seasonal changes do not affect the works after completion the construction contractor will remain responsible for the remedy of defects in the works [5].

### 2.3 Defects During Defect Liability Period (DLP)

There are limited studies in the literature to show a deep focus on DLP. However, some of the most common defects identified at DLP by others are incorrect or missing grout on tiles, and fixtures and fittings in toilets. In addition, failure to apply second coats of paint onto walls was found to be a problematic issue too. Typical surface/appearance defects included floor or wall unevenness, stains, mess, and small cracks and marks, primarily caused by lack of protection. In areas where fixtures, fittings, and finishes were similar, such as the kitchen and bathroom (where the walls are lined with tiles), and lounge and hallway areas [6].

## 3.0 METHODOLOGY

This study focuses on the defects and causes of defects that occurred during defect liability period. The study began with a literature review to the research topic. Then, site observations were carried out to observe common defects which occurred in Taman Ilmu Indah, Pulau Pinang and Taman Koperat Peradong, Terengganu due to the reason that these sites were still in the defect liability period. The main source of data collection for this study was through questionnaire surveys.

## 4.0 RESULTS AND DISCUSSION

### 4.1 Site Observation

Accordingly, the followings present the collected data from the above sources.

#### 4.1.1 Taman Ilmu Indah, Pulau Pinang

From Figure 1, it can be seen that there were irregular color finishes of tiles in the floor especially located at near to the wall. Figure 2 shows the tiles were not placed tight and closely to each other like in image 1 due to poor of workmanship in installation of the tiles.



**Figure 1** Irregular color finishes of tiles



**Figure 2** Floor finishes are not closely

Cracks occurred on the floor in diagonal state based on Figure 3 Regarding the Figure 4, some of wall tiles were broken.



Figure 3 Cracks in floor

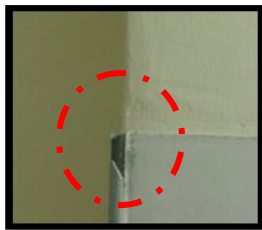


Figure 4 Broken wall tiles

Figure 5 shows the wall surface looks rough or corrugated. The photo in Figure 6 shows the vertical crack on the wall and its located in the kitchen area in this house.



Figure 5 Wall surface rough



Figure 6 Cracks

Figure 7 below shows that the wall was in improper condition because of the paints was peel off and the Figure 8 shows the irregular color of finishes.

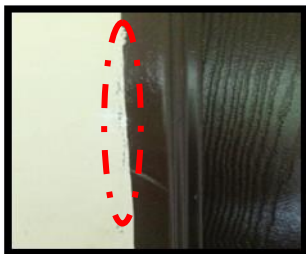


Figure 7 Paints peel off



Figure 8 Irregular colour

Based on Figure 9, it can be observed that the tiles used for roof were broken.



Figure 9 Broken roof tiles

#### 4.1.2 Taman Koperat Peradong, Kuala Terengganu, Terengganu

Figure 10 shows the wall surface was roughed and the crack occurred in the wall. In Image 11 the cracks occurred in the wall either in vertical or diagonal state.



Figure 10 Rough wall Surface and cracks

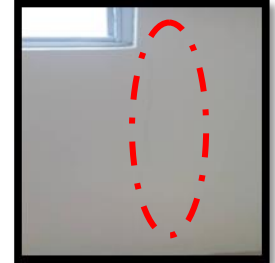


Figure 11 Vertical cracks

Paints peel off the wall as shown in Figure 12 might be due to the surface preparation. Based on Figure 13, irregular color finishes is seen on the wall.



Figure 12 Paints peel

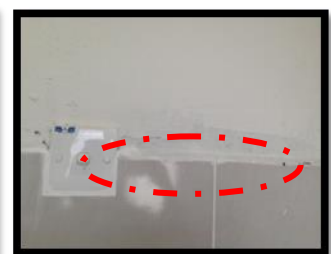


Figure 13 Irregular colour

Figure 14 shows irregular color finishes of tiles and white stains which appeared in the joints of tile. From Figure 15 it can be seen that the ceiling was cracked due to moisture damage from above the ceiling.



Figure 14 Irregular color finishes of tiles

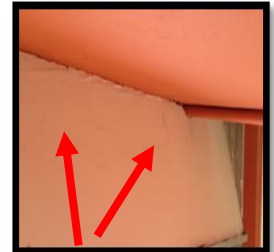


Figure 15 Cracks and broken ceiling

Based on Figure 16 it can be seen that the painting cracked or flaked on the door frame due to the using of low quality paint. Figure 17 shows that the window frame was tilted or damaged due to poor

workmanship during the installation of these windows.



**Figure 16** Cracks / flaking painting in door frame



**Figure 17** Window frame filts/damaged

#### 4.2 Questionnaire Analysis

From the list of defects in structures that are often reported have found that cracks on the column are the highest mean which is 2.64, as shown in Table 1.

**Table 1** Defects in structure

ELEMENTS	DEFECTS	MEAN
STRUCTURE	Cracks column	2.64
	Sediment floor	2.56
	Failure footing	2.14

In terms of defects in floor of the building from the Table 2, the problem of irregular finishes is that the problem defects have the highest mean which is 3.48.

**Table 2** Defects in floor

ELEMENTS	DEFECTS	MEAN
FLOOR	Crack floor	3.02
	Irregular finishes	3.48
	Unplug floor finishes	3.24
	Broken floor finishes	3.19
	Floor finishes not closely	3.25
	Irregular colour finishes	2.92

Table 3 shows defects in the wall of the building that are often reported. The highest defect occurs are cracks on wall. From the list of defects that often occur on the ceiling of the building, the ceiling is damp or leaking defects that often occurs which is having 3.45 of mean values as shown in Table 4.

**Table 3** Defects in wall

ELEMENTS	DEFECTS	MEAN
WALL	Cracks wall	3.64
	wall surface rough	3.24
	paint peel off	3.14
	broken wall tiles	2.97
	unplug wall tiles	2.91
	wall tiles not closely	2.91
	irregular color finishes	2.91

**Table 4** Defects in ceiling

ELEMENTS	DEFECTS	MEAN
CEILING	cracks/broken ceiling	3.03
	damp/leak ceiling	3.45
	uneven ceiling	2.30

Based on Table 5, the most defects occur on doors are the key issues which are damaged or not working which leads to be a problem in most of the main entrance door. Windows too tight is the issue of defects for windows of buildings which shows the most of the respondents agreed with mean value which is 2.97 as shown in Table 6 below.

**Table 5** Defects in door

ELEMENTS	DEFECTS	MEAN
DOOR	damaged door leaf	2.43
	door not tight closed	2.94
	door too tight	2.43
	door frame tilt/damaged	2.94
	key damaged	2.94

**Table 6** Defects in window

ELEMENTS	DEFECTS	MEAN
WINDOW	window not close	2.86
	tight window	2.97
	rubber on window ripped	2.30
	window frame tilt/damaged	2.66
	window lock damaged/malfunctioning	2.30

For defects in the roof, roof leaking with a mean value 3.50 was the main problem in the list of defects related to the roof. This is shown by the mean value in Table 7. Finally for defects in toilet and the bathroom the frequently reported problem was a leaky pipe the most common problems (3.16) as shown by Table 8.

**Table 7** Defects in roof

ELEMENTS	DEFECTS	MEAN
ROOF	roof leaks	3.50
	roof tiles tear off	2.94
	uneven/not flat roof	2.59
	broken/weak trusses	2.28

**Table 8** Defects in toilet and bathroom

ELEMENTS	DEFECTS	MEAN
TOILET AND BATHROOM	toilet/sink clogged	3.04
	toilet pump damaged	3.03
	shower tap damaged	2.84
	leaky pipes	3.16
	sanitary fitting damaged/broken	2.73
	floor trap clogged	2.94

Figure 18 shows the summary of defects commonly occurred in building element during the defect liability period. It can be concluded that the most defect occurs involving floor which has 3.18 of mean values and wall which has 3.10 of mean values.

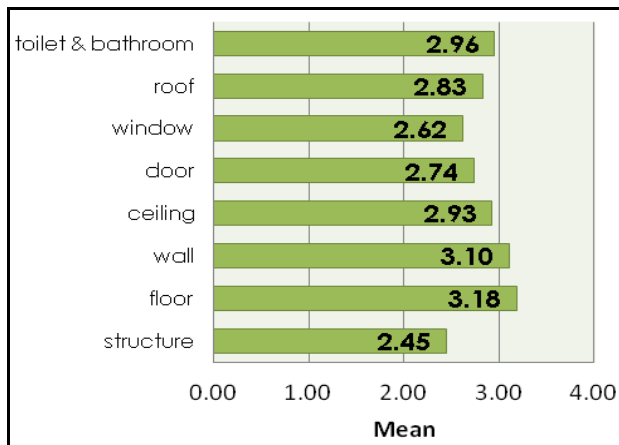


Figure 18 Summary of defects

From Figure 19, it has been found that unskilled worker is the most important factor that contributes to the causes of defects occurred regarding the technical causes. Meanwhile, ineffective planning and scheduling and lack of systematic supervising are the most important causes of defect occurred regarding the management causes as been shown in Figure 20.

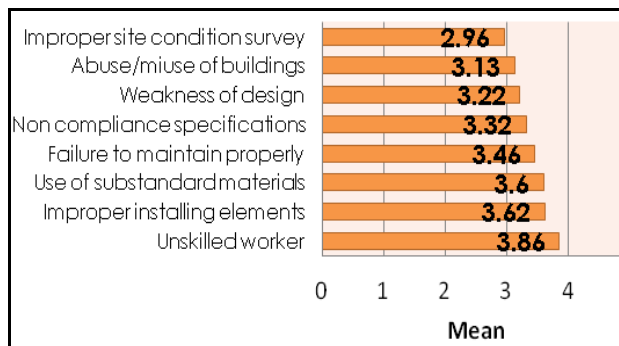


Figure 19 Causes of defect occurs by technical

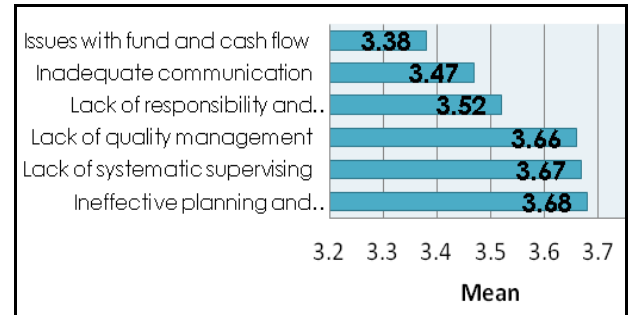


Figure 20 Causes of defect occurs by management

## 5.0 CONCLUSION

The types of defects which commonly occurred during defect liability period were identified, as cracks on wall was the most common defect that can be found on during DLP. From the data collection through questionnaire survey, unskilled worker was ranked as the most significant causes of defect occurred by technical and ineffective planning and scheduling by management factor.

## References

- [1] Dalib M. S. 2010. Isu Kecacatan Pada Bangunan Kediaman Semasa Tempoh Tanggungan Kecacatan. Degree thesis. Universiti Teknologi Malaysia.
- [2] Douglas J. & Ransom B. 2007. *Understanding Building Failure*. 3<sup>rd</sup> edn. Taylor and Francis, London & New York.
- [3] Buys F. & Roux M. 2013. Causes of Defects in South African Housing Construction Industry: Perceptions of Built Environment Stakeholders'. 78-99.
- [4] Crocker. A. 1990. *Building Failures, Recovering the Cost*. 1<sup>st</sup> edn. Oxford London Edinburgh, Boston Melbourne
- [5] Delmon J. 2009. Private Sector Investment in Infrastructure: Project Finance, PPP. The Netherlands.
- [6] Macarulla M., Forcada N., Casals M., Gangoella M., Fuertes A., Roca X. 2013. Standardizing Housing Defects: Classification, Validation, and Benefits. 968-976.