



## **SATISFACTION ANALYSIS OF FLOOD VICTIMS TOWARDS HOUSING RELOCATION SCHEME DURING POST OCCUPANCY AT KUALA KRAI, KELANTAN**

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### **Abstract**

This study aims to determine flood victims' satisfaction towards housing relocation at Kuala Krai, Kelantan, during the post-occupancy period. The evaluation of satisfaction criteria of housing relocation is derived from the literature review conducted. Throughout this study, a questionnaire survey was used to obtain the required data. This quantitative research method employed a questionnaire survey to identify flood victims' satisfaction towards housing relocation established from the selected 13 criteria. The data were collected from 80 out of 100 targeted respondents among the flood victims in Kuala Krai residing in this area. The data obtained were analysed using the Statistical Package for Social Sciences (SPSS) version 23.0 software. The data were also interpreted in a table and ranked according to the mean score range. Hence, this study's overall findings indicate that the respondents were not satisfied with the relocation building's performance, particularly on housing design, indoor air quality, waste management, public amenities, public transportation, safety and were most dissatisfied with public areas. Therefore, it is hoped that this study's findings will be benefited mainly to improve the post-disaster housing construction for the flood victims in the future since the satisfaction level for every element is highlighted in this study.

**Keywords:** Flood victim, satisfaction, housing relocation, post occupancy

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## **BACKGROUND OF FLOOD SITUATION IN KELANTAN**

In Malaysia, flood accounts for 62% of a natural disaster occurring and the severity of floods had increased in magnitude over the last decade, a point in case is the 2014 flood causing massive damage to Kelantan, Terengganu, and Pahang (Karim et al., 2016). Hence, one of the most devastating effects of these flood cases is the destruction of houses. It is indisputable that housing is the most valuable asset for people and is a highly affected property in most disasters. During flood rapid-onset events, houses are usually the most extensively damaged or lost element, representing the most significant total impact on the national economy. The Federal Emergency Management Agency (FEMA) reports that approximately 90 per cent of all disaster-related property damage results from flooding each year. The government and organisations will analyse and evaluate their losses to develop a long-term and effective relief plan for the flood victims. As for the massive flood that hit Kelantan in 2014, the government came out with an effective housing relocation plan for the disaster impact area. The flood victims losing their houses would be provided with new homes through the housing relocation plan, namely Rumah Kekal Baharu (RKB).

However, there are few highlighted issues in the housing relocation for flood victims in Kuala Krai, Kelantan. According to the first series of the Auditor-General's Report 2015 audit of the National Disaster Management Agency (NADMA) under the Prime Minister's Department, the report criticised the poor utilisation rate of the allocation as only RM75.95 million of the RM246.73 million flood reconstruction fund (31 per cent) was used as of January 8, 2016. Other than that, it was reported that some contractors tasked with the RKB construction did not fulfil their obligations. For example, some new homes that were supposed to be 800 square feet in size were constructed at only 660 square feet (Malay Dewan Rakyat, 2015). According to the Malay Dewan Rakyat (2015), the delay in commencement of construction works was due to the constraints of construction works implementation in the early stages. This project lacked suitable land for RKB development, high infrastructure costs, and a private land acquisition process requiring site verification, consideration, and approval of the authority.

As stated in the previous research, many reconstruction projects have failed due to housing that does not respond to the relocates' needs. According to Hanafi (2018), the occupants were pleased with the house replacement for post-disaster housing in Kuala Krai, Kelantan. However, they were not pleased with the conditions of the house. It was discovered that certain housing necessities and local traditions were not considered in the original house design (Hanafi, 2018). These shortcomings were the major reasons that forced some occupants to modify their houses even with meagre financial resources. However, the majority of the

occupants could not afford to improve their houses to meet their needs. Therefore, this research paper aims to determine the flood victims' satisfaction towards housing relocation at Kuala Krai, Kelantan, during the post-occupancy phase.

## **LITERATURE REVIEW**

### **Housing Relocation**

Housing is a major global concern, as a country's well-being reflects its people enjoying a particular standard of living (Husin et al., 2018). As stated by Carrasco et al. (2017), residential and neighbourhood satisfaction are important. Relocation refers to the change of place for residence, and it usually a short distance and within the same city (Wang, 2015) or as a moving away of people's lives, from places in which people are accustomed to living and working among many others.

### **Housing Relocation Evaluation Criteria**

Husin et al. (2018) developed the occupants' framework post-occupancy evaluation integrated with the safety elements: structural, services, space, amenities, fittings, materials, environment, and workmanship. The identification of the safety elements and attributes incorporated into the framework was first gathered from the preliminary survey using a questionnaire survey involving industry practitioners with previous or current experience in relocation development in Malaysia. Hence, it is important to understand the flood victims' satisfaction level towards housing relocation criteria during the post-occupancy stage to build better relocation housing in the future. Based on the literature review, criteria affecting the occupants' satisfaction towards relocation housing were derived and 13 criteria were identified to determine the occupants' satisfaction level via post-occupancy survey towards housing relocation at Kuala Krai, Kelantan.

## **METHODOLOGY**

### **Study Area and Housing Relocation Programme in Kelantan and Kuala Krai**

According to Hanafi (2018), the government and its agencies had established the provision of relocation housing for flood victims in Kelantan in 2014. The relocation housing is known as Rumah Kekal Baharu (RKB). The National Disaster Management Agency (NADMA) stated that 1824 relocation housing would be built in various villages across Kelantan.

### **Questionnaire Survey**

This study was conducted by using a quantitative approach through a questionnaire survey. Questionnaires were distributed to the occupants of Rumah

Kekal Baharu (RKB) in Kuala Krai, Kelantan. The questionnaires for data collection were chosen because it is one of the most widely used social research techniques. A questionnaire was designed to collect data to generalise a sample to a population. This survey dealt with questions. It was fulfilled by a number of respondents with certain opinions towards this research issue. The questionnaires were prepared in the simplest form for effortless understanding. It is also to avoid misinterpretation of respondents that may cause an error in the data analysis.

The sampling method used for this research was the simple random sampling technique. Simple random sampling (also referred to as random sampling) is the purest and the most straightforward probability sampling strategy. The simple random sampling is done by selecting a sample from the population in such a way that each item has an equal chance of being selected as a sample. The sample is then drawn randomly from a sampling frame. For this study, the population list's sampling frame has been derived from the Jabatan Kerja Raya (JKR) Kuala Krai. The JKR provided information regarding the number of houses provided for the flood victims and the location of RKB, Kuala Krai. With the information provided, a random sampling frame had been chosen without any bias. Among the recipient's population of RKB at Kuala Krai, around 6% (Leh, 2018) were chosen randomly as respondents for the post-occupancy survey to measure flood victims' satisfaction towards housing relocation criteria. Subsequently, 75 samples (6%) from the 1257 population of flood victims at Kuala Krai were required for this research. However, to get a 100% returned rate, 100 questionnaires were distributed. Eighty were returned and analysed as the findings of this study.

## **ANALYSIS AND DISCUSSION**

### **Demographic Profile of Respondents**

The gender distribution of the respondents shows that there is an equivalent number of male and female respondents of 50% each. The involvement of both male and female respondents provides different opinions on answering the questionnaires. Further analysis shows that most of the respondents aged between 40 to 60 years (73%), and none of the respondents are less than 20 years old. It indicates that respondents for this survey are mature enough to understand the survey questions; thus, providing valid and reliable results. Next, 38% of the respondents indicate that they lived in the provided house more than 20 hours per day during weekdays and 58% on weekends. Hence, this result shows that most respondents were housewives or independent workers because of the tendency to be in the house for more than 20 hours during weekdays.

### Flood Victims' Satisfaction Level towards Housing Relocation Criteria

The housing relocation criteria for this research consist of 13 variables: 1. Indoor Air Temperature; 2. Indoor Lighting; 3. Indoor Air Quality; 4. Noise; 5. Water Supply; 6. Indoor Layout; 7. Design; 8. Waste Management; 9. Safety; 10. Public Transportation; 11. Public Area; 12. Public Amenities; and 13. Community. The mean score and rank for each factor involved were analysed in the following Table 1.

**Table 1:** Flood victims' satisfaction level towards housing relocation criteria

Item	Housing Relocation Criteria	Mean	Item	Housing Relocation Criteria	Mean
1.	Indoor Air Temperature		7.	Design	
A	I am satisfied with the temperatures in my home during day time	2.06	A	I am satisfied with the appearance of the house	2.66
B	I am satisfied with the temperatures in my home during night time	2.91	B	I am satisfied with the outside view	2.59
C	I feel that my home is quick to cool down during day time	2.23	C	I am satisfied with the cleanliness of common areas	1.65
D	I feel that my home is quick to cool down during night time	2.88	D	I am satisfied with the size of my house	2.74
2.	Indoor Lighting		E	I am satisfied with the amount of storage in my house	2.78
A	I am satisfied with the amount of electric lighting in my house	3.61	8.	Waste Management	
B	I am satisfied with the brightness of electric lighting in my house	3.65	A	I am satisfied with the waste collection in my housing area	2.61
C	I am satisfied with the amount of natural daylight in my house	2.84	B	I am satisfied with the cleanliness of the communal waste area	2.04
3.	Indoor Air Quality		C	I am satisfied with the access to the communal waste area	2.11
A	I am satisfied with the air quality in my house	2.48	9.	Safety	

B	I am satisfied with the air quality outside my house	2.31	A	I am satisfied with the windows and doors security	1.75
C	I am satisfied with the air movement within my house during the day	2.11	B	I am satisfied with the level of security in my housing area	1.90
D	I am satisfied with the air movement within my house during the night	2.40	C	I am satisfied with the safety of my house during day time	2.16
E	I am satisfied with the odours in my house during day time	2.21	D	I am satisfied with the safety of my house during night time	1.86
F	I am satisfied with the odours in my house during night time	2.39	10. Public Transportation		
4. Noise			A	I am satisfied with the frequency of buses in the local area	1.68
A	I am satisfied with the noise level in my home	3.70	B	I am satisfied with the distance to the nearest public transport	1.49
B	I am satisfied with the noise level from other rooms	3.40	C	I am satisfied with the amount of traffic within my housing area	2.98
C	I am satisfied with the noise level from my neighbours	2.71	11. Public Area		
D	I am satisfied with the noise level from the traffic	3.40	A	I am satisfied with the quality of parks/ open space	1.25
E	I am satisfied with the noise level from other sources	3.03	B	I am satisfied with the distance to parks/ open space	1.48
5. Water Supply			C	I am satisfied with the maintenance of parks/ open space	1.35
A	I am satisfied with the water pressure in my home	3.88	D	I am satisfied with the cleanliness of parks/ open space	1.21
B	I am satisfied with the taste of drinking water	3.18	12. Public Amenities		
C	I am satisfied with the size of my toilet	3.41	A	I am satisfied with the educational facilities in the area	2.10

6.	Indoor Layout		B	I am satisfied with the exercise facilities in the area	1.90
A	I am satisfied with the internal layout of the living and dining area	3.29	C	I am satisfied with the health facilities	1.83
B	I am satisfied with the internal layout of bedroom 1	3.13	D	I am satisfied with the community facilities	1.86
C	I am satisfied with the internal layout of bedroom 2	2.51	E	I am satisfied with the postal services in the area	1.46
D	I am satisfied with the internal layout of bedroom 3	2.44	F	I am satisfied with the variety of shops in the area	2.74
E	I am satisfied with the internal layout of the kitchen	1.59	13.	Community	
F	I am satisfied with the internal layout of the bathroom and toilet	2.76	A	I am satisfied with the overall services of the local council	3.19
			B	I am satisfied with the information received from the local council	3.14

### **Flood Victims' Satisfaction Level towards Housing Relocation Criteria Analysis:**

#### *Criteria 1: indoor air temperature*

From Table 1, it is apparent that a few factors contribute to the flood victims' satisfaction level towards indoor air temperature of the housing relocation at Kuala Krai, Kelantan. Findings show that the respondents were satisfied with the housing air temperature at night with a mean of 2.91. They also agreed that the house was easy to cool down during night time with a mean of 2.88. However, during day time, respondents were not satisfied with the housing's indoor air temperature (mean = 2.06). Results also indicate that respondents expressed dissatisfaction with cool down during day time (mean = 2.23).

#### *Criteria 2: indoor lighting*

The factors that may influence flood victims' satisfaction towards indoor lighting were also analysed. From Table 1, 'I am satisfied with the amount of electric lighting in my house' takes the first rank among the other factors, indicating that the respondents were satisfied with the amount of lighting provided in the house.

Respondents also agreed that they were satisfied with the brightness of electric lighting in their house (mean = 3.65) and the amount of natural daylight in the house, with an average mean of 2.88. Overall, respondents provided positive feedback on the indoor lighting criteria of the housing relocation at Kuala Krai.

*Criteria 3: indoor air quality*

Table 1 provides the breakdown of flood victims' satisfaction towards indoor air quality of the housing relocation. As shown in the table (above), the average mean range for six (6) items under indoor air quality criteria was below 2.50. It indicates that the respondents were not satisfied with the indoor air quality in their house, including air quality, air movement, and odours indoors during day and night.

*Criteria 4: noise*

From Table 1, it is apparent that several factors contribute to occupant's satisfaction on noise criteria of their house. Based on the average mean range analysis, respondents were satisfied with their house's overall noise level (mean = 3.70). However, they have mixed feelings about the noise level from other rooms and the traffic, with a mean of 3.40, respectively. The analysis shows that the occupants also have mixed feelings about the noise level from other sources. The noise from the neighbourhood has the lowest mean of 2.71.

*Criteria 5: water supply*

As presented in Table 1, a few factors influence occupants' satisfaction towards the water supply provided in their house. With an average mean range of above 3.00 on three (3) items under the water supply criteria, it can be summarised those respondents have mixed feelings about the water supply provided. However, they agreed that the water pressure in their house is sufficient (mean = 3.88).

*Criteria 6: indoor layout*

Table 1 shows the factors contributing to flood victims' satisfaction with the indoor layout of the housing provided to them through the relocation incentives. The respondents have mixed feelings on the following items: internal layout of living and dining area, toilet, and internal layout of bedrooms in the house. However, with an average mean range of below 2.00, the respondents were not satisfied with the kitchen layout (mean = 1.59) in their house.

*Criteria 7: design*

As obtainable in Table 1, a few factors influence occupants' satisfaction regarding the housing design. Based on the analysis, respondents have mixed



feelings on the following items (average mean between 2.59 to 2.78): the amount of storage provided in the house, house size, appearance, and outside view. However, respondents were not satisfied with the cleanliness of the common area (mean = 1.65).

*Criteria 8: waste management*

From Table 1, it is apparent that there are a few factors contributing to the flood victims' satisfaction level towards waste management of the housing relocation at Kuala Krai, Kelantan. Findings show that the respondents were not satisfied with the relocation area's overall waste management, especially on the communal waste area's cleanliness (mean = 2.04). It is followed by dissatisfaction with the communal waste area's access (mean = 2.11). Lastly, respondents have mixed feelings about the waste collection in the area.

*Criteria 9: safety*

Table 1 shows the breakdown of safety criteria of housing relocation rated by flood victims at Kuala Krai. It indicates that respondents were not satisfied with the relocation area safety with an average mean range between 1.76 to 2.16 on the following items: security of the windows and doors, the safety of the house during night time, level of security provided in the area and safety of their house during day time.

*Criteria 10: public transportation*

Table 1 illustrates some of the factors contributing to occupants' satisfaction towards public transportation in the relocation area. Respondents have mixed feelings on their satisfaction regarding the amount of traffic within the housing area (mean = 2.98). The findings show that respondents were not satisfied with the frequency of buses in the area (mean = 1.68) and the distance to the nearest public transport provided in the area (mean = 1.49).

*Criteria 11: public area*

Table 1 above presents the factors impacting occupants' satisfaction concerning the relocation area's public area. The results obtained from the analysis show that the respondents were not satisfied with all items under public area criteria with an average mean of below 2.00.

*Criteria 12: public amenities*

Table 1 shows the factors contributing to flood victims' satisfaction towards public amenities provided in the relocation area of Kuala Krai, Kelantan. The respondents have mixed feelings about the variety of shops in the area (mean =

2.74). However, based on survey findings, respondents were not satisfied with the area's overall public amenities. Respondents' dissatisfaction was rank in the following manner: educational facilities (mean = 2.10), exercise facilities (mean = 1.90), community facilities (mean = 1.86), health facilities (mean = 1.83), and postal service facilities (mean = 1.46) provided in the housing relocation area.

*Criteria 13: community*

As presented in Table 1, a few factors influence the occupants' satisfaction regarding the relocation area's community. Overall findings show that respondents have mixed feelings towards the local council's information (mean = 3.14) and the local council's overall services (mean = 3.19) at the Kuala Krai relocation housing area.

**Housing Relocation Criteria Overall Ranking**

Table 2 indicates the housing relocation criteria 'overall ranking based on respondents' survey analysis conducted at Kuala Krai, Kelantan.

**Table 2:** Housing Relocation Criteria Overall Ranking

Item	Housing Relocation Criteria	Overall Mean	Satisfaction Indication	Criteria Ranking
1	Indoor Air Temperature	2.52	Mixed feelings	6
2	Indoor Lighting	3.37	Satisfied	2
3	Indoor Air Quality	2.33	Dissatisfied	8
4	Noise	3.25	Mixed feelings	3
5	Water Supply	3.50	Satisfied	1
6	Indoor Layout	2.62	Mixed feelings	5
7	Design	2.48	Dissatisfied	7
8	Waste Management	2.25	Dissatisfied	9
9	Safety	1.92	Dissatisfied	12
10	Public Transportation	2.0	Dissatisfied	10
11	Public Area	1.32	Very dissatisfied	13
12	Public Amenities	1.98	Dissatisfied	11
13	Community	3.17	Mixed feelings	4

The mean score for the main criteria is identified, analysing the breakdown of each category's factors. According to Table 2, 'Water Supply' (mean = 3.50) criteria of flood victims' satisfaction towards housing relocation takes the first rank among all the others. It is followed by 'Indoor Lighting' at the second rank with an average mean of 3.37. The third highest mean score is

‘Noise’ (3.25), continuing with ‘Community’ (3.17) at the fourth rank. ‘Indoor Layout’ (2.62) of the housing relocation provided at Kuala Krai takes the fifth rank, followed by ‘Indoor Air Temperature’ (2.52), ‘Design’ (2.48), ‘Indoor Air Quality’ (2.33), ‘Waste Management’ (2.25), ‘Public Transportation’ (2.00), ‘Public Amenities’ (1.98), and ‘Safety’ (1.92), in that order. Lastly, respondents were least satisfied with the ‘Public Area’ (1.32) of the housing relocation.

**Table 3:** Final Summary of Flood Victims’ Satisfaction towards Housing Relocation  
 Criteria

<b>Satisfied</b>	<b>Mixed Feeling</b>	<b>Dissatisfied</b>	<b>Very Dissatisfied</b>
Water Supply	Noise	Design	Public Area
Indoor Lighting	Community	Indoor Air Quality	
	Indoor Layout	Waste	
	Indoor Air	Management	
	Temperature	Public Amenities	
		Public	
		Transportation	
		Safety	

Table 3 summarises the findings derived from Table 2. Overall, it can be concluded that respondents were satisfied with only two housing relocation criteria, which are Water Supply and Indoor Lighting. They have mixed feelings regarding Noise, Community, Indoor Layout, and Indoor Air Temperature. Flood victims expressed their dissatisfaction concerning the housing Design, Indoor Air Quality, Waste Management, Public Amenities, Public Transportation, and the area's safety. Finally, respondents were very dissatisfied with the Public Area provided at the housing relocation area. According to Saraf (2019), the flood risks cannot be eliminated despite many mitigation programmes which both federal and state governments have executed. However, it is noted that this research’s findings were contradicted with a previous study conducted by Leh (2018). Leh found that the majority of the respondents were satisfied with their redeveloped houses and the infrastructure provided at the RKB.

## CONCLUSION AND FUTURE STUDIES

In conclusion, the findings show that most respondents were not satisfied with their houses under the RKB programme. There were 13 housing relocation criteria identified in this study. The flood victims were dissatisfied with 7 out of 13 criteria (around 54%), including Design, Indoor Air Quality, Waste Management, Public Amenities, Public Transportation, Safety, and Public Area. Hence, results of findings on occupants’ satisfaction level towards housing relocation at Kuala Krai, Kelantan during the post-occupancy stage can be

perceived as dissatisfied with the house provided as the actual outcome is lower than their expectation. The respondents were dissatisfied with the performance of the relocation housing in which the mean score for the occupants' satisfaction towards the relocation of housing using post-occupancy evaluation (POE) performance criteria was below 3.50 except for the Water Supply and Indoor Lighting with four mixed feeling results of these variables: Noise, Community, Indoor Layout, and Indoor Air Temperature. Therefore, it is hoped that this research's findings will provide an insight into the flood victims' satisfaction level; thus, developing a comprehensive housing relocation that meets occupants' needs and expectations.

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