

BUILDING DEFECT:  
CASE STUDY AT TAMAN SERI INDAH, PULAU PINANG

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## ABSTRACT

Malaysia is one of the developing countries and many projects are being implemented. Currently, which some of the projects involve construction of buildings. The construction industry helps to generate the nation's economy as well as providing benefits to construction companies. But some of these firms acted unprofessionally by involving in projects that do not meet the standard especially in housing development. There are a lot of defects to the houses purchased by house buyers especially in terms of material and workmanship. This study is conducted to identify types of building defect occur in building and to identify causes of building defect occur in building. Besides that, study on building defects which occur at case study area also has been done. The resident satisfactions level on their housing after defect liability period also being analyzed. The study area is located at Taman Seri Indah, Penang. The methodology adopted is through literature review and interview with the developer and house buyers. The data are collected through questionnaire that had been distributed to the parties involve in construction and the house buyers at study area. Types and causes of building defect also can be identified according to survey that has been done to people that involve in construction industry. The results also show the poor workmanship is the major contributor to poor quality of construction. In order to minimize the problem, the contactor has to provide workers with necessary experience and skills. The finding of this study can be used for future references.

## ABSTRAK

Malaysia merupakan sebuah negara yang membangun dengan projek-projek baru dan antara projek ini adalah melibatkan projek pembinaan bangunan baru. Industri pembinaan dapat menjana ekonomi dan dapat memberi keuntungan kepada sesebuah firma. Namun begitu, terdapat sesetengah firma ini bertindak secara tidak profesional dengan menceburi bidang ini tanpa mengira spesifikasi yang telah ditentukan. Terdapat banyak aduan yang diterima mengenai kecacatan ke atas rumah yang dibeli, samada dari segi kualiti kerja mahupun bahan binaan yang digunakan. Kajian ini dijalankan bagi mengkaji jenis-jenis kecacatan dan punca-punca yang kecacatan yang berlaku di dalam bangunan. Di samping itu, kepuasan pembeli di kawasan kajian selepas tempoh tanggungan kecacatan juga telah dikenalpasti. Kajian telah dijalankan di Taman Seri Indah, Pulau Pinang. Penggunaan pendekatan kajian literatur dan temubual dengan pemaju dan pembeli rumah akan menjawab objektif kajian yang telah ditetapkan. Data dikumpul melalui kertas kaji selidik yang telah diedarkan kepada mereka yang terlibat dalam industri pembinaan dan pembeli rumah di kawasan kajian dijalankan. Hasil kajian menunjukkan, jenis-jenis dan punca-punca kecacatan ke atas bangunan dapat dikaji. Selain itu, berdasarkan kepada keputusan kajian, ketidakmahiran pekerja merupakan penyumbang terbesar kepada kecacatan dan kualiti bangunan. Sebagai langkah untuk mengurangkan masalah ini, pihak kontraktor dikehendaki menyediakan pekerja yang mempunyai kemahiran tinggi dan juga berpengalaman di dalam bidang masing-masing.

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Now one might ask, how were these defective buildings allowed to be occupied assuming that they have met the requirements of building by-laws and are certified fit for occupation. Many researches had been done to prevent this problem. However, this problem still cannot be solved. If this problem can be solved, it will prevent uncomfortable to customer, reduce the maintenance of building to people which maybe close up million dollars per year.

The quality of the workmanship is another aspect that has been giving contractors a bad name. The Construction Industry Development Board (CIDB) is supposed to wrestle this issue by requiring all relevant laborers or those in a similar trade to undergo a skills training programmer conducted by the CIDB Academy.

Besides, lack of enforcement and supervision also contributed to these defects. However, a good project management team acting on behalf of the client should be able to look after the interest of its clients by making sure the contractors do not compromise on the quality of the workmanship through its resident engineer.

Traditionally, we are only concerned with the financial burden of getting the building erected and we are not made aware of the yearly maintenance cost, the operational cost and replacement cost. At times, the total cost of these three elements might surpass the construction cost (Siti Hamisah Tapsir, 2007).

## 1.2 Problem statement

Building defect is one of the major components of building that needed attention. When a building fails to perform as it should, we immediately look for answers. Is the problem is the result of someone's failure to assemble it properly? Is the problem an act of nature? Was the proper maintenance of the building not performed as it should have been? The answers often depend upon a number of factors: the age of the affected building component, the exact nature of the problem, the presence or absence of human error, or some combination of all three (3).

According to the National Building Agency (1985), defects occur either because of poor design, or low quality workmanship, or because the building was not constructed according to the design, or because it has been subject to factors not allowed for in the design. These primary causes may operate singly or in combination and result in defects indicated by changes in composition of materials; in the construction itself; in the size, shape or weight of materials; or simply in appearances.

As stated in The Star Tuesday May 1, 2007, "Pak Lah orders immediate inspection of government buildings" (Appendix A). Based on this statement, The Prime Minister ordered an immediate inspection of all government buildings for defects referring to a spate embarrassing defects in new government offices - the collapse of a ceiling due to a leaky sprinkler system at the Entrepreneur and Co-operative Development Ministry in Putrajaya.

Besides that, some 170 residents of block four at Taman Jaya, Skudai, are living in fear as the building they occupy may collapse anytime due to severe cracks on the walls and floors. According to one of residents of that block, the problem started three (3) years ago when a wall that divided two (2) ground floor units situated at the left side of the building cracked. She also said, “The fracture was so serious that the bricks fell off, exposing the steel bars used as supports”. More over, residents were also afraid if the building will collapse and don’t know where to move. This statement is stated in The Star Wednesday July 16, 2008 (Appendix B).

More over, as stated in The Star Sunday November 16, 2008, Housing and Local Government Minister Datuk Seri Ong Ka Chuan, said the ministry had received about 250 complaints every year on building defects from buyers. “Many of those defects are caused by defective or poor quality building materials” (Appendix C).

Then, the Bukit Damansara tragedy has open many eyes toward the significant of proper maintenance not just to avoid building defect but the world disaster. As stated in New Straits Times Sunday December 14, 2008, Works Minister Datuk Mohd Zin Mohamed is baffled how rainwater was trapped atop Taman Bukit Mewah which he believes led to the Bukit Antarabangsa landslide.

"I suspect this is caused by humans, so let's not blame Mother Nature," he told Public Works Department (PWD) engineers. He ordered the PWD, which is spearheading a three-month geotechnical, forensics and integrity probe of the slope and building structure stability, to come up with answers on the cause of the landslide and provide recommendations to avert disasters (Appendix D). Will the tragedy of landslide in Bukit Antarabangsa teach us some lesson? Or will it be a platform for people to point fingers at each other, or will it be the stage for people to condemn the work of God?

Because buildings are not single products but rather an assembly of individual parts and components often put together by different contractors; and because the materials used often require periodic maintenance to maintain their projected service lives; and because acts of nature often intervene to test the resistance of building components to leaks and decay, it is usually never exactly clear why a particular building defect occurs. The average person who might sit in judgment one day cannot easily understand, much less unwind the disputes that arise over these enigmatic, technical and often costly problems (Tyler, 2008)

### **1.3 Objectives**

The objectives of carrying out this study are as follow:

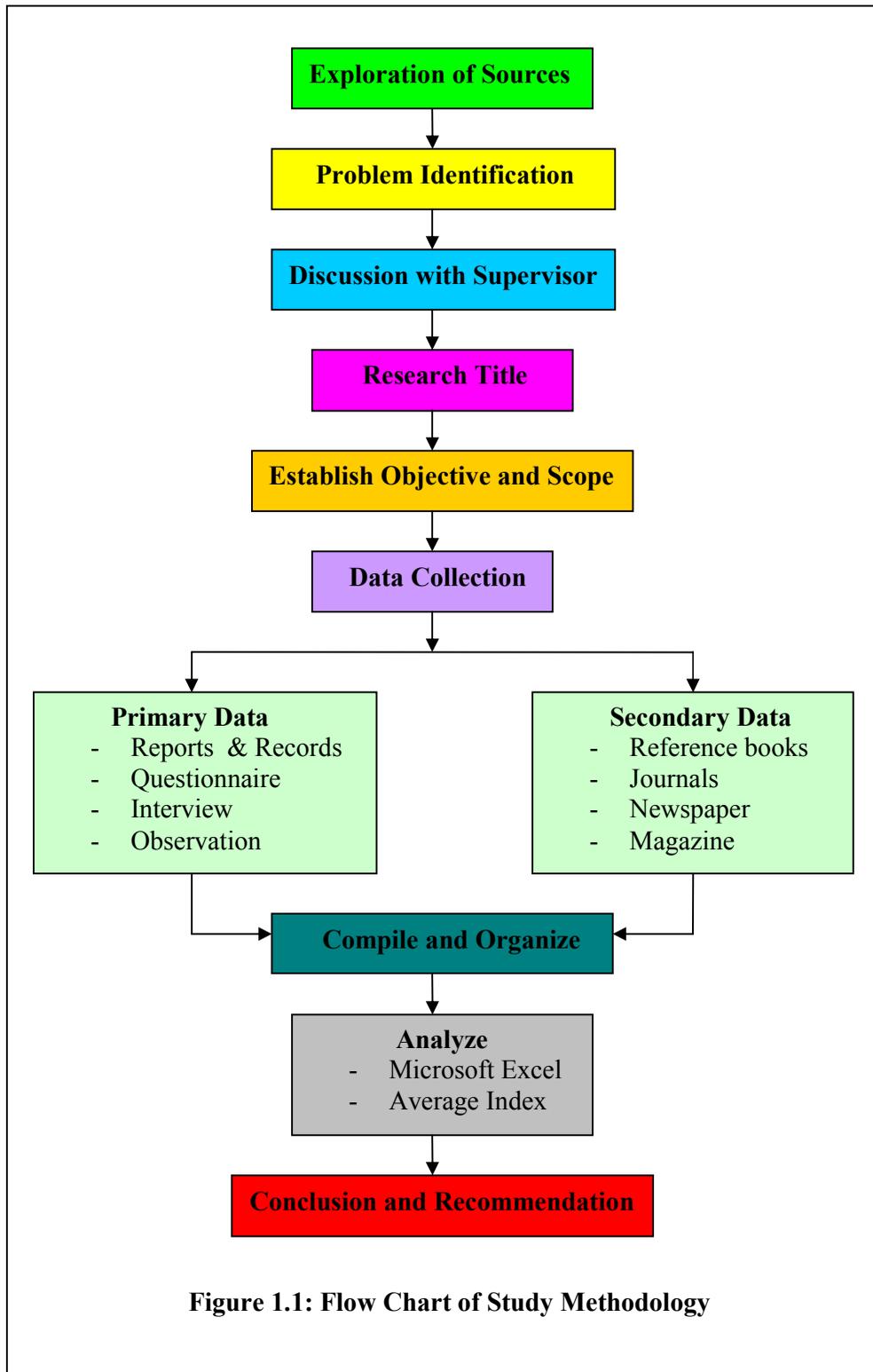
- a) To identify types of building defect occur in building.
- b) To identify causes of building defect occur in building.
- c) To study on building defect occur at case study area.

### **1.4 Scopes of Study**

In relation with the objectives of the study, the scopes of study are:

- a) The study will be conducted at Taman Seri Indah, Kepala Batas, Penang as case study area.
- b) The study will be carried out the data on building defect occur at case study area.
- c) Questionnaire will be prepared and interview will be conducted with the parties involve in construction industry and residents at case study area.

## 1.5 Study Methodology



## **1.6 Significance of the Study**

Building defects are so common that Malaysians do not bat an eye anymore, or one could say they are immune to news of these defects when highlighted. The question is why we must let this issues conquer the development of building? Nothing packs a more costly punch and ruins a project than a construction defect dispute. I choose this title for my study because I personally interested to understand this issue more deeply and get the knowledge by my own way and experience.

When a building suffers defects, the causes of that defect have to be properly identified before any remedial work can be undertaken. The study has been done to assist professionals and students who are involved in building construction to identify types of building defects and its causes. Besides, the readers will know the satisfaction level of residents at my case study area.

A building or construction defect is a defect or deficiency in the design, construction, or materials on a construction project. Broadly speaking, building defects fall into two (2) categories: defects that affect the performance of the structure, and defects that affect the appearance of the structure. From the legal perspective, a building defect is defined in somewhat different terms. Legally, a building defect is a violation of the applicable building code, a violation of the standard of care in the community in which the project is located, or a violation of the manufacturer's recommendations (Robert S.Mann, 2007)

Defect is the nonconformity of a component with a standard or specified characteristic. Defect is used sometimes as a synonym for "failure", but the preferred meaning is to indicate only a deviation from some (perceived) standard that may, but will not necessarily, result in failure (David, 1997)

## **2.2 Types of Defect**

### **2.2.1 Erosion of Mortar Joints**

Basically, the main function of a mortar joint is to even out irregularities of individual blocks, whether they are of stones or bricks. At the same time it provides some adhesion between the blocks. Decayed mortar can be removed forcibly by the use of a mechanical disc or carefully raked out by using a knife or spike manually.

### **2.2.2 Peeling Paint**

Peeling paint usually occurs on building facades, mainly on plastered walls, columns and other areas which are exposed to excessive rain and dampness. Some buildings located near the sea may face a much greater risk once the signs of peeling paint are visible on the exterior walls.

### **2.2.3 Cracking of Walls / Leaning Walls**

Apart from distributing loads from roofs and floors to foundations, external walls may be harmful to a building if they are structurally unsound. Cracks in wall, either vertical or diagonal, are common symptoms of structural instability.

#### 2.2.4 Unstable Foundations

Foundations are a part of a building which distributes loads from roofs, walls and floors on to the earth below. They are structurally important to the permanent of a building and if this is lacking there is no point of spending large sums of money on other superficial restoration work.

#### 2.2.5 Roof Defects

Besides being one of the main structures in a building, roof may act as a weather shield, giving protection to users or occupants from rain and sun. Therefore, it is important to treat any aging roof tiles.

#### 2.2.6 Honeycombing

Honeycombing refers to voids in concrete caused by the mortar not filling the spaces between the coarse aggregate particles. It usually becomes apparent when the formwork is stripped, revealing a rough and 'stony' concrete surface with air voids between the coarse aggregate. Sometimes, however, a surface skin of mortar masks the extent of the defect. Honeycombing may extend some depth into the member. Honeycombing is always an aesthetic problem, and depending on the depth and extent may reduce both the durability performance and the structural strength of the member. Formation of honeycombing is due to the presence of air and bubble at the surface of formwork and results a separation between aggregates and cement mixture. This problem will damage the concrete and more serious attack the reinforcement bar in concrete.

### 2.2.7 Dampness

Dampness can be a serious matter, particularly to buildings located near water sources. Not only does it deteriorate building structures but also damages to furnishings. The main cause of dampness is water entering a building through different routes. Water penetration occurs commonly through walls exposed to prevailing wet wind or rain. With the existence of gravity, water may penetrate through capillaries or cracks between mortar joints, and bricks or blocks before building up trap moisture behind hard renders. Water may also drive further up the wall to emerge at a higher level. Dampness also occurs in walls due to other factors such as leaking gutters or down pipes, defective drains, burst plumbing and condensation due to inadequate ventilation.

## **2.3 The causes of building defect**

### 2.3.1 Erosion of Mortar Joints

Erosions of mortar joints are caused by factor as discussed below which are weathering action, unaccommodated building movement and influence of the freeze cycle or thaw cycle.

### 2.3.1.1 Weathering Action

Weathering is inevitable. Wind and rain erode mortar. Mortars lacking Portland cement are especially vulnerable to weathering from acid rain. On extreme exposures, the mortar joint can be weathered away to a depth of several inches. Usually, weathering of mortar is accompanied by deterioration of masonry.

### 2.3.1.2 Unaccommodated Building Movement

Prior to the 20th century, building movement caused by wind, thermal cycling, and masonry growth due to moisture absorption was poorly understood. Tolerance for movement was not designed into structures. When movement or uneven settling of a building's foundation or walls, occurs, cracking of the masonry, usually at mortar joints will occur. Repeated thermal cycling causes the masonry to expand and contract breaking the bond between the mortar and units.

### 2.3.1.3 Influence of the Freeze/Thaw Cycle

Moisture entering at a cracked or open mortar joint can freeze, expand, and cause a section of the joint and a portion of the surrounding masonry to pop off. This is called spalling. It can be repeated and cause a chain of failures.

## 2.3.2 Peeling Paint

### 2.3.2.1 Water

If water vapor condenses underneath the primer or finish pressure will result causing the paint to lift from the surface and crack. This crack will be very small, but it will allow more water onto the surface and behind the finish. This process accelerates until peeling paint is notified. A possible cause of water infiltration is inadequate or split caulking. Applying the best sealant and using proper caulking techniques can make or break any paint job. An additional area of concern is water vapor in the exterior walls. This can be a major problem with older homes that do not have plastic vapor barriers installed between the framing and drywall or plaster.

## 2.3.3 Cracking of Walls / Leaning Walls

### 2.3.3.1 Settling

Footers (the things foundation sits on) may be built on loose material. It might expand or contract over time because of the weight on it. In any case, settling results from the shifting. So, cracks that develop from that settling will be seeing. Loose backfill that has been placed around the house can also settle and exert extra pressure on the walls, creating the same problem, especially if that backfill is comprised of lots of dense clay materials.

### 2.3.3.2 Deterioration

Deterioration is the gradual adverse loss of physical or chemical properties of a material (American Society 1990; American Concrete 1979) People expect their roofs to need replacing periodically. They also expect to re-paint their home periodically. What they do not realize is that the same thing applies to a foundation. The coatings put on the walls can break down over time, allowing water to come in contact with the concrete. Once that happens, the water begins to affect the strength of the concrete. At that point, discolorations, water, cracks, or bowing of the walls might begin to see.

### 2.3.3.3 Shrinkage

Shrinkage comes from the curing of the concrete or mortar. As it shrinks, cracks develop, usually along mortar lines, but sometimes in the form of vertical cracks. Once there is a crack, it is weaker than the surrounding wall and that leads to the possibility that pressures from outside will begin to bow that wall. Later shrinkage is caused by continuing hydration and carbonation (Rollings, 1993)