

The Major Types of Defects and Structure Failures at Low-cost Flats Building in Taman Tun Aminah

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Abstract

Building defects and structural failures are defects or flaws in a structure's materials, design, or construction that jeopardise its structural integrity, safety, or functionality. Building defects and structural failures are especially common in low-cost flats caused by financial and resource limitations, which frequently result in the use of inadequate materials and construction techniques. The situation is rendered further by inadequate supervision which puts resident's living conditions in risk. Ensuring low-cost flats satisfy acceptable standards of quality and safety is the foremost concern in order to provide low-income families a safe and healthy environment. This study aims to identify the types of building defects as well as rank the types of defects based on the severity level and investigate potential contributing factors for construction defects and structural failures in Taman Tun Aminah, low-cost flats. The questionnaire was reviewed by specialist in building construction before distributed to the residents to responded. Analysis of result by SPSS Version 17.0 was used to succeeded in discovering the most severe defect in the flats, which is dampness in the wall and insects and pest infestation, which affects the majority of the houses in the flats. Following that, cracks in wall and roof leaking are also categorised as very severe cracks in flats. Based on previous research, it has been shown that low-quality building materials are the primary cause of building defects, while there are other contributing factors as well. This study is expected to assist the building industry identify deficiencies and raise the quality of low-cost flats for the welfare and safety of the residents.

1. Introduction

Building defects are flaws in the construction, insufficient planning, or the aftermath of natural disasters that can affect the structure of a building and diminish its lifespan. The survey of the existing literature describes defects as poor-quality construction (or design) that leads to failure to meet user expectations [1]. It defines structural failure as high stresses triggering the component failure or collapse [2]. Examples of defects include dampness, as different types of cracks, foundation failures, termite attacks on timber, faults in piping and sewerage, corrosion, poor insulation, clogged drains, electrical hazards, pest infestations, squeakiness of floors, peeling of paint, defects in staircases, water leakage, and poorly executed finishing [3][4][5][6].

A major problem that has far-reaching consequences for the construction sector is the ongoing problem of defects in low-cost buildings or flats in Malaysia. The previous case study documents examines diverse causes of building defects across materials and environmental factors. Issues in cementitious materials stem from moisture and carbonation. Timber experiences decay influenced by humidity and fungal growth. Metal structures face mechanical failures under varied loads, while soils exhibit complex behaviors affecting foundation stability. Furthermore, the reasons for such failures include the insufficient thickness or quality of paint resulting in peeling paint failures, drainage failures leading to moisture penetration, and bonding joint failures from freeze-thaw cycling [7][8][9]. The dearth of thorough studies focused on low-cost flats in Malaysia emphasizes how urgent is this inquiry.

The objective of this study is to identify and prioritize types of building defects in low-cost flats in Taman Tun Aminah based on severity, and to propose recommendations for mitigating these issues through comprehensive data collection and analysis. The study covers an investigation into building defects in low-cost flats in Taman Tun Aminah, focusing on identifying defect types, evaluating causes, and proposing mitigation strategies through thorough data collection and analysis. The study employs physical inspections, structural assessments, surveys, interviews with occupants, and examination of relevant records and documents to comprehensively investigate building defects in low-cost flats in Taman Tun Aminah. The research seeks to make contributions in policy and practice toward the improvement of building practices and regulations and, through such contributions, toward the improvement of the structural safety and quality of low-cost housing. In conclusion, the findings from this study will provide valuable insights into addressing and mitigating building defects in low-cost flats in Taman Tun Aminah, thereby contributing to improved safety and quality of residential structures in Malaysia.

2. Research Methodology

2.1 Research Method

The research strategy for this paper is to approach the causes of building defects in low-cost flats in Taman Tun Aminah through several different methods. Quantitative methods included an exhaustive physical inspection of the building structure, as well as a survey of building-related problems using a questionnaire. The questionnaire collected quantitative data on the reported experiences of residents on building-related causes. It ranked causes in two ways: in terms of their frequency and terms of their objective severity. The study plan to use the resulting data to provide numerical estimates of the prevalence and consequences of different types of defects. In the process of collecting this data using SPSS and Microsoft Excel software, the study employed statistical techniques. In addition to the data collection through the survey, our study includes a review of the literature on building defects in low-cost flats. This review provides us with a research framework. Our research is therefore simultaneously firmly grounded in a systematic literature review and expected to be quite new, as we attempt to apply it to the case of low-cost flats in Taman Tun Aminah.

2.2 Analysis Data

Fig. 1 shows the flow chart of research methodology. The study area is to investigate building defects in low-cost flats in Taman Tun Aminah in Johor by distributing questionnaires that match our objectives. The data will be listed down to make it easier to analyze. The validity and correlation of data are analyzed using approved software such as SPSS.

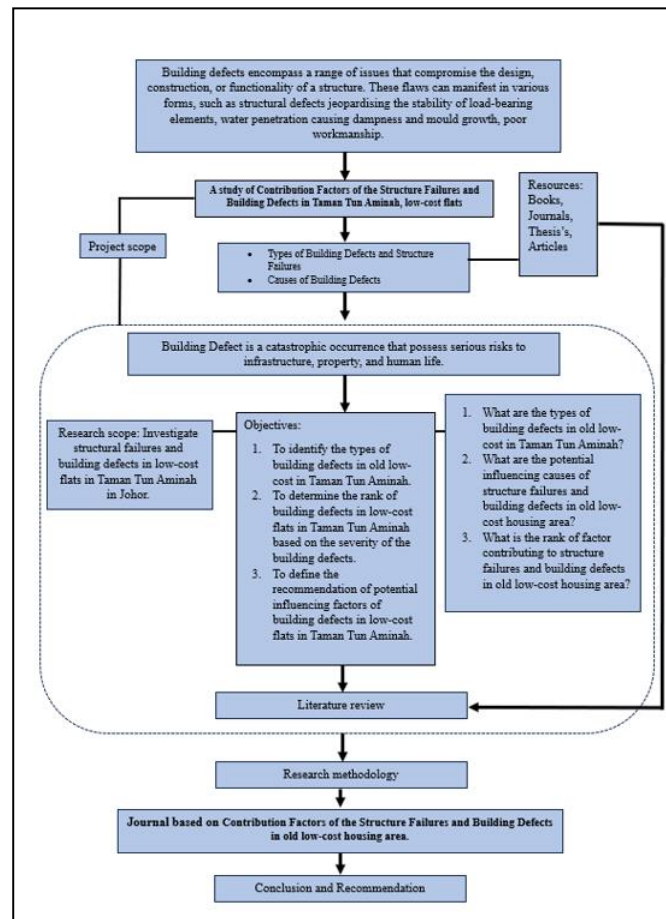


Fig. 1 Research Flowchart

Fig. 2 shows the location chosen for the research. The study area is limited to several blocks, which are Blok 5 to Blok 20, which is located at Jalan Pendekar, and Blok 40 to Blok 68, located at Jalan Perkasa.



Fig. 2 Study area: Taman Tun Ungku Tun Aminah flats

2.3 Data Processing

The Statistical for Social Science (SPSS) program was used to analyze the gathered data. IBM created the statistical software suite SPSS Statistics, which is used for business intelligence, multivariate analysis, advanced analytics, data management, and criminal investigations. The SPSS output is used to produce frequency analysis, and the average index method is then used to analyze the frequency analysis results. Tables, bar charts, and pie charts will all be used to display the frequency and percentage.

3. Results and Discussion

3.1 Type and Ranking of building defects

The histogram of defect types displays a bell-shaped curve with a mean of 2.81 which indicates a normal distribution. 1.42 is the lowest possible severity level rating while 4.37 is the highest possible value. The lowest value indicates that certain faults were either not present at all or were only classified as minor ones, while the maximum value indicates that the majority of defects have high severity. The histogram for types of defects shown in Fig. 3. The descriptive statistics present an overview of the fundamental characteristics of the dataset and a clear picture regarding its variability, central tendency, and distribution. For this analysis, the mean and standard deviation are important values to take into account. The standard deviation shows the range of scores around the mean, whereas the mean number shows the respondents' average score on each item. The descriptive statistics for types of defects is shown in Table 1.

Table 1 Descriptive statistics for type of defects

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
B1	302	1	5	3.40	.952
B2	302	1	4	1.80	.637
B3	302	1	5	3.52	.963
B4	302	1	5	3.52	.957
B5	302	1	5	3.02	.915
B6	302	1	5	2.98	.983
B7	302	1	5	2.86	1.112
B8	302	1	5	1.75	.694
B9	302	1	5	3.24	1.096
B10	302	1	5	3.08	1.127
B11	302	1	5	2.31	.905
B12	302	1	5	2.43	.843
B13	302	1	5	2.86	1.074
B14	302	1	5	3.03	.943
B15	302	1	5	3.30	1.010
B16	302	1	5	3.08	1.046
B17	302	1	5	3.09	.921
B18	302	1	5	3.04	1.085
B19	302	1	1	1.00	.000
Valid N (listwise)	302				

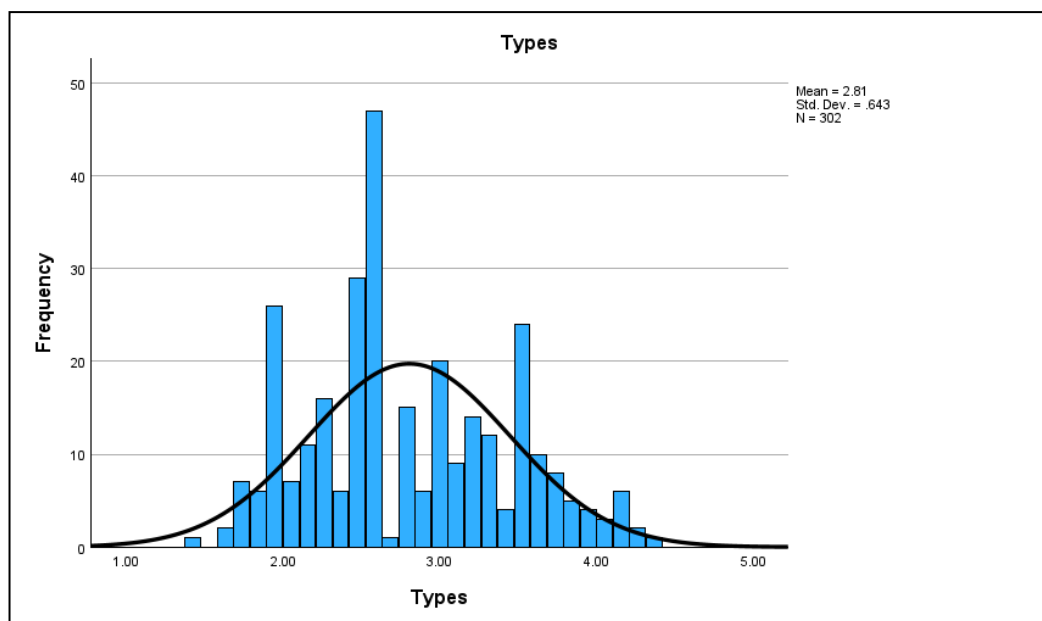


Fig. 3 Histogram for types of defects

The rank of building defects in low-cost flats in Taman Tun Aminah was determined based on the severity of the building defects according to the data analysis using SPSS. The ranking of types of defects is shown in ascending order based on the mean value of each defect in Table 2.

Table 2 *Ranking of type of defects*

Type of Defects	Ranking
Dampness in wall	1
Insects and pest infestations	2
Cracks in wall	3
Roof leaking	4
Clogged drain	5
Small holes and cracks in staircase	6
Waterproofing defects	7
Improperly constructed staircases (steps of varying heights)	8
Piping Sewerage Defect	9
Structure Defect	10
Corrosion and Rust	11
Poor Insulation	12
Peeling paint	13
Finishing defect	14
Electrical defects	15
Cracks in door	16
Timber defect	17
Squeaking of Floor	18

3.2 Recommendation of potential influencing factors of building defects

The data and result of analysis obtained from this study used to determine the potential influencing factors of building defects in low-cost flats. The determination of contributing factors is based on a previous study to ensure the reliability of the result. Low quality construction materials is the main factor for the building defects because low-quality building materials ensure poor installation and no longevity. The rank of common contribution factors to building defects and structural failures of an earlier case study is shown in Table 3.

Table 3 *Rank of common contributing factors to building defects*

Contribution Factors	Rank
Construction Materials	1
Faulty During Construction	2
Corruption	3
Lack of Supervision	4
Faulty Design	5
Climate Condition	6
Lack of maintenance	7
Building Type and Change in Use	8
Location of Building	9

4. Conclusion

This final chapter summarizes the research on categorizing and ranking of building defects in Taman Tun Aminah low-cost flats, suggesting factors affecting such defects. The research objectives were fulfilled through interview surveys, physical inspection, analysis of the data obtained, and literature reviews recommended for further studies.

The objectives of this research study have been achieved that is to identify the types of building defects and structure failures in low-cost flats in Taman Tun Aminah and to determine the rank of building defects and structure failures in low-cost flats in Taman Tun Aminah based on the severity of the building defects. Furthermore, to define the recommendation of potential influencing factors of building defects and structure failures in low-cost flats in Taman Tun Aminah.

The investigation revealed that building defects and structural failures are primarily caused by dampness in walls, insects and pest infestations, cracking, roof leaking, clogged drain, small holes and crack in staircase, waterproofing defects, improperly constructed staircases, piping sewerage defect, and structure defect. These are the top 10 defects that can be found in Taman Tun Aminah low-cost flats. Defects and failures are significant because they can physically affect the building appearance as well as damage the building structure. These defects compromise the safety and structural integrity of buildings, posing risks to occupants. Understanding the types and causes of these defects is crucial for developing effective maintenance and prevention strategies.

Several recommendations can be proposed to reduce defects in buildings for future studies: investing in research and innovation to develop new materials and construction methods that minimize defects, exploring potential solutions specific to building defects in Malaysia, examining the role of sustainable building practices in reducing defects, and investigating the impact of climate and environmental factors on building defects.

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Conflict of Interest

The authors declare that there is no conflict of interests regarding the publication of the paper.

Author Contribution

The author confirms sole responsibility for the following: study conception and design, data collection, analysis and interpretation of results, and manuscript preparation: Eswari Kesavan, Jashnavissri Uigneswaran, Kavithra Krishnan, Salman Salim. All the authors reviewed the results and approved the final version of the manuscript.

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