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# THE EMPIRICAL FINDINGS ON THE STUDY OF UNDERSTANDING BUILDING FACILITIES AND DEFECTS IN LOW-COST HOUSING: IMPLICATIONS FOR RESIDENTS

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## Abstract

Due to urbanisation, people from rural areas are migrating to major cities in developing nations. As a result, the demand for housing in urban areas becomes higher. This higher demand resulted in an increase in urban house prices, which caused low-income people to be unable to afford the house prices. In Malaysia, the government has endeavoured to promote and provide low-cost housing for the low-income group to address the people's housing needs since independence. However, it is not enough to provide low-cost housing in terms of quantity alone; the quality of life of housing residents is also an issue that needs to be emphasised and focused on in Malaysia's low-cost housing development. This study investigated the factors affecting low-cost housing residents' satisfaction, such as planning policy, design principles, interaction with neighbours, user comfort, and building services in Selangor, Malaysia. A quantitative method was employed, and 172 questionnaire responses were collected from the low-cost housing residents. In this study, several issues and defects related to low-cost housing performance were identified and played a vital role in helping relevant authorities develop practical performance standards for successful low-cost housing development strategies.

Keywords: Building services, Design principles, Interaction with neighbours, Low-cost housing, Planning policy, Resident's satisfaction, User comfort.

## 1. Introduction

Following independence in 1957, Malaysia was grappling with post-independence economic hardships and inequalities; low-cost housing was a topic that the government prioritised. The implementation of the First Malaysia Plan (1966-1970) aimed to improve living conditions for all Malaysians, particularly the impoverished in rural and urban areas, and promote economic growth. In this case, the concept of "low-cost housing" has been formally launched to promote the well-being of lower-income groups [1]. The First Malaysia Plan aimed to build 30,000 low-cost housing units between 1966 and 1970. Among the 30,000 targeted units, 21,700 low-cost housing units have been constructed throughout the First Malaysia Plan.

In 1971, the Malaysian government announced the New Economic Policy (NEP), which sought to reorganise Malaysian society and end poverty for all Malaysians. It was intended for the housing sector to take the lead in promoting economic expansion [2]. For instance, the government established a financing scheme through Malaysia Building Society Bhd (MBSB) for those constructed units priced under RM 20,000 as low-cost units in the Third Malaysia Plan (1976-1980).

Besides, the Housing Developers Association founded HDA Perumahan Berhad as a housing corporation with the exclusive goal of constructing low-cost housing. Throughout the five years of this Malaysia Plan, 26,250 low-cost houses have been constructed. During the Fourth Malaysia Plan (1981-1985), new guidelines were introduced by the Malaysian government. Constructing low-cost housing was no longer the sole responsibility of public developers. Private developers that previously focused on serving populations with middle or higher monthly incomes are mandated to ensure that 30% to 50% of the units in any proposed housing project will be low-cost [3].

A more precise definition of low-cost housing has also been developed in this Malaysia Plan. Low-cost housing is characterised by selling price, target population, type of housing, and standard design (Table 1). Through a set of policies enhancement by the Malaysian government, the low-cost units delivered in the Fourth Malaysia Plan achieved 95,096 units, three times as many as in the previous Malaysia Plan.

**Table 1. Definition of low-cost housing in Malaysia.**

| | |
|---|---|
| **Selling Price** | Not exceeding RM 25,000 per unit |
| **Target Groups** | Household with income which lesser than RM 750/ month |
| **Type of Housing** | Flats, Single storey terrace or detached house |
| **Standard of Housing Design** | 550-600 square feet built up area (with two bedrooms, a living room, a kitchen and a bathroom-cum-toilet) |

Due to the high cost of land, expensive development and infrastructure expenses, rushing off the developers and substandard of low-cost housing, the standardised selling price of low-cost housing in Malaysia was adjusted in 1998 to meet the current housing market. Depending on the location, type of housing, and household income, the cap of the low-cost housing price has been increased from RM 25,000 to RM 42,000 (Table 2). By raising the ceiling price of low-cost housing, housing developers will also be encouraged to offer more affordable housing to the public.

**Table 2. Prices of low-cost housing.**

| House Price per Unit | Location (Land price per square meter) | Monthly Income of Target Population |
|---|---|---|
| **RM 42,000** | City Centre and Urban (RM 45 and above) | RM 1,200 – RM 1,500 |
| **RM 35,000** | Urban and Sub-urban (RM 15-RM 44) | RM 1,000 – RM 1,350 |
| **RM 30,000** | Small Township and Sub-rural (RM 10-RM 14) | RM 850 – RM 1,200 |
| **RM 25,000** | Rural (below RM 10) | RM 750 – RM 1,000 |

As prices changed, so did the design standard of low-cost housing (Table 2). The main differences between the previous and revised design standards are (1) the minimum number of bedrooms in a unit changed from two to three; (2) the bathroom and toilet need to be separated; and (3) the additional provision of a drying area in a multi-storey building (flat) [4].

## 1.1. Problem statement

Malaysia's efforts to provide an adequate supply of affordable housing significantly contribute to ensuring shelter for lower-income families. However, focusing solely on quantitatively increasing the number of low-cost housing units is not enough to ensure the success of housing programmes. Other factors that impact residents' needs also play a crucial role. The ignorance of the factors influencing residential satisfaction can be considered as one of the reasons for the failure of numerous housing projects [4].

The location, upkeep, sanitary system, building materials utilised, construction quality, amenities offered, location, and several social issues are among the many concerns residents voice about the quality of low-cost housing in Malaysia [5]. It is necessary to assess the level of satisfaction among residents of low-cost housing to have a comprehensive understanding of the perception of low-cost housing residents towards the quality of units provided. The key reasons contributing to satisfaction and dissatisfaction can be determined throughout the evaluation. The findings of this study will be useful as a reference for relevant authorities in improving low-cost housing policy decision-making.

## 1.2. Research questions

In order to assess living conditions and satisfaction levels in affordable housing, pinpoint important elements influencing tenants' experiences, and direct improvements, this research is crucial. Consequently, two research questions are formulated based on these problem statements.

Research Questions:

- What is the satisfaction level of low-cost unit residents?
- What are the key factors that contribute to residents' satisfaction and dissatisfaction?

## 1.3. Aim and objectives

To study the current living conditions of housing and to understand the residents' satisfaction with low-cost housing.

The objectives of the study are as follows:

- To assess the satisfaction level of low-cost unit residents
- To identify the key factors that contribute to residents' satisfaction and dissatisfaction in terms of living conditions in low-cost housing.

## 2. Literature Review

### 2.1. Residential satisfaction

User satisfaction is defined as a comparison of what occurred during a service encounter and what the user anticipated occurring [6]. It is a psychological emotion that emerges from evaluating what was expected with what was obtained [7]. Based on the "psychological construct theory" concept by Glaster [8], residential satisfaction evaluates how closely a resident's current residence, and the quality of their surroundings resemble their ideal home. By reviewing the existing literature, factors that influence residential satisfaction can be divided into five broad categories, which include (1) planning policy, (2) design principles, (3) interaction with neighbours, (4) user comfort, and (5) building services.

### 2.2. Planning policy

Due to Malaysia's high pace of urbanisation over the past few decades, the higher housing demand in the city centre is one of the reasons for higher housing prices. People find it unaffordable to buy a home in or close to the city centre since the prices offered are typically too high for them, especially for low-income families. Therefore, they would need to stay further from the city centre, where the dwelling is generally more affordable. Despite a decrease in housing costs, commuting costs are rising because it takes a longer distance to get to the workplace. Reduced job productivity results in higher transportation costs, longer commute times, and weariness [9].

### 2.3. Design principles

One of the most prominent issues of low-cost housing mentioned in the existing literature is the issue regarding the recreational areas, including playgrounds and multipurpose halls, for community and recreational activities [10]. Low-cost unit residents commonly received complaints regarding the availability and quality of the public facilities and the walking distance from their units to the recreational areas [5]. Other than the public open space, the indoor environment is also a problem that impacts the quality of life of the low-cost housing residents.

According to Ghazali et al. [11], more than two-thirds of low-cost housing occupants share 650 square feet of living space with three to ten other individuals per housing unit. As a result, the residents experienced difficulties in unwinding, feelings of insecurity, and were unable to take the initiative at home due to the limited, less privacy and inadequate spaces [11]. Moreover, Wahi et al. [12] found that issues regarding lifting are the most significant problems that most residents have met. Despite the inadequate lift size and lift numbers, which inconvenience residents' lives, improper maintenance also makes residents lose faith in lifts of buildings. Other issues regarding the housing circulation area, such as safety walking under uncovered corridors, staircase conditions, corridor spaces, and corridor lighting also contribute to most of the dissatisfaction of the occupants [12].

## 2.4. Interaction with neighbours

Housing unit is not the only factor that may influence the resident's satisfaction; the surrounding community is also considered very important to residents to have a satisfactory living experience. According to Zainal et al. [10], social support is defined as help from neighbours and is one of the key factors influencing living quality and experience. They found a negative relationship between the household size and the assistance received, which means the greater the household size, the lower the residents' assistance. The study team deduces that this is because of the belief in society that a larger family will be more self-sufficient or self-supporting.

Karim [5] claims that disputes between residents are a regular occurrence in practically all low-cost housing. This has become one of the reasons that caused the intention of low-cost residents to move out of their current housing [5]. Additionally, noise and littering of rubbish are also the complaints that low-cost housing residents have lodged.

## 2.5. User comfort

The quality of the indoor environment needs to be emphasised in affordable housing, particularly in high-density housing and small inter-building areas [13]. The invasion of privacy created by the neighbour's view inside the house made most residents avoid opening their windows and main door most of the time. Therefore, proper ventilation and natural daylighting cannot be fully utilised, which results in a lack of comfort [14]. Additionally, poor indoor air quality is mainly brought on by energy released from appliances and household activities [14].

In addition to the discomfort, poor indoor air quality also harms the occupants' health [15]. Other than indoor environment quality, residents' satisfaction also highly depends on thermal and acoustic comfort. As per Fatt et al. [16], every respondent, irrespective of their unit's level, reported experiencing temperature discomfort on a daily basis. Despite the planted trees appearing to shade the sunshine, the tropical temperature of Malaysia causes discomfort for the occupants owing to heat. Besides, noise from heavy traffic due to inadequate acoustic proofing is also one of the most troublesome circumstances for the occupants. Out of all the characteristics pertaining to the surrounding environment, two-thirds of the respondents thought that the noisy environment had lowered their quality of life [10].

## 2.6. Building services

To achieve the government's goal of guaranteeing that all Malaysians, particularly those from lower-income backgrounds have access to adequate housing, the public sector was no longer the only one responsible for constructing and providing affordable housing; private developers were also required to allocate at least 30% of the proposed projects would be the low-cost units. Since they are considered unprofitable, developers only construct low-cost units to meet the quota. As a result, the buyers of low-cost dwelling units frequently encountered issues brought on by careless private housing developers. Despite issuing the Certificate of Fitness, problems with substandard quality, improper water and electrical connections, and insufficient ventilation have still been reported [10]. Additionally, Hashim et al. [17] have determined the key factors that affect the performance of low-cost housing, including water system failure, leaks, rain penetration, and water

seeping through cracks and corrosion. Similarly, Abdul-Rahman et al. [18] also found that leaky pipes and a malfunctioning water supply were the frequent defects detected in low-cost dwelling units in Malaysia.

## 3. Method

Table 3 shows the research design of this research study. The data required for each objective and method to collect the data are stated in the table. Both primary and secondary data will be used as the method of collection.

**Table 3. Research design.**

| Objectives | Data Required | Source of Data | Method of Collection |
|---|---|---|---|
| **To access the satisfaction level of low-cost units residents.** | Satisfaction level of low-cost units residents. | ● Questionnaire<br>● Journal<br>● Article<br>● Research Paper | Primary Data:<br>● Questionnaire<br>Secondary Dara:<br>● Journal<br>● Article<br>● Research Paper |
| **To identify the key factors that contribute to residents' satisfaction and dissatisfaction** | Key factors that contribute to residents' satisfaction and dissatisfaction. | ● Questionnaire<br>● Journal<br>● Article<br>● Research Paper | Primary Data:<br>● Questionnaire<br>Secondary Dara:<br>● Journal<br>● Article<br>● Research Paper |

By reviewing the existing literature, the variables that may influence the residential satisfaction can be divided into five categories. Figure 1 shows the research framework, which outlines the main concept of this research study.

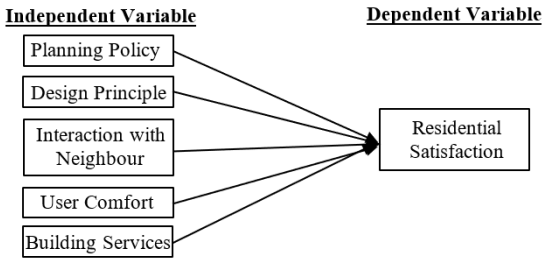


**Fig. 1. Research framework.**

Data are collected by distributing Google Form questionnaires to the case study building, the low-cost housing residents, namely Flat PKNS Tapak Maha, located in Taman Datuk Harun, Petaling Jaya, Selangor, Malaysia. It comprises five blocks with 360 units. The questionnaire consists of two sections. Section A is a demographic profile, which includes questions such as race, number of households, age of the child, number of bedrooms in the units and others to comprehensively understand the respondents' background. Section B consists of questions regarding the respondents' satisfaction with each variable's item. Ordinal scale is the

measurement scale used in this section. From 1 to 5 scales, which represent strongly dissatisfied to strongly satisfied, respondents were required to rate their perceptions of their satisfaction level with the low-cost housing they live in. For the inferential analysis, the reliability test will be first tested, and Cronbach's Alpha will be used to assess internal consistency. Data collected will be analysed by using correlation analysis and regression analysis in the following chapter to test the strength of the relationship between the dependent and independent variables.

## 4. Data Analysis and Findings

The study was conducted by distributing the designed questionnaire to 186 samples based on a population number of 360 units from Flat PKNS Tapak Maha, Malaysia. 172 usable responses were collected and used as the basis for the data analysis in this research study.

### 4.1. Section A: Demographic profile

Personal data of respondents such as race, nationality, age, number of people living, type of ownership, and bedroom number are provided in this section. The respondents' demographic profile is illustrated in Table 4.

**Table 4. Demographic profile of residents.**

| No. | Item | Frequency | Percentage |
|---|---|---|---|
| **1.** | ***Race:*** | | |
| | Malay | 168.0 | 97.7 |
| | Bumiputera | 2.0 | 1.2 |
| | Chinese | 0.0 | 0.0 |
| | Indian | 2.0 | 1.2 |
| | Others | 0.0 | 0.0 |
| **2.** | ***I am a Malaysian citizen:*** | | |
| | Yes | 170.0 | 98.8 |
| | No | 2.0 | 1.2 |
| **3.** | ***Have children aged 18 years and below:*** | | |
| | No | | |
| | 1 or 2 kids | 74.0 | 43.0 |
| | 3 or 4 kids | 50.0 | 29.1 |
| | More than 4 kids | 46.0 | 26.7 |
| | | 2.0 | 1.2 |
| **4.** | ***Number of People Living:*** | | |
| | 1 people | 2.0 | 1.2 |
| | 2-4 people | 74.0 | 43.0 |
| | 5-7 people | 96.0 | 55.8 |
| | More than 8 people | 0.0 | 0.0 |
| **5.** | ***Type of ownership:*** | | |
| | Homeowner | 130.0 | 75.6 |
| | Tenants | 42.0 | 24.4 |
| **6.** | ***Bedroom number:*** | | |
| | 1 bedroom | 6.0 | 3.5 |
| | 2 bedrooms | 132.0 | 76.7 |
| | 3 bedrooms | 28.0 | 16.3 |
| | 4 bedrooms | 6.0 | 3.5 |
| **Total** | | **172** | **100%** |

Knowing the percentage of each race is essential to ensuring that the low-cost housing community is multicultural. Table 4 shows that 97.7% of respondents are Malay, 1.2% are Bumiputera, and 1.2% are Indian. Among the 172 respondents, most

of them (43%) have no kid aged 18 years old and below, 29.1% and 26.7% of them have 1 or 2 and 3 or 4 kids below 18 years old, respectively, and only 1.2% of the residents have more than four kids which aged 18 years old and below. As for the number of people living, 55.8% live with five to seven people in one housing unit, 43% live with two to four people, and only 1.2% have their own private living space. Based on the data collected, 75.6% owned their house, while 24.4% rented it. Lastly, 76.6% have only two bedrooms in their housing units, 16.3% have three bedrooms, and 3.5% have one bedroom and four bedrooms in their housing units, respectively.

## 4.2. Section B: Residents' satisfaction

### 4.2.1. Reliability test

The reliability test results for the independent and dependent variables, which will be analysed using multiple regression and correlation analysis in the following sections, are illustrated in Table 5. The dependent and independent variables all have Cronbach's Alpha values over 0.7, which indicates that they are all regarded as dependable and reliable. As a result, the dependent and independent variables in this study were all accepted and retained.

**Table 5. Cronbach's alpha reliability analysis.**

| Type of Variable | Name of variable | Number of items | Cronbach's Alpha | Reliability Test |
|---|---|---|---|---|
| **Dependent Variable** | Residential Satisfaction | 8 | .901 | Excellent |
| **Independent Variable** | Planning Policy | 3 | .911 | Excellent |
| **Independent Variable** | Design Principles | 16 | .949 | Excellent |
| **Independent Variable** | Interaction with Neighbours | 5 | .872 | Good |
| **Independent Variable** | User Comfort | 6 | .945 | Excellent |
| **Independent Variable** | Building Services | 7 | .923 | Excellent |

### 4.2.2. Normality test

According to Table 6, all of the standard deviations of dependent and independent variables are less than their respective half mean, which the data are considered normal. Furthermore, the six histograms, which show a bell-shaped curve, support the assertion of normalcy. Therefore, the results demonstrate that all the data were normally distributed, supporting the validity of parametric statistical tests performed on this variable in later analyses.

**Table 6. Descriptive statistics.**

| Figure | Name of Variable | N | Mean | Std. Dev. |
|---|---|---|---|---|
| **Fig. 2.** | Residential Satisfaction | 172 | 2.26 | 0.901 |
| **Fig. 3.** | Planning Policy | 172 | 2.78 | 1.246 |
| **Fig. 4.** | Design Principles | 172 | 1.92 | 0.717 |
| **Fig. 5.** | Interaction with Neighbours | 172 | 1.76 | 0.628 |
| **Fig. 6.** | User Comfort | 172 | 2.02 | 0.791 |
| **Fig. 7.** | Building Services | 172 | 1.84 | 0.68 |

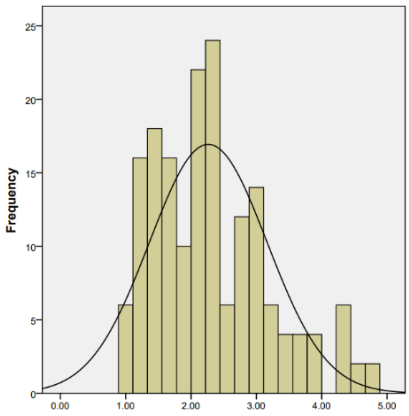


**Fig. 2. Residential satisfaction.**

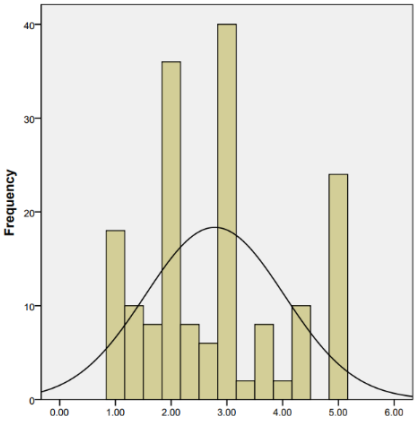


**Fig. 3. Planning policy.**

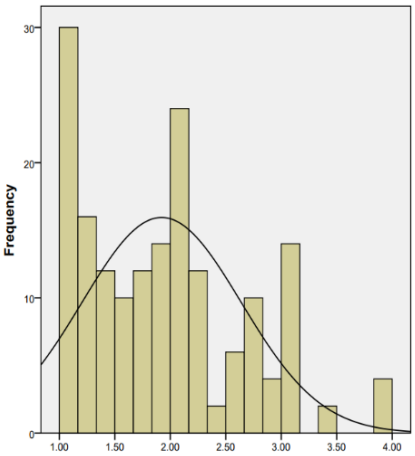


**Fig. 4. Design principle.**

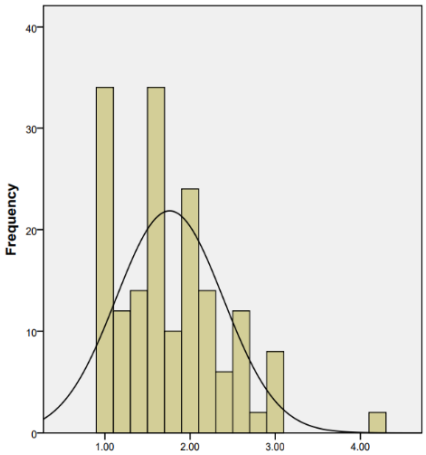


**Fig. 5. Interaction.**

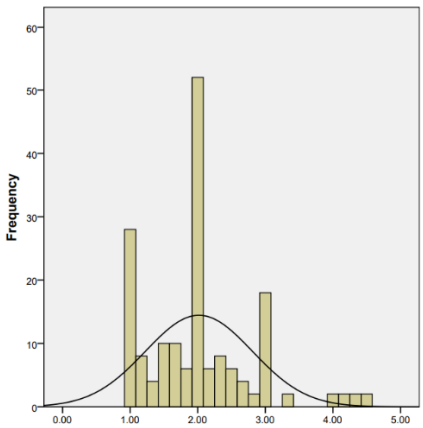


**Fig. 6. User comfort.**

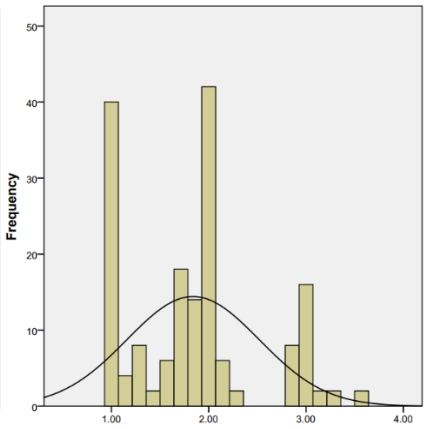


**Fig. 7. Building services.**

### 4.2.3. Correlation test

According to Table 7, design principles with a 0.725 (72.5%) Pearson correlation coefficient have the highest correlation with residential satisfaction. The second, third, and fourth highest Pearson correlation to residential satisfaction is building services - 0.581 (58.1%), user comfort - 0.579 (57.8%), and planning policy - 0.553 (55.3%). The last will be the interaction with neighbours, which has a Pearson correlation to residential satisfaction of 0.390 (39.0%).

**Table 7. Correlations.**

| | | Residential Satisfaction | Strength of correlation |
|---|---|---|---|
| **Planning Policy** | Pearson Correlation<br>Sig. (2-tailed)<br>N | .553<br>.000<br>172 | High correlation |
| **Design Principles** | Pearson Correlation<br>Sig. (2-tailed)<br>N | .725<br>.000<br>172 | Very high correlation |
| **Interaction with Neighbours** | Pearson Correlation<br>Sig. (2-tailed)<br>N | .390<br>.000<br>172 | Medium correlation |
| **User Comfort** | Pearson Correlation<br>Sig. (2-tailed)<br>N | .579<br>.000<br>172 | High correlation |
| **Building Services** | Pearson Correlation<br>Sig. (2-tailed)<br>N | .581<br>.000<br>172 | High correlation |

### 4.2.4. Multiple regression test

Table 8 illustrates the five independent variables of this study that were used to study their relationship with the dependent variable, which is the low-cost housing residents' satisfaction. It was hypothesised that the planning policy, design principles, interaction with neighbours, user comfort, and building services would positively predict the low-cost housing resident's satisfaction. Multiple regression was used to test the hypothesis in this study.

According to the results of multiple regression tests, planning policy, design principles, interaction with neighbours, and user comfort are all accepted due to their significant level, below 0.05. Among these four variables, planning policy and design principles are considered significant due to their significance level of 0.001. On the other hand, building services are rejected due to the significant value (0.784) above 0.05.

Among the four accepted independent variables, design principles (unstandardised coefficient Beta: 0.725), user comfort (unstandardised coefficient Beta: 0.191), and planning policy (unstandardised coefficient Beta: 0.163) are the three variables that positively predict residents' satisfaction. This finding is supported by [5, 10-12, 16], in which the researchers agreed that the housing design, comfort, and planning policy would affect the resident's satisfaction level.

**Table 8. Coefficients.**

| Model | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|
| | B | Std. Error | Beta | | |
| **(Constant)** | .360 | .152 | | 2.374 | .019 |
| **Planning Policy** | .163 | .043 | .226 | 3.826 | .000 |
| **Design Principles** | .725 | .104 | .577 | 6.984 | .000 |
| **Interaction with Neighbours** | -.218 | .097 | -.152 | -2.248 | .026 |
| **User Comfort** | .191 | .082 | .168 | 2.314 | .022 |
| **Building Services** | .030 | .108 | .022 | .274 | .784 |

## 5. Discussion and Conclusion

According to analysis, planning policy has a major impact on people' satisfaction with affordable housing, with high commute expenses and the distance between home and job being important variables. Longer commutes can be inconvenient in day-to-day living, leading to annoyance and dissatisfaction. Residents' dissatisfaction is also influenced by design principles, such as overcrowded complexes, window orientations that interfere with privacy, and malfunctioning utilities like elevators. These design defects worsen residents' overall satisfaction, which impacts their mental and physical health.

Residents have highlighted a number of user comfort-related factors. A good living environment depends on several factors, including thermal comfort, indoor air quality, lighting, acoustic comfort, and proper ventilation. Residents have cited these problems as crucial in determining their feelings about housing. While noise or temperature problems might impact residents' health and well-being, poor ventilation or inadequate illumination can make the living area uncomfortable.

Relevant authorities must concentrate on the aspects that have a direct impact on residents' satisfaction if low-cost housing initiatives in Malaysia are to succeed. Resolving design problems, enhancing planning regulations, and putting user comfort first would improve living conditions, promote long-term contentment, and help affordable housing projects succeed. Developers and regulators can improve the standard of living for those living in affordable housing and encourage the development of more sustainable housing options by addressing these aspects.

These findings offer important information for bettering living conditions and policymaking. Future studies should investigate combining green construction concepts, advanced technologies, and comparative evaluations across various housing developments to improve comfort and sustainability. Furthermore, putting in place strong feedback mechanisms will guarantee ongoing development and conformity to the requirements of the residents, ultimately assisting in the creation of successful affordable housing developments that put long-term sustainability and quality of life first.

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