# The Classification of Residential Defects (Case Study: Citra Garden Residence in Indonesia)

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**Abstract.** The classification of residential defects (case study: Citra Garden Residence in Indonesia) was studied. This study aims to more satisfied customers. The study begins with the literature review to formulate the classification of house defects. Then classify the defect of house into two, namely the classification of house defects based on period of post hand over, and the classification of house defects based on category of the defects. Further studies followed by dividing the classification of house defects based on period of post-hand over into three parts, namely before hand over period (inviting time), hand over period, and post-hand over period. The next step is to check the complaint report from the customer service in Citra Garden Residence in Indonesia to quantificate the defects of the house. The classification of house defects based on category of the defect (minor, moderate, serious). The next step is also to check the complaint report from the customer is also to check the complaint report from the level minor defect the defects of the house. The results show that complaint hand over in the level minor defect is the highest complaint. Complaint in the serious defect is the lowest complaint.

#### Introduction

One of the human base needed of their life is the requirement of the dwelling i.e a house that has a function as a medium of family building. A house that has built in the residential community is the place to inhabitted and completed with many expedient that is physically base equipment n the residential community such as drink water supply, waste for landfills, electricity, telephone, and the road might be function for the settlement as what it is. The development of the residential always connected with advisability to inhabitted for humanbeeing. The house with advisability to inhabitted could be inspect from the quality of the house. If the quality is good, such as not many defects of the house that has built from the contractor, and it will be distributed comfortable and satisfaction aspect for the customers. But if the quality is not good, then the customers becoming increasingly dissatisfied.

Defects can have a significant impact on construction performance. A defect is not usually an outcome of a single cause, but rather occurs when multiple interrelated causes combine, forming a deffect's pathway. Because defects may occur through numerous pathways, the risk of causes can vary in terms of the number (i.e., frequency) of pathways that they take part in and impact (i.e., magnitude) of the contribution they provide for the formation of these pathways [1]. The most commoon defects identified at handover by customers were incomplete tile grouting and incorrect fixtures and fittings in toilets. In addition, failure to apply second coats of paint to walls was deemed a prblematic issue. Typical surface/appearance defects were found to include floor or wall unevennes, stains, mess, small cracks and marks mainly caused by lack of protection. In areas where fixture and fittings and finishes were a similar nature, such as the kitchen and bathroom, defect types also arose [2].

The defects can happen in the newly house in the residence area, and it will be responsible of the developer, they are for about 6 months guarantee for the leakage work and 3 months for the civil

work (such as painting, wall crack, utility work, and so on). It means that the customer can complaint about their quality of the house that they had bought from the developer. Furthermore, The developer turn over the work of the defects to the contractor. Then, the contractor must do the work according to the complaints report and the customer did not have to pay to the contractor or the developer for the repair work. But, if the defects happened over 3 months for the civil work and 6 months for the leakage work, it will not be responsible of the developer or the contractor. Generally, the customer can complaint for the quality of their house over the guarantee time (3 - 6 months) to the developer, but they have to pay about the work to the worker who will do the defects work.

Generally, The defects of the house happened in the low cost housing. It could be understand, because, usually the material that used to built the house is poor in quality. Besides that, the worker or the contractor who built the house did not have good experience in construction projects. But In fact, The defects of the house happened in the high cost housing (luxurious residence) that have over 1000,000,000 Indonesia Rupiah or 100,000 US Dollars price per-unit of the house. More over, the defects happened on post-handover. The preface survey in Citra Garden Residence find that the defects happened in 3 phase, they are: 1. Before Post-Handover Period or They usually called Inviting Time before Post Hand-Over, 2. Post-Handover Period, and 3. After Post-Handover Period. It indicate that the quality of the contractor's work have to improve to build the house.

The quality in construction management project is the capability to carry out the projects and to produce the product (building) or service according to user regulation, just in time, appropriate to the cost and enable to have much benefits. It means that, to build the good quality of the house, it will be needed the Quality Management System that the contractor have to do. And with the result that the complaint (the defect) of the house will be decreased.

## The Defects of The House in Citra Garden Residence

One of the exclusive residential in West Jakarta, Indonesia is Citra Garden Residence that has been built since 1984 until now. In 2012, The development of the residential project distributed to 3 area, they are Citra 2A, Citra 6, and Citra 7. The table 1 below shows the number of the post-hand over houses to the customers at January to December Period in 2012.

| No    | Area     | The Amount of The Post-Hand Over House |  |
|-------|----------|--|--|
| 1     | Citra 2A | 7                                      |  |
| 2     | Citra 6  | 64                                     |  |
| 3     | Citra 7  | 96                                     |  |
| Total |          | 167                                    |  |

Table 1: The Number of The Post-Hand Over in Citra Garden Residence in 2012

Source: Customer Service, Citra Garden Residence, 2012

Every customer who buy the unit of the house in Citra Garden Residence can complaint about the quality of the house. The Customer Service will give them a form to fill up about the complaint. The complaint is devided in 2 category, i.e., 1. Work Complaint, 2. Material Complaint. The detail of the 2 category of the complaint can be seen in Table 2 below:

| No | Category of The Complaint | Detail of The Category of The Complaint |
|----|---------------------------|---|
| Ι  | Work Complaint            | The Leakage                             |
|    |                           | The Wall                                |
|    |                           | The Painting                            |
|    |                           | The Floor and The Ceramic Wall          |
|    |                           | The Plafond                             |
|    |                           | The Stairs                              |

Tabel 2: Detail of The Category of The Complaint in Citra Garden Residence

|    |                    | The Roof                               |  |  |
|----|--------------------|--|--|--|
| II | Material Complaint | Wood Window & Door Frame               |  |  |
|    |                    | Aluminium Window & Door Frame          |  |  |
|    |                    | Fence Door & Garage                    |  |  |
|    |                    | Woodstone                              |  |  |
|    |                    | Prestone                               |  |  |
|    |                    | Railing/ Grill                         |  |  |
|    |                    | The Floor and The Ceramic Wall Spotted |  |  |
|    |                    | Sanitair Problem                       |  |  |

Source: Customer Service, Citra Garden Residence, 2012

The detail of the category of the complaint above is the data of the defects that will be analyzed. Based on Introduction, so we try to formulate about the problems of this paper:

- 1. What is the classification of house defects in Citra Garden Residence based on data mining of customer complaint?
- 2. How many defects of the house based on period of post-hand over of the house?
- 3. How many defects of the house based on category of the defects?

Then, we try to gain objectives i.e,:

- 1. To formulate the classification of house defects in Citra Garden Residence based on data mining of customer complaint.
- 2. To quantification the defects of the housebased on period of post-hand over of the house.
- 3. To quantification the defects of the house based on category of the defect.

### **Research Approach**

Many literature explain about the defects of the house, and the most comprehensive definition has been provided by Watt (1999) [3] who defined a defect as a "failing or shortcoming in the function, performance, statutory or user requirements of a building, and might manifest itself within the structure, fabric, services or other facilities of the affected building". An immediate way to reduce and/or eliminate post hand-over defects is to ensure that quality controls and inspections are implemented during design and construction (AECCTI, (1993); J. Georgiou (1999) [8]; Chong and Low (2005) [9]; Mils et al. (2009); Forcada et al. (2012) [2,6]). The classification of the defects clustered by 3 categories, i.e., 1. Minor Defects, 2. Moderate Defects, and 3. Serious Defects. Constraint of the defects categories is devided in 3 group, they are: 1. Structural Defects, 2. Non Structural Defects, 3. Utilities Defects. (Usman and Winandi, 2009) [4]. And according to *Ditjen Cipta Karya* (2006) [5], The defects of the house is devided in 2 categories, i.e., :

- 1. Structural Defects (Minor Defects, Moderate Defects and Serious Defects), the defects of structural components such as the colomn, the wall and the sloof.
- 2. Architectural Defects (Minor Defects, Moderate Defects and Serious Defects), the defects of architectural design such as the painting, the wood window and door frame, the plafond.

J. Georgiou (1999) [8] in Macarulla et al (2012) [6] suggests classifying defects into major and minor categories, taking into account the severity, classifying the defect as technical, aesthetic or functional. Technical meaning when the workmanship or material of an element reduces its capacity to fulfill the functional performance of a structure, aesthetic, when the appearance of a material or building element is adversely affected or functional, when a dwelling fails to function in its intended manner.

In this paper, as noted above, the definition of a defect proposed by Watt (1999) is adopted [3]. And Literature Review from several author is purposed as the basis to develop the classification of house defect as shown in Table 3 below.

| No | Title of The Book/ Journal   | Author   | Year |
|----|--|--|------|
| 1  | The Systems of Evaluation<br>and Maintenance of Structural<br>and Arschitectural on Public<br>Building [5] | Composing<br>Team, PU<br>Departement and<br>IICA Bandung   | 2007 |
| 2  | The Analysis of Management<br>of Maintenance Building in<br>Lampung University [4]                         | Kristianto<br>Usman and<br>Restita Winandi   | 2009 |
| 3  | Standardizing Housing<br>Defects: Classification,<br>Validation and Benefits [2, 6]                        | Marcel<br>Macarulla, Nuria<br>Forcada, Miquel<br>Casals, Marta<br>Gangolells, Alba<br>Fuertes and<br>Xavier Roca | 2012 |
| 4  | Analysis of Causes of<br>Construction Defects Using<br>Fault Trees and Risk<br>Importance Measures [1]     | Hamad Aljassmi<br>and Sangwon<br>Han   | 2012 |
| 5  | Assessmentof Residential<br>Defects at Post-Handover [6]   | Nuria Forcada,<br>Marcel2012Macarulla and<br>Peter E.D Love2012  |      |
| 6  | Defects in Affordable<br>Housing Projects in Klang<br>Valley, Malaysia [7]                                 | Hamzah Abdul<br>Rahman, Chen<br>Wang, Lincoln<br>C.Wood, You<br>Min Khoo   | 2012 |

The Research Approach of this paper can be seen in this figure 1 below:



Figure 1. Research Approach

In order to get easier to classified the defects of the house, we can use the form like table below:

| NO | The Kind<br>of The<br>Defect | The Level of<br>The Defect | The Time of The<br>Defect | Component<br>of The Defect | Category of<br>The Defect |
|----|------------------------------|----------------------------|---------------------------|----------------------------|---------------------------|
| 1  | Structural                   | Minor                      | Before Hand Over          |                            |                           |
|    |                              |                            | Hand Over                 |                            |                           |
|    |                              |                            | Post Hand Over            |                            |                           |
|    |                              | Moderate                   | Before Hand Over          |                            |                           |
|    |                              |                            | Hand Over                 |                            |                           |
|    |                              |                            | Post Hand Over            |                            |                           |
|    |                              | Serious                    | Before Hand Over          |                            |                           |
|    |                              |                            | Hand Over                 |                            |                           |
|    |                              |                            | Post Hand Over            |                            |                           |
| 2  | Non                          | Minor                      | Before Hand Over          |                            |                           |
|    | Structural                   | Structural                 | Hand Over                 |                            |                           |
|    |                              |                            | Post Hand Over            |                            |                           |
|    |                              | Moderate                   | Before Hand Over          |                            |                           |
|    |                              |                            | Hand Over                 |                            |                           |
|    |                              |                            | Post Hand Over            |                            |                           |
|    |                              | Serious                    | Before Hand Over          |                            |                           |
|    |                              |                            | Hand Over                 |                            |                           |
|    |                              |                            | Post Hand Over            |                            |                           |

#### **Data Collection**

From the customer complaint forms in Citra Garden Residence in 2012, data was collated. It is similar to J. Georgiou (1999) [8], Mills et al. (2009) and Forcada et al. (2012) [2, 6]. These databases contained about the house and the detail of the category of the defects that post hand over in 2010, 2011 and 2012. Furthermore in this paper, it will be attention for the house that post hand over in 2012. But not all customer who buy the house in Citra Garden Residence complaint about their house. Usually the customer will complaint if they will be occupied the house, and the customer will not complaint if they will not be occupied the house. It could be understand, because, they buy the house in order to invest their money and they will sell the house later.

The detail of the customer complaint that post hand over in 2012 can be seen in Table 4 below:

| No | Area    | The Month    | The Number of | The       | The        |
|----|---------|--------------|---------------|-----------|------------|
|    |         | of Post Hand | The Post Hand | Number of | Percentage |
|    |         | Over         | Over          | The House | of The     |
|    |         |              |               | of The    | House of   |
|    |         |              |               | Complaint | The        |
|    |         |              |               | 1         | Complaint  |
| 1  | Citra   | January      | 1             | -         | -          |
|    | 2A      | February     | -             | -         | -          |
|    |         | March        | -             | -         | -          |
|    |         | April        | 1             | -         | -          |
|    |         | Mei          | 2             | -         | -          |
|    |         | June         | 1             | -         | -          |
|    |         | July         | 1             | -         | -          |
|    |         | August       | -             | -         | -          |
|    |         | September    | -             | -         | -          |
|    |         | October      | -             | -         | -          |
|    |         | November     | 1             | -         | -          |
|    |         | December     | -             | -         | -          |
|    | TOT     | AL           | 7             | -         | -          |
| 2  | Citra 6 | January      | 3             | 2         | 66,67%     |
|    |         | February     | 5             | 1         | 20%        |
|    |         | March        | 8             | 4         | 50%        |
|    |         | April        | 16            | 7         | 43,75%     |
|    |         | Mei          | 5             | 2         | 40%        |
|    |         | June         | 12            | 6         | 50%        |
|    |         | July         | 3             | 3         | 100%       |
|    |         | August       | 3             | 2         | 66,67%     |
|    |         | September    | -             | -         | -          |
|    |         | October      | 4             | 3         | 75%        |
|    |         | November     | 2             | 2         | 100%       |
|    |         | December     | 3             | -         | 0%         |
|    | ТОТ     | AL           | 64            | 32        | 50%        |
| 3  | Citra 7 | January      | -             | -         |            |
|    |         | February     | -             | -         |            |
|    |         | March        | 2             | -         | 0%         |
|    |         | April        | 13            | -         | 0%         |
|    |         | Mei          | 6             | 1         | 16,67%     |

Table 4 : The Detail of The Customer Complaint that Post Hand Over in 2012

|     | June       | 10 | -  | 0%     |
|-----|------------|----|----|--------|
|     | July       | 9  | 3  | 33,33% |
|     | August     | 2  | -  | 0%     |
|     | September  | 8  | -  | 0%     |
|     | October    | 22 | 14 | 63,64% |
|     | November   | 10 | 4  | 40%    |
|     | December   | 14 | 8  | 57,14% |
| ТОТ | <b>TAL</b> | 94 | 30 | 31,91% |

The Statistical Package for The Social Sciences for Windows (Version 16) was used to analyzed these data bases.

## **Results and Discussion**

Based on the customer complaint report in 2012 (from january – december), an analysis of the defect data revealed according to the number of the complaint after the classification process using the form as described in some graphic below:

I. The Level of The Defect (Minor, Moderate, Serious)



Figure 2.Complaint versus the level of the defect for structural defect

Minor Defect 99 Complaint Before Hand Over, 114 Complaint Hand Over, 7 Complaint Post Hand Over Moderate Defect 2 Complaint Before Hand Over Serious Defect 0 Complaint



Figure 3.Complaint versus the level of the defect for non structural defect

Minor Defect

48 Complaint Before Hand Over, 84 Complaint Hand Over, 5 Complaint Post Hand Over

Moderate Defect

69 Complaint Before Hand Over, 79 Complaint Hand Over, 4 Complaint Post Hand Over Over Serious Defect

0 Complaint

II. The Time of The Defect Happen (Before Hand Over, Hand Over and Post Hand Over) A. Structural Defects



Figure 4.Complaint versus the time of the defect happen for structural defect

Before Hand Over 99 Complaint Minor Defect, 7 Moderate Complaint Defect <u>Hand Over</u> 114 Complaint Minor Defect, 18 Moderate Complaint Defect <u>Post Hand Over</u> 7 Complaint Minor Defect, 2 Moderate Complaint Defect

## B).Non Structural Defect



Figure 5.Complaint versus the time of the defect happen for non structural defect

<u>Before Hand Over</u>
48 Complaint Minor Defect, 69 Moderate Complaint Defect
<u>Hand Over</u>
84 Complaint Minor Defect, 79 Moderate Complaint Defect
<u>Post Hand Over</u>
5 Complaint Minor Defect, 4 Moderate Complaint Defect

Figure 2 is show complaint versus the level of the defect for structural defect. Figure 3 is show complaint versus the level of the defect for non structural defect. Figure 4 is figure about complaint versus the time of the defect happen for structural defect. Complaint versus the time of the defect happen for non structural defect is shown in figure 5. From figures 2-5, we concluded that complaint hand over in the level minor defect is the highest complaint. Complaint in the serious defect is the lowest complaint.

## Conclusion

The classification of residential defects (case study: Citra Garden Residence in Indonesia) was studied. This study aims to more satisfied customers. The study begins with the literature review to formulate the classification of house defects. Then classify the defect of house into two, namely the classification of house defects based on period of post hand over, and the classification of house defects. The results are as follows, complaint hand over in the level minor defect is the highest complaint. Complaint in the serious defect is the lowest complaint.

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