

PERCEPTION OF FLOOD VICTIMS TOWARDS HOUSING
RECONSTRUCTION AFTER 2014 FLOOD IN KUALA KRAI, KELANTAN

NIK NURUL HANA BINTI HANAFI

UNIVERSITI TEKNOLOGI MALAYSIA

PERCEPTION OF FLOOD VICTIMS TOWARDS HOUSING
RECONSTRUCTION AFTER 2014 FLOOD IN KUALA KRAI, KELANTAN

NIK NURUL HANA BINTI HANAFI

A thesis submitted in fulfilment of the
requirements for the award of degree of
Master of Philosophy

Faculty of Built Environment and Surveying
Universiti Teknologi Malaysia

OCTOBER 2018

ACKNOWLEDGEMENT

First and foremost I thank God almighty who provided me with strength, direction and showered me with blessings throughout. My sincerest gratitude to my supervisor Prof Dr Mohd Hamdan bin Ahmad for his continuous guidance and support. With his expert guidance knowledge I was able to overcome all the obstacles that I encountered during this journey.

I wish to thank the Ministry of Higher Education, Malaysia and Universiti Malaysia Kelantan for providing the full scholarship. Credit is also due to my friends and staffs in FABu, UTMJB and Razak School, UTMKL. I owe a special appreciation to those who accompanied me in the fieldwork across the villages no matter rain or shine and leading me to the information I need.

Greatest gratitude goes to my parents, Hanafi bin Mamat and Tuan Aminah Tuan Yusof. I am forever indebted for their unconditional and immeasurable love and support. Love to my two boys and my husband for being understanding and wonderful in so many ways. To my siblings and in-laws, I am thankful for the support and prayers from near and afar.

Lastly, I wish to express my deepest appreciation to all those who helped me, in one way or another, to complete this thesis. I could never thank you enough.

ABSTRACT

Housing reconstruction in the aftermath of a disaster is critical assistance that is provided after emergency aid. The government and agencies are compelled to rebuild houses for the community made homeless by the disaster. Nevertheless, inadequate attention has been given to the post-reconstruction stage to ascertain if the project was built according to occupants' needs. Previous studies have highlighted numerous issues that had occurred within the completed post-disaster housing which have caused living difficulties among the occupants. In view of the foregoing issues, this study explored residents' perceptions, housing modifications and their preferences for the reconstructed houses in Kuala Krai, the most severely-hit district in Kelantan during the disastrous 2014-flood. Across the district, there are two types of housing reconstruction, namely *Rumah Kekal Baru* (RKB) and *Rumah Kluster* (RK). RKB was built on the beneficiaries' own land, and RK was a relocation scheme. Kampung Manek Urai Lama was chosen as the case study for RKB, and Laman Seri Ehsan in Kampung Telekong was the case study that represented RK. Semi-structured interviews were conducted to collect data for this study, while visual research was accomplished to assess housing modifications and adaptations. 18 respondents were selected through purposive sampling from which only informative samples with related experiences were selected. A qualitative analysis software, Atlas.ti Version 8 was utilised in this study. The analysis revealed that residents were pleased with the house replacement, but 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. These shortcomings were found to be the major reasons that forced the residents to modify their houses even with meagre financial resources. Unfortunately, a majority could not afford to improve their houses to meet their needs. This study discovered that "one-size-fits-all" house design is not feasible to be adopted especially in poverty-stricken community. Therefore, with an emphasis on the beneficiaries' well-being, this research recommends the adoption of a core house approach, participatory approach and a comprehensive evaluation when designing and planning for better future housing in a post-disaster context. The outcome of this research could facilitate a better pre-disaster planning and post-disaster recovery that would involve various parties including the government, authorities, consultants, academicians and the rescue department. Finally, this research has demonstrated that it is important to evaluate post-disaster housing outcomes as they offer opportunities to recognise and subsequently overcome the issues that had previously led to housing that did not fulfil the occupants' needs.

ABSTRAK

Pembinaan semula rumah selepas bencana merupakan suatu bantuan kritikal selepas bantuan kecemasan. Kerajaan dan agensi terdorong untuk membina semula rumah bagi komuniti yang kehilangan tempat tinggal disebabkan oleh bencana. Walau bagaimanapun, amat sedikit perhatian diberikan kepada pasca-pembinaan semula bagi menentukan sama ada projek itu dibina mengikut keperluan penghuni. Kajian lepas telah menunjukkan terdapat pelbagai isu yang timbul dari perumahan pasca-bencana yang mengakibatkan kesukaran penghuni untuk menjalani kehidupan. Berdasarkan isu tersebut, kajian ini meneroka persepsi penghuni, pengubahsuaian rumah dan pandangan mereka terhadap perumahan yang dibina semula di Kuala Krai, iaitu daerah yang paling teruk terjejas di negeri Kelantan semasa banjir buruk pada 2014. Di seluruh daerah, terdapat dua jenis rumah yang dibina semula iaitu Rumah Kekal Baru (RKB) dan Rumah Kluster (RK). RKB dibina di atas tanah persendirian milik benefisiari, manakala RK merupakan skim penempatan semula. Kampung Manek Urai Lama dipilih sebagai kajian kes bagi RKB, dan Laman Seri Ehsan di Kampung Telekong merupakan kajian kes yang mewakili RK. Temubual separa berstruktur telah dijalankan bagi mengumpul data untuk kajian ini manakala kajian visual dijalankan bagi menilai pengubahsuaian dan adaptasi perumahan. 18 orang responden telah dipilih secara persampelan bertujuan dan hanya sampel yang berinfomatif dan mempunyai pengalaman berkaitan sahaja telah dipilih. Perisian analisis kualitatif, Atlas.ti Versi 8 telah digunakan dalam kajian ini. Analisis menjelaskan bahawa komuniti berpuas hati dengan pembinaan semula rumah, namun mereka tidak berpuas hati dengan keadaan rumah tersebut. Kajian menemukan bahawa beberapa keperluan perumahan dan tradisi tempatan tidak diambil kira dalam reka bentuk rumah asal. Kekurangan ini dikenal pasti sebagai punca utama yang memaksa penghuni mengubah suai rumah mereka, walaupun dengan sumber kewangan yang terhad. Namun, majoriti tidak dapat menampung kos pengubahsuaian rumah bagi memenuhi keperluan mereka. Kajian ini mendapati bahawa reka bentuk rumah yang merupakan *one-size-fits-all* tidak sesuai dilaksanakan terutama dalam komuniti yang hidup dalam kemiskinan. Oleh itu, dengan mengutamakan kesejahteraan benefisiari, kajian ini mencadangkan pembinaan rumah teras (*core house*), penyertaan benefisiari dan penilaian komprehensif dalam mereka bentuk dan merancang perumahan yang lebih baik pada masa akan datang dalam konteks pasca-bencana. Dapatan kajian ini dapat memudahkan perancangan pra-bencana dan pemulihan pasca-bencana yang lebih baik yang melibatkan pelbagai pihak termasuk pihak kerajaan, pihak berkuasa, perunding, ahli akademik dan pasukan penyelamat. Akhirnya, kajian ini menunjukkan bahawa adalah penting untuk menilai sesebuah projek perumahan pasca-bencana kerana ia memberi peluang bagi mengenal pasti dan seterusnya memperbaiki isu-isu yang menyumbang kepada perumahan yang tidak menepati keperluan penghuni.

TABLE OF CONTENTS

CHAPTER	TITLE	PAGE
	DECLARATION	ii
	ACKNOWLEDGEMENT	iii
	ABSTRACT	iv
	ABSTRAK	v
	LIST OF TABLES	x
	LIST OF FIGURES	xi
	LIST OF APPENDICES	xiii
1	INTRODUCTION	1
	1.1 Introduction	1
	1.2 Background of Problem	1
	1.3 Statement of the Problem	5
	1.4 Research Aim and Objectives	7
	1.5 Research Questions	8
	1.6 Scope of the Research	9
	1.7 Significance of the Research	9
	1.8 Research Methodology	10
	1.9 Organisation of the Thesis	11
2	LITERATURE REVIEW	14
	2.1 Introduction	14
	2.2 Key Terms in Disaster Studies	14
	2.2.1 Hazards	15
	2.2.2 Disaster	16
	2.3 Disaster Management	17

2.3.1	Process of Disaster Recovery	21
2.3.2	Recovery through Housing Reconstruction	23
2.4	The Affected Community	25
2.4.1	Community's Role in Housing Reconstruction	26
2.4.2	Consideration to Community	28
2.5	Perceptions of Housing Reconstruction	35
2.5.1	Method of Evaluation	37
2.6	Perception Parameters	38
2.6.1	Physical Condition	41
2.6.2	Non-physical Condition	46
2.6.3	Resettlement	51
2.6.4	Residents' Adaptation in Post-disaster Setting	55
2.6.5	Summary of Housing Perception	62
2.7	Conclusion	62
3	NATURAL DISASTER IN MALAYSIA	64
3.1	Introduction	64
3.2	Natural Disaster in Malaysia	64
3.2.1	Post-disaster Housing Reconstruction in Malaysia	67
3.3	Flood due to North-east Monsoon	69
3.3.1	Flood and Housing in Kelantan	70
3.4	Flood in December 2014	73
3.4.1	Housing Reconstruction after 2014 Flood	78
3.5	Conclusion	79
4	RESEARCH METHODOLOGY	80
4.1	Introduction	80
4.2	Research Strategy	80
4.2.1	Case under Study	81
4.3	Research Choice	82
4.4	Research Design	83
4.5	Research Methods	86
4.5.1	Preliminary Visit	87
4.5.2	Semi-Structured Interview	88

	4.5.3	Visual Research	95
4.6		Data analysis	96
	4.6.1	Computer Assisted Qualitative Data Analysis Software	97
4.7		Conclusion	99
5		DATA ANALYSIS AND FINDINGS	100
5.1		Introduction	100
5.2		Post-flood Housing Schemes in Kuala Krai	100
	5.2.1	Overview of <i>Rumah Kekal Baru</i> in Kampung Manek Urai	102
	5.2.2	Overview of <i>Rumah Kluster</i> in Laman Seri Ehsan	107
5.3		Data Collection	112
5.4		Background of Respondents	112
5.5		Achieving Objective 1: Housing Condition	113
	5.5.1	Involvement in Reconstruction	114
	5.5.2	Perception on Physical Condition	116
	5.5.3	Perception on Non-physical Condition	124
	5.5.4	Perception towards Resettlement	129
5.6		Achieving Objective 2: Resident's Adaptation	132
	5.6.1	Housing modification	132
	5.6.2	Adaptation to Limitation	143
5.7		Achieving Objective 3: Residents' Preferences	146
	5.7.1	Encourage Residents' Participation	146
	5.7.2	House That Meet Needs	147
	5.7.3	House That Support Renovation/Modification	148
	5.7.4	Improving Utility Services	148
5.8		Conclusion	149

6	HOUSING RECONSTRUCTION OUTCOMES	150
6.1	Introduction	150
6.2	Housing Reconstruction Outcomes	150
6.2.1	Advantageous Points of the House	151
6.2.2	Limitations of the House Attributes	154
	Perception on	159
6.2.3	Resettlement	159
6.3	Signs of Adaptation	160
6.4	Structural Modification	161
6.4.1	Space Requirement	162
6.4.2	Functional Affordances	163
6.4.3	Economic Affordance	165
6.4.4	Living Improvement	166
6.5	Conclusion	167
7	CONCLUSIONS AND RECOMMENDATIONS	168
7.1	Introduction	168
7.2	Summary of Findings	168
7.3	Recommendations for Post-disaster Housing Reconstruction	172
7.3.1	Core House	172
7.3.2	Participatory Construction Approach	174
7.3.3	Continuous Evaluation	177
7.4	Research Limitation	178
7.5	Suggestions for Future Research	178
7.6	Concluding Statement	180
	REFERENCES	181
	APPENDIX A	193
	APPENDIX B	194

LIST OF TABLES

TABLE NO	TITLE	PAGE
2.1	Construction parameter	42
2.2	Parameters for material	43
2.3	Parameter of house design	43
2.4	Space and dimension parameter	45
2.5	Housing services parameter	46
2.6	Parameters of community involvement	48
2.7	Lifestyle, social and cultural parameter	50
2.8	Living condition parameter	51
2.9	Spatial and social factor as perception parameter	54
2.10	Type of adaptation	58
2.11	Type of housing modification/ improvement	59
4.1	Research Design	84
4.2	Description of interview themes	94
5.1	Differences between Type 1 and Type 2	105
5.2	Respondent details and codes	112
5.3	Type of housing modification	133
7.1	Considerations for participatory approach	177
7.2	Considerations for evaluation period	178

LIST OF FIGURES

FIGURE NO	TITLE	PAGE
1.1	Organisation of the thesis	13
2.1	Disaster Management Cycle	17
2.2	The Phases of Disaster	18
2.3	The Overlapping Phases in Major Disasters	19
2.4	Planning for recovery	20
2.5	Ladder of community participation	29
2.6	Conceptual Framework	61
3.1	Natural disaster frequency in Malaysia 1990 – 2015	65
3.2	Main river network in Kelantan	74
3.3	Flood coverage in Kuala Krai	76
3.4	The situation in certain parts of Kuala Krai	76
3.5	Destruction in Kuala Krai	77
3.6	Empty house plot due to destruction	77
5.1	The number of permanent housing reconstruction in Kuala Krai	101
5.2	Location of Kampung Manek Urai Lama, Kuala Krai	102
5.3	Layout of Kampung Manek Urai Lama	103
5.4	Typical street setting with RKB after the flood	104
5.5	Floor plan of Type 1	105
5.6	Floor plan of Type 2	106
5.7	Overall design of Type 1 (a) and Type 2 (b)	106
5.8	Type 1 houses (a and b) which collapsed during construction	107
5.9	Location of Laman Seri Ehsan in Kampung Telekong, Kuala Krai	108
5.10	Entrance Signboard at Laman Seri Ehsan	108
5.11	Layout of Phase 1 of Laman Seri Ehsan	109
5.12	Floor plan of Phase 1 house in Laman Seri Ehsan	110
5.13	Typical street of Phase 1 house in Laman Seri Ehsan	110
5.14	Multipurpose hall at Laman Seri Ehsan	111

5.15	Prayer hall (<i>surau</i>) at Laman Seri Ehsan	111
5.16	Shop lots at Laman Seri Ehsan	111
5.18	RKB houses that were built too close to each other	122
5.19	RKB houses that were built too close to each other	123
5.20	The remains of concrete stumps and brick wall from an old house	125
5.21	Typical street of Kampung Manek Urai after the flood	126
5.23	Walls were added underneath the house	134
5.24	Ground floor modification and space extension	135
5.25	Ground floor modification with space extension	135
5.26	Extensions made to the side and front elevation	136
5.27	Porch was constructed at Type 2 house in RKB	137
5.28	Porch was constructed at Type 2 house in RKB	137
5.29	A modified frontage as source of income	138
5.30	Provision of outdoor seats at Type 1 house in RKB scheme	139
5.31	Provision of seats at stairs landing and underneath the house	139
5.32	Provision of seats under the porch of Type 2 house in RKB	140
5.33	Provision of seats in front of non-modified Type 2 house in RKB	140
5.34	Provision of seats in front of a house in RK	141
5.35	A house of RKB with potted plants to replace the old garden	142
5.36	A house of RKB with potted plants	142
5.37	A house in RK with potted plants, vegetables and herbs	143
5.38	Temporary stall in front of a house in RK	144
5.39	Chicken coop assembled at the side of the house in RK	145

LIST OF APPENDICES

APPENDIX	TITLE	PAGE
A	Interview Guide	193
B	Initial Interview Appraisal	194

CHAPTER 1

INTRODUCTION

1.1 Introduction

This research is conducted to explore the perception, housing modification and housing preferences of the 2014 flood victims in the district of Kuala Krai, Kelantan, Malaysia. It is intended to offer design considerations in planning for a post-disaster housing in Malaysia with the aim to gain some insights on how to improve the next project. This introductory chapter portrays the overall structure of the research. It begins by clarifying background of the problem and justification of the study. Next, it describes the research objectives, scopes and limitation of the research. Subsequently, the chapter summarises methodology undertaken, follows by justifying the significance of the research. Finally, the thesis structure is presented at the last section of this chapter.

1.2 Background of Problem

Magnified by climate change, disasters around the world are increasing yearly in terms of frequency and intensity which not only generating rise in losses and impacts but also impede development. Additionally, recurring minor disasters, mostly at the same areas, make long-term recovery difficult therefore prohibit progression. The impact of disaster is even more severe in rural areas of developing countries where mortality and economic losses are significantly higher as compared

to developed nations (Barakat, 2003). There is a common consensus that natural disasters and its negative impacts is unavoidable, nevertheless, systematic and effective efforts could be made to reduce the impacts (Moe & Pathranarakul, 2006). These efforts must be holistic which comprise a well-balanced planning during pre-disaster as well as post-disaster.

As outlined in *Shelter After Disaster* (Davis, 2015), there are three phases of disaster relief in the aftermath of a disaster, namely Phase 1 - Immediate relief period (the day of impact to day 5), Phase 2 - Rehabilitation period (day 5 to 3 months), and Phase 3 - Reconstruction period (3 months onward). Although the time frames may vary from one disaster to another, but these three phases are considered as the most crucial response in assisting the affected communities for recovery. Housing reconstruction following a major disaster is seen as the most urgent assistance needed after distribution of immediate emergency aid such as food, clothes and emergency shelter. Driven by this concern and steered with good intention, local and international agencies were compelled to take part in reconstruction process, beginning with needs assessment of the affected communities to physical rebuilding. Besides guidelines and models sketched for post-disaster housing reconstruction (PDHR), there was a lot of research that studied theoretical aspect to put forward the practical methods of PDHR. To date studies on post-disaster housing reconstruction have mostly focused on policies, stakeholder advanced and vernacular construction, context and cultural consideration, construction methods and approaches, aids and resource, as well as evaluative learning. Above all, Lettieri, Masella, & Radaelli (2009) contend that learning is frequently being disregarded hence further studies should be conducted in order to employ this learning into the disaster management.

As the number of disasters increase annually, post-disaster housing reconstruction projects will observe an increment too, in terms of volume and scale (Ahmed, 2011). In addition, the problems and opportunities for sheltering and housing will continue to increase in forthcoming years (Davis, 2015). Housing reconstruction offers opportunity to recognise and subsequently overcome the contributing factors or issues that previously lead to weak housing (Ahmed & Charlesworth, 2015). Additionally, it is crucial for those involved in disaster relief to

manage risk by learning from disaster recovery and reconstruction process, to the greatest degree possible (Hayles, 2010). Barakat (2003) asserts that there is a distinct need to find ways to build better post-disaster housing in future. Similarly, more study is needed to assess the outcome of the longer-term development in communities that have been provided by international aid and expertise (Hayles, 2010).

Despite of the above, too many post-disaster housing schemes do not perform and serve beneficiaries accordingly. One of the reported project outcomes is housing reconstruction following the 2004 Indian Ocean tsunami in Aceh. The devastation state in Aceh had drawn attention from multiple international agencies and funds and reliefs were pouring in. These agencies had engaged in housing reconstruction project which was an area out of their usual expertise and experience, after they had received an unexpected amount of money from donors (Steinberg, 2007; Kennedy et al., 2008). From evaluation, it was learned that a few housing scheme had demonstrated exceptional outcome according to the residents. However, many others had failed to address construction necessities including quality and basic services such as water and sanitation. As a result, houses were rejected by the beneficiaries and some houses had remained empty. In addition, hundreds of poorly constructed houses had to be destroyed (Steinberg, 2007). Money and resources were already limited in this area and this adverse situation had made it worse by causing wastage in time, money and resources. In this respect, community perceptions and beliefs must be taken into account (Sanderson, Sharma, & Anderson, 2012) regardless during planning stage for reconstruction or after project completion.

In the case of Malaysia, the 2004 Tsunami is a turning point for the country's capability to execute rehabilitation and post-disaster housing reconstruction. Foong, Shiozaki, & Horita (2006) notify that it was the first time for Malaysia to manage disaster in great volume when more than 40 fishing villages along the coastline of northern west Peninsular Malaysia were destroyed and affected more than 4000 people. Subsequent to prompt response for evacuation and temporary residence, permanent housing scheme was planned accordingly and adapted '*Rumah Mesra Rakyat*' Housing Scheme which was fully financed by the Tsunami Fund and

developed by SPNB. Tsunami victims were offered a loan repayment scheme with subsidies from Tsunami Fund as well as National Budget.

In Malaysia, flood has produced the highest number of occurrences compared to other natural disaster. The most common is flood during the North-East Monsoon season that occurs every year in Kelantan, the study area for this research. Between November to March, this monsoon season has yielded heavy rain in Kelantan River Basin area, causing an increase in overflow rate for the Kelantan river tributaries (Syed Hussain & Ismail, 2013). The flood plain of the Kelantan River Basin consists of several districts including Kuala Krai, the case location for this study. Even though this river basin is highly prone to be flooded, people are still continued to reside in the area due to multiple of reasons including tradition, land ownership and financial constraint. As of 2013, the population in river basin has reached one third of the total population in Kelantan (Syed Hussain & Ismail, 2013). It is very common in developing countries where people cannot afford to move the entire family to geographically safe areas (Lindell & Prater, 2003). Evacuation during flood has become a custom for most of these people.

In 2014, a widespread monsoon flood had struck Malaysia, which forced more than 230,000 people to be evacuated and 17 people pronounced dead nationwide (IFRC, 2015). The disaster that took place between end of December 2014 and early January 2015 has left people shaken. The major flood was reported to be the most destructive in past few decades, making Kelantan one of the most-hit states. In Kelantan, 9 out of 10 districts were paralysed by the flood, and Kuala Krai had been identified as the most critically-affected district. The flood had severely inundated Kelantan, ruined a large number of houses and washed away thousands more. Most of these houses were made of timber owned by villagers in rural areas who work as rubber tappers, carpenters, farmers and the like. To this people, losing a house is close to losing everything they owned and constructing a new one, to some degree, is uncertain. Loss of house does not only mean a loss of physical possession but it also signifies a loss of income, stability, dignity and certainty.

After the water receded, the provision of permanent house for the flood victims has been established by the government as the lead role. According to National Disaster Management Agency (NADMA), a total of 1295 permanent houses will be built in various villages across Kuala Krai. Most of the houses will be built on residents' own land. For households with no land grants, suitable location has been identified for relocation and resettlement. Meanwhile, other organisations have also focus on both temporary and permanent shelters (IFRC, 2015). Housing reconstruction is undeniably a major part of response after disaster especially in the long run. As suggested by da Silva (2010), besides being culturally and climatically suitable, post-disaster housing must be built durable and easy to maintain, allow for future living and be developed with the residents' participation. Apart from providing the basic accommodation needs, permanent housing reconstruction must deliver to meet various expectations embracing the built environment for a longer term recovery (N. Tas, Cosgun, & Tas, 2007). Failing to address these, residents may suffer from discontent. Constant dissatisfaction may cause the residents to suffer from various health condition including stress, delinquency, and pathological conditions (Dikmen & Elias-Ozkan, 2016). However, due to efficiency reason, most authorities developed standardised models of post-disaster housing based on their beliefs of what people need to have (Barakat, 2003). In the case of Kuala Krai, how do we know these housing provisions have met the residents' basic needs? Impacts of these housings towards the residents, especially in the long run is not known. In this subject, after project completion, the impact on end-users are much more relevant to be assessed, irrespective the constraint it is facing before its completion (Shenhar, Levy and Dvir, 1997).

1.3 Statement of the Problem

In project management context, a project is often assessed by the numbers of houses built and whether it is built within the stipulated time and budget, besides being compliant to specifications and related guidelines. However, despite of adhering to the aforementioned criterions, many projects had failed because the user's concerns were not met (Shenhar et al., 1997). In fact, various problems that

occur in the built environment are the consequences of neglecting the users' point of view (Francescato, Weidemann, & Anderson, 1989). From end-user's perspective, their happiness, satisfaction, comfort, freedom, security and quality of construction are among the components that emerged when assessing a house. Above all, their experience living in the house is often used as indicator to assess or describe whether the house is responding to their needs.

The above concern is similar in post-disaster context, but often coupled with great challenges where the disaster-affected communities' viewpoints were overlooked. After the completion of housing reconstruction project, the building actors and building donors including governments and agencies would often leave the site without being concerned about the impact of the house towards the occupants. At this juncture, they had failed to recognise their long-term responsibility towards the affected community. The community has to be the main focus of the housing reconstruction process hence should be given privilege to make decisions that will affect their lives (Jha, Barenstein, Phelps, Pittet, & Sena, 2010) whether it is before reconstruction or during occupancy period to accomplish the house life-cycle concern. Various studies on residents' response towards their reconstructed houses have revealed countless housing problems and challenges that lead to difficulties in their daily lives (see for example da Silva, 2010; Dikmen & Elias-Ozkan, 2016; Rahmayati, 2016b; Sanderson et al., 2012; N. Tas et al., 2007). It is essential to relate housing to what it does rather than just what it is. Therefore it is important to learn a lesson from previous experience to facilitate improvement for future housing reconstruction projects (Johnson, Lizarralde, & Davidson, 2004) and this can be done through evaluating the housing from the resident's point of view.

Nevertheless, all studies that examined this matter were undertaken in other countries of different social and cultural context than Malaysia. Even if the subject has been illuminated elsewhere in the world, it is not appropriate to presume the same views for Malaysia. There are a number of post-disaster housing schemes in Malaysia but studies on post-disaster housing have not been widely addressed and surprisingly, none of the research in this subject focuses on the evaluation of post-disaster house from the residents' perspective. Study about these affected

community's perspectives and preferences are absent although it has been previously documented that the affected community are the most significant stakeholder in post-disaster housing context (Shafique & Warren, 2015) thus their viewpoint, particularly about the house, should not be overlooked.

It has become apparent that shortcomings on housing reconstruction must be addressed, in the same way merits must be modelled. Therefore, this research emphasized that assessing the residents' viewpoint is important in providing us input of the operational phase of the post-disaster housing after the construction phase has ended. It is essential to acquire the strengths and weaknesses of the house, which have not been dealt before, so that the next post-disaster housing project could learn from it and be build better. When the actual sources of problems are identified, then it will be viable to articulate necessary corrections and changes where possible. On the other hand, if evaluation is ignored, similar problems may be occurring in next project, valuable resources miss their targets and lead to wastage, and true meaning of success may be misinterpreted. For that reasons, this study attempted to explore residents' perception, modification and their preference towards the reconstructed houses, which took place across two types of housing reconstruction schemes after the 2014 flood in Kuala Krai, Kelantan.

The foundation of this present study is to learn how residents perceive their donated houses thus investigation will focus on of individual experiences, their stories about the daily life living in the house as well as their preferences of the post-flood house, which consequently weighed against the researcher's observation on house modification. This outcome is an indication of what works and what does not. It emphasize on a broader picture of practical and sensible ground rules to be adopted or adapted when planning for housing reconstruction.

1.4 Research Aim and Objectives

The aim of this study is to develop an understanding of project impacts towards the users, including the expected and unexpected impacts, with the intention

to gain some insights on how to improve the next project. Therefore it investigates how residents perceived their house when they reside in its original form and their experience living in the house after modification. Based on statement of the problem, the research objectives have been formulated as follows:

1. To assess the residents' perceptions towards post-flood housing reconstruction in Kuala Krai
2. To evaluate modification carried out within the relocated and non-relocated housing schemes
3. To recommend the key considerations in constructing post-disaster housing

1.5 Research Questions

Objectives of the research were derived from following Research Questions:

1. How the residents perceived the house in terms of its physical conditions and non-physical conditions?
2. How residents are adapting to new house setting? Why modifications were carried out?
3. What are the residents' preferences of post-disaster housing condition that can be adopted in constructing well-received post-disaster housing?

1.6 Scope of the Research

This research concentrates on the residents' experience and general perception towards the post-flood housing condition and qualities during the occupancy period. However, the study does not adhere to design performance or technical component of 'Post-Occupancy Evaluation' (POE) strategy. Even so, this study acknowledged that POE is also concerned with residents' perspective.

This study focuses on evaluation of post-disaster reconstruction project or the outcome of the project based on the residents viewpoint, and not the evaluation of the reconstruction programs or process. Subsequently, it is not an assessment of any institution even though role of specific organisations are mentioned throughout this study. Thus issues on management, policy, resources or other related subjects are excluded from the scope of this study.

The aim of the study is not to provide a technical step-by-step guide but instead to offer suggestion of design considerations on how to plan and prepare for a post-disaster housing.

This research is being carried out in the district of Kuala Krai, Kelantan within two post-flood housing reconstruction schemes namely the New Permanent House scheme or *Rumah Kekal Baru* (RKB) and Cluster House or *Rumah Kluster* (RK). For RKB, Kampung Manek Urai Lama was chosen as case study. Meanwhile, Laman Seri Ehsan in Kampung Telekong was chosen to represent RK.

1.7 Significance of the Research

This research emphasise on residents' perspective towards the permanent house constructed after the 2014 flood in Kuala Krai. Apart from acknowledging the house residents or beneficiaries as the most significant stakeholder in post-disaster context, this research will also reveal whether the house meets the user's needs and

how users are adapting to satisfy their needs. This post-flood housing reconstruction is a recent development and large in terms of quantity. Thus, evaluating the development is integral to determine the current operative condition of post-disaster housing in Malaysia thus unfolding the potential for bettering the next post-disaster housing project. The outcome of the research present guidance for those related in disaster management when planning and designing future housing in disaster-stricken area with the aspiration to promote continuous improvement and present wider benefits to communities. The findings could facilitate all parties in pre-disaster planning and post-disaster recovery including:

- i. Government - as building actors and building donors such as JKR and Ministry of Housing
- ii. Local Authority - as decision maker and authority in approving a development project
- iii. Academics - as a potential in research and development (R&D)
- iv. Consultants - as development teams in managing the project on site
- v. Others - Fire department, academicians and insurance companies

1.8 Research Methodology

To address the problem statement and research questions, case study methodology was employed and relevant to this research because it seeks to investigate present phenomenon which ‘how’ and ‘why’ being asked as the large part of the research questions (Yin, 2014). The first driving aim in this research is to evaluate ‘how’ residents perceived the house in terms of physical attributes and general comfort. To address this, semi-structured interview was conducted to collect data. To answer second questions, the research further examines the residents’ adaptation patterns, focusing on ‘why’ residents are adapting in terms of structural modification. Semi-structured interview was employed to collect the required data. Apart from that, visual research was carried out to provide illustration of the adaptation. Finally, the third research question is addressed through semi-structured interview with the residents concentrating on their perspectives of a preferred post-

disaster housing condition and setting. Analysis of all the findings from all the research questions is formulated to recommend the fundamentals in constructing well-received post-disaster housing.

1.9 Organisation of the Thesis

This thesis incorporates six chapters which described as follows. The organisation of thesis is summarised in Figure 1.1.

The first chapter presents an overview of this research which begins with the background of the problem, thesis statement, the objectives, scope of the study as well as the significance the research. In the final part of the chapter, important terms are defined and report structure is illustrated as summary.

Chapter 2 presents an overview of disaster studies, disaster management and recovery through housing reconstruction. It follows with description of community's role and their perception of housing. Evaluation parameters are outlined as a result of intensive review of literatures.

Chapter 3 presents discussion to disasters in Malaysia and housing reconstruction research at national level. This chapter proceeds with flood occurrence in Kelantan. Ultimately, it elaborates on 2014-flood in Kuala Krai and housing reconstruction that follows.

Chapter 4 outlines the methodology conducted for this research. Employing case study protocol, the research is designed to investigate the residents' perception and modification of their house which are. Chapter 4 also explains the data collection process which began with semi-structured interviews and follows by visual research.

Chapter 5 presents introduction to case study areas, which are Kampung Manek Urai and Laman Seri Ehsan. Thematic analysis is used to analyse data gathered from interviews and visual research. Themes were assembled from

literature review and data collection. Apart from rich description, this analysis also comprises visual image collected from the fieldwork to present the type of adaptation constructed by the residents.

Chapter 6, which presents the housing reconstruction outcome, comprised the findings that will secure the answers to address the research questions. Based on the results, the researcher will interpret of what constitute a well-received post-disaster housing that support the victims' recovery process. The findings reveal the residents' perception towards their houses which demonstrated through their adaptation structurally.

The final chapter, Chapter 7 which is the concluding chapter consists of conclusion derived from analysis of results. The chapter will further outline the recommendation to be considered for improving future post-disaster housing reconstruction in Malaysia. Apart from that, limitations of the research were also illustrated, followed by recommendations for further researches.

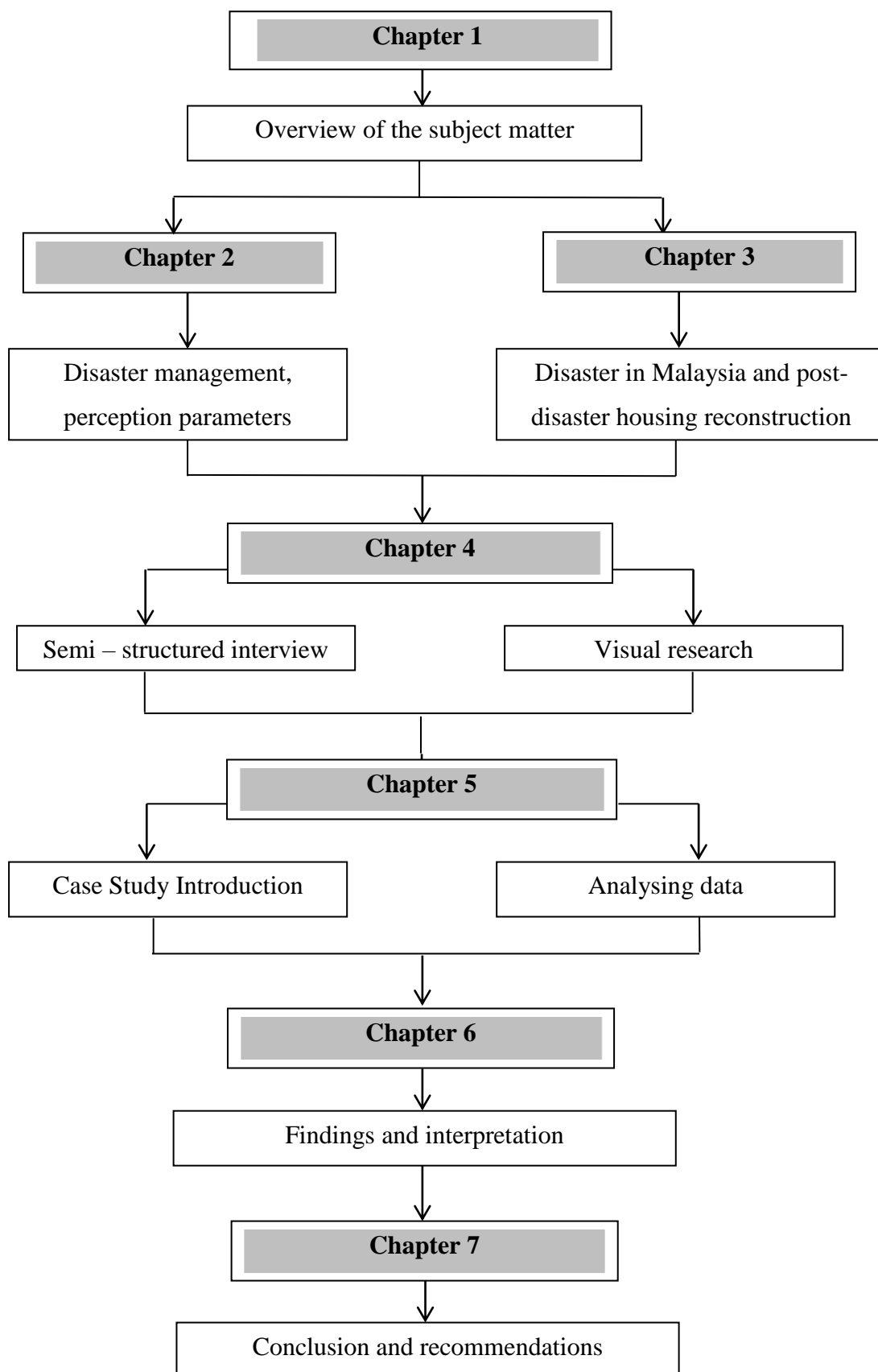


Figure 1.1 Organisation of the thesis

REFERENCES

- Ahmed, I. (2011). An overview of post-disaster permanent housing reconstruction in developing countries. *International Journal of Disaster Resilience in the Built Environment*, 2(2), 148–164.
- Ahmed, I., & Charlesworth, E. R. (2015). An evaluation framework for assessing resilience of post-disaster housing. *International Journal of Disaster Resilience in the Built Environment*, 6(3), 300–312.
- Ahmed, I., & McEvoy, D. (2014). Post-tsunami resettlement in Sri Lanka and India: site planning, infrastructure and services. *International Journal of Disaster Resilience in the Built Environment*, 5(1), 53–65. <https://doi.org/10.1108/IJDRBE-08-2012-0028>
- Alexander, D. (2002). *Principles of emergency planning and management*.
- Amaratunga, D., & Haigh, R. (2010). Disasters and the built environment: towards a mature discipline. *International Journal of Disaster Resilience in the Built Environment*, 1(1).
- Andrew, S. A., Arlikatti, S., Long, L. C., & Kendra, J. M. (2013). The effect of housing assistance arrangements on household recovery: An empirical test of donor-assisted and owner-driven approaches. *Journal of Housing and the Built Environment*, 28(1), 17–34.
- Arlikatti, S., & Andrew, S. A. (2012). Housing design and long-term recovery processes in the aftermath of the 2004 Indian Ocean tsunami. *Natural Hazards Review*, 13(1), 34–44. [https://doi.org/10.1061/\(ASCE\)NH.1527-6996.0000062](https://doi.org/10.1061/(ASCE)NH.1527-6996.0000062).
- Asean. (2015). *SITUATION UPDATE NO. 1 FLOOD/ MALAYSIA*. Retrieved from https://reliefweb.int/sites/reliefweb.int/files/resources/SituationUpdate_1_AHA_MAL_FL2015.pdf
- Asmawi, M. Z., & Ibrahim, A. N. (2013). The Impacts of Tsunami on the Well-Being of the Affected Community in Kuala Muda, Kedah, Malaysia. *Journal of Clean Energy Technologies*, 1(3), 246–250.

- Barakat, S. (2003). *Housing reconstruction after conflict and disaster. Humanitarian Practice Network (HPN)*. Retrieved from [http://www.ifrc.org/PageFiles/95751/B.d.01.Housing Reconstruction After Conflict And Disaste_HP.N.pdf](http://www.ifrc.org/PageFiles/95751/B.d.01.Housing_Reconstruction_After_Conflict_And_Disaste_HP.N.pdf)
- Barenstein, J. D. (2006). *Housing reconstruction in post-earthquake Gujarat: A comparative analysis. ODI Humanitarian Practice Network (Vol. 44)*.
- Barenstein, J. D. (2008). From Gujarat to Tamil Nadu: Owner-driven vs. Contractor-driven Housing Reconstruction in India. In *4th International i-Rec Conference 2008 Building resilience: achieving effective post-disaster reconstruction*. (pp. 1–17). Retrieved from <http://scholar.google.com/scholar?hl=en&btnG=Search&q=intitle:From+Gujarat+to+Tamil+Nadu:++Owner-driven+vs+.+contractor-driven+housing+reconstruction+in+India#0%5Cnhttp://scholar.google.com/scholar?hl=en&btnG=Search&q=intitle:From+Gujarat+to+Tamil+Nadu:+O>
- Barenstein, J. D. (2013). Communities' Perspectives on Housing Reconstruction in Gujarat following the Earthquake of 2001. In J. E. D. Barenstein & E. Leemann (Eds.), *Post-Disaster Reconstruction and Change: Communities' Perspectives* (pp. 71–100). Taylor & Francis Group. <https://doi.org/10.1126/science.1123296>
- Barenstein, J. D. (2015). Continuity and change in housing settlement patterns in post-earthquake Gujarat, India. *International Journal of Disaster Resilience in the Built Environment*, 6(2), 140–155.
- Boano, C., & Zetter, R. (2010). Space and place after natural disasters and forced displacement. In *Rebuilding after disasters: from emergency to sustainability* (pp. 206–230).
- Bouraoui, D., & Lizarralde, G. (2013). Centralized decision making, users participation and satisfaction in post-disaster reconstruction: the case of Tunisia. *International Journal of Disaster Resilience in the Built Environment*, 4(2)
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3, 77–101.
- Brun, C., & Lund, R. (2008). Making a home during crisis: Post-tsunami recovery in a context of war, Sri Lanka. *Singapore Journal of Tropical Geography*, 29(3)
- Bryman, A. (2012). *Social research methods. OXFORD University Press*.
- Carrasco, S., Ochiai, C., & Okazaki, K. (2017). Residential satisfaction and housing modifications A study in disaster-induced resettlement sites in Cagayan de Oro,

- Philippines. *International Journal of Disaster Resilience in the Built Environment*, 8(2).
- Chan, N. W. (1995a). *A contextual analysis of flood hazard management in peninsular Malaysia*. Retrieved from <http://eprints.mdx.ac.uk/6377/>
- Chan, N. W. (1995b). Choice and constraints in floodplain occupation: the influence of structural factors on residential location in peninsular Malaysia. *Disasters*, 19(4), 287–307.
- Chan, N. W. (1995c). Flood disaster management in Malaysia: an evaluation of the ineffectiveness of government resettlement schemes. *Disaster Prevention and Management*, 4(4), 22–29.
- Chan, N. W. (1997). Increasing flood risk in Malaysia: causes and solutions. *Disaster Prevention and Management*, 6(2), 72–86.
- Chan, N. W. (2012). Impacts of disasters and disasters risk management in Malaysia: The case of floods. *Economic and Welfare Impacts of Disasters in East Asia and Policy Responses.*, (December), 503–551.
- Chan, N. W., Zakaria, N. A., Ghani, A. A., & Tan, L. Y. (2004). Integrating Official and Traditional Flood Hazard Management in Malaysia. *1st International Conference on Managing Rivers in the 21st Century: Issues and Challenges*, (JANUARY), 409–419.
- Coate, B., Handmer, J., & Choong, W. (2006). Taking care of people and communities: Rebuilding livelihoods through NGOs and the informal economy in Southern Thailand. *Disaster Prevention and Management*, 15(1), 135–145.
- Collier, J., & Collier, M. (1986). *Visual Photography as a Research Method*.
- Collins, A. E., Manyena, B., Jayawickrama, J., Jones, S., & Manyena, B. (2015). Introduction : Hazards , Risks , and Disasters in Society. In *Hazards, Risks and Disasters in Society* (pp. 1–15). Elsevier Inc.
- Comerio, M. C. (2014). Disaster Recovery and Community Renewal: Housing Approaches. *Cityscape: A Journal of Policy Development and Research*, 16(2)
- Creswell, J. W. (2013). *Qualitative Inquiry and Research Design – Choosing Among Five Approaches* (3rd ed.). Sage Publications.
- da Silva, J. (2010). *Lessons from Aceh: Key Considerations in Post-Disaster Reconstruction*. Practical Action Publishing.
- Davidson, C. H., Johnson, C., Lizarralde, G., Dikmen, N., & Sliwinski, A. (2007). Truths and myths about community participation in post-disaster housing

- projects. *Habitat International*, 31(1), 100–115.
- Davis, I. (1981). Disasters and settlements - Towards an understanding of the key issues. *Habitat International*, 5(5–6), 723–739.
- Davis, I. (2015). *Shelter after Disaster*. (P. Thompson & F. Krimgold, Eds.) (2nd Editio). IFRC, UNOCHA. Retrieved from http://www.ifrc.org/Global/Documents/Secretariat/201506/Shelter_After_Disaster_2nd_Edition.pdf
- de Ville de Goyet, C. (2008). Information Gaps in Relief, Recovery, and Reconstruction in the Aftermath of Natural Disasters. In S. Amin & M. Goldstein (Eds.), *Data against Natural Disasters*. The World Bank.
- Denzin, N. K., & Lincoln, Y. S. (2005). *The SAGE Handbook of Qualitative Research. The SAGE Handbook* (3rd ed.).
- Dias, N. T., Keraminiyage, K., & Desilva, K. K. (2016). Long-term satisfaction of post disaster resettled communities: The case of post tsunami – Sri Lanka. *Disaster Prevention and Management: An International Journal*, 25(5)
- Dikmen, N. (2006). Relocation or rebuilding in the same area: An important factor for decision making for post disaster housing projects. In *Proceedings of the International Conference and Student Competition on Post-disaster Reconstruction" Meeting Stakeholder Interests*.
- Dikmen, N., & Elias-Ozkan, S. T. (2016). Housing after disaster: A post occupancy evaluation of a reconstruction project. *International Journal of Disaster Risk Reduction*, 19(October), 167–178.
- El-Masri, S. (1997). Learning from the People: A Fieldwork Approach in War-Damaged Villages in Lebanon. In Awotona A. Aldershot (Ed.), *Reconstruction after Disaster: Issues and Practices* (pp. 57–72). Ashgate Publishing Ltd. Retrieved from <http://cidbimena.desastres.hn/pdf/eng/doc13792/doc13792.pdf>
- Emmison, M., & Smith, D. P. D. (2000). *Researching the Visual: Images, Objects, Contexts and Interactions in Social and Cultural Inquiry*. Sage Publications.
- Few, R., Ahern, M., Matthies, F., & Kovats, S. (2004). *Floods , health and climate change: a strategic review* (No. 63). Retrieved from https://www.unisdr.org/files/1985_VL206506.pdf
- Floodlist. (2015). Malaysia Floods – Kelantan Flooding Worst Recorded as Costs Rise to RM1 Billion. Retrieved from <http://floodlist.com/asia/malaysia-floods-kelantan-worst-recorded-costs>

- Foong, S. L., Shiozaki, Y., & Horita, Y. (2006). Evaluation of the Reconstruction Plans for Tsunami Victims in Malaysia. *Journal of Asian Architecture and Building Engineering*, 5(2), 293–300.
- Francescato, G., Weidemann, S., & Anderson, J. R. (1989). Evaluating The Built Environment From The Users' Point Of View: An Attitudinal Model Of Residential Satisfaction. In *Building Evaluation* (pp. 181–198).
- Ghaffarianhoseini, A., Berardi, U., Dahlan, N. D., & Ghaffarianhoseini, A. (2014). What can we learn from Malay vernacular houses? *Sustainable Cities and Society*, 13, 157–170. h
- Gillham, B. (2000). *Case study research methods*.
- Gray, D. E. (2004). *Doing Research in the Real World*. SAGE Publications.
- Guest, G., Bunce, A., & Johnson, L. (2006). How Many Interviews Are Enough? *Field Methods*, 18(1), 59–82.
- Hashim, A. H. (2003). Residential Satisfaction and Social Integration in Public Low Cost Housing in Malaysia. *Pertanika J. Soc. Sci. & Hum*, 11(1), 1–10.
- Hayles, C. S. (2010). An examination of decision making in post disaster housing reconstruction. *International Journal of Disaster Resilience in the Built Environment*, 1(1), 103–122.
- Hua, A. K. (2015). An Adaptation of Kota Bharu Community towards Monsoon Flood. *International Journal of Academic Research in Environment and Geography*, 2(1), 27–33.
- Ibem, E. O. (2012). Residents' perception of the quality of public housing in urban areas in Ogun State, Nigeria. *International Journal of Quality & Reliability Management*, 29, 1000–1018.
- IFRC. (2015). *DREF final report Malaysia / South East Asia : Seasonal Flooding*. Retrieved from <https://reliefweb.int/sites/reliefweb.int/files/resources/MDRMY002drefFR.pdf>
- Jha, A. K., Barenstein, J. D., Phelps, P. M., Pittet, D., & Sena, S. (2010). *Safer Homes, Stronger Communities - A Handbook for Reconstructing after Natural Disasters*. The International Bank for Reconstruction and Development / The World Bank.
- Jigyasu, R. (2013). Long-term cultural impacts of disaster decision-making: The Case of Post Earthquake Reconstruction in Marathwada, India. *Archnet-IJAR*, 7(3), 14–23.

- Johnson, C., Lizarralde, G., & Davidson, C. (2004). Learning oriented evaluation of reconstruction projects. In *Proceedings of the Second International Conference on Post-disaster Reconstruction: Planning for Reconstruction*, Coventry University (pp. 22–23). Retrieved from <http://www.grif.umontreal.ca/pages/papers2004/Paper - Johnson C, Lizarralde G %26 Davidson C.pdf>
- Kamani-Fard, A., Ahmad, M. H., & Ossen, D. R. (2012). The sense of place in the new homes of post-Bam earthquake reconstruction. *International Journal of Disaster Resilience in the Built Environment*, 3(3), 220–236.
- Kennedy, J., Ashmore, J., Babister, E., & Kelman, I. (2008). The meaning of “build back better”: Evidence From post-tsunami Aceh and Sri Lanka. *Journal of Contingencies and Crisis Management*, 16(1), 24–36.
- Keraminiyage, K., & Piyatadsananon, P. (2013). Achieving success in post-disaster resettlement programmes through better coordination between spatial and socio-economic/cultural factors. *International Journal of Disaster Resilience in the Built Environment*, 4(3), 352–372.
- Kura, Y., Joffre, O., Laplante, B., & Sengvilaykham, B. (2017). Coping with resettlement: A livelihood adaptation analysis in the Mekong River basin. *Land Use Policy*, 60, 139–149.
- Leman, A. M., Rahman, K. A., Salleh, M. N. M., Baba, I., Feriyanto, D., Johnson, L. S. C., & Hidayah, S. N. (2016). A review of flood catastrophic management in Malaysia. *ARPN Journal of Engineering and Applied Sciences*, 11(14)
- Lettieri, E., Masella, C., & Radaelli, G. (2009). Disaster management: findings from a systematic review. *Disaster Prevention and Management: An International Journal*, 18(2), 117–136.
- Lindell, M. K. (2013). Recovery and Reconstruction After Disaster. *Encyclopedia of Natural Hazards*, 812–824.
- Lindell, M. K., & Prater, C. S. (2003). Assessing Community Impacts of Natural Disasters. *Natural Hazards Review*, 4(4), 176–185.
- Lizarralde, G., & Bouraoui, D. (2010). Users’ Participation And Satisfaction In Post-Disaster Reconstruction. In *I-Rec*.
- Lloyd-Jones, T. (2006). *Mind the Gap! Post-disaster reconstruction and the transition from humanitarian relief*. RICS. Retrieved from https://www.preventionweb.net/files/9080_MindtheGapFullreport1.pdf

- Malaysian Meteorological Department. (n.d.). *List of Earthquakes - Malaysian Meteorological Department*. Retrieved from <http://www.met.gov.my/web/metmalaysia/listofrecentearthquake/earthquaketsunami/2015/06>
- Malaysian Meteorological Department. (2017). Malaysia's Climate - Malaysian Meteorological Department. Retrieved January 4, 2018, from <http://www.met.gov.my/web/metmalaysia/education/climate/generalclimateofmalaysia>
- Marcillia, S. R., & Ohno, R. (2012). Learning from Residents' Adjustments in Self-built and Donated Post Disaster Housing after Java Earthquake 2006. *Procedia - Social and Behavioral Sciences*, 36, 61–69.
- Marshall, B., Cardon, P., Poddar, A., & Fontenot, R. (2013). Does sample size matter in qualitative research?: a review of qualitative interviews in IS research. *Journal of Computer Information Systems*, 54(1), 11–22.
- Mazza, M., Pino, M. C., Peretti, S., Scolta, K., & Mazzarelli, E. (2014). Satisfaction level on quality of life post-earthquake rebuilding. *International Journal of Disaster Resilience in the Built Environment*, 5(1), 6–22.
- Merriam, S. B. (2009). *Qualitative research: A guide to design and implementation*. Jossey-Bass.
- Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis: An expanded sourcebook*. Sage Publications.
- Moe, T. L., & Pathranarakul, P. (2006). An integrated approach to natural disaster management: Public project management and its critical success factors. *Disaster Prevention and Management*, 15(3), 396.
- Mohit, M. A., Ibrahim, M., & Rashid, Y. R. (2010). Assessment of residential satisfaction in newly designed public low-cost housing in Kuala Lumpur, Malaysia. *Habitat International*, 34(1), 18–27.
- Morse, J. M. (1995). The Significance of Saturation. *Qualitative Health Research*, 5(2), 147–149.
- Nath, R., Shannon, H., Kabali, C., & Oremus, M. (2017). Investigating the key indicators for evaluating post-disaster shelter. *Disasters*, 41(3), 606–627.
- Neuman, W. L. (2014). *Social Research Methods: Qualitative and Quantitative Approaches*. Pearson.
- Nor Eliza, A., Hazim, M., Wan, Y. C., & Yusop, Z. (2016). Rainfall Analysis Of The

- Kelantan Big Yellow Flood 2014. *Jurnal Teknologi*, 9(4), 83–90.
- Oliver-Smith, A. (1990). Post-Disaster Housing Reconstruction and Social Inequality: A Challenge to Policy and Practice. *Disasters*, 14(1), 7–19.
- Oliver-Smith, A. (1991). Successes and Failures in Post-Disaster Resettlement. *Disasters*, 15(1), 12–23.
- Ophiyandri, T., Amaratunga, D., & Keraminiyage, K. (2016). Advantages and Limitations of Community-based Post-disaster Housing Reconstruction Project. *International Journal of Disaster Resilience in the Built Environment*, 7(4)
- Ophiyandri, T., Amaratunga, D., & Pathirage, C. (2010). Community based post disaster housing reconstruction: Indonesian perspective. In *Proceeding of CIB World Congress, Salford*. Retrieved from <http://usir.salford.ac.uk/9761/>
- Ophiyandri, T., Amaratunga, D., Pathirage, C., & Keraminiyage, K. (2013). Critical success factors for community-based post-disaster housing reconstruction projects in the pre-construction stage in Indonesia. *International Journal of Disaster Resilience in the Built Environment*, 4(2), 236–249.
- Othman, M. A., Zakaria, N. A., Ab. Ghani, A., Chang, C. K., & Chan, N. W. (2016). Analysis Of Trends Of Extreme Rainfall Events Using Mann Kendall Test : A Case Study In Pahang And Kelantan River Basin *Jurnal Teknologi Analysis Of Trends Of Extreme Rainfall Events Using Mann Kendall Test : A Case Study In Pahang And Kelantan River. Jurnal Teknologi (Sciences & Engineering)*
- Pasupuleti, R. S. (2013). Designing culturally responsive built environments in post disaster contexts: Tsunami affected fishing settlements in Tamilnadu, India. *International Journal of Disaster Risk Reduction*, 6, 28–39.
- Piyatadsananon, P., Amaratunga, D., & Keraminiyage, K. (2010). The role of spatial analysis in resettlement programme. In *The Construction, Building and Real Estate Research Conference of the Royal Institution of Chartered Surveyors 2010*. Retrieved from <http://usir.salford.ac.uk/9739/>
- Quarantelli, E. L. (1995). Patterns of sheltering and housing in US disasters. *Disaster Prevention and Management*, 4, 43–53.
- Rahmayati, Y. (2016a). Post-disaster housing: Translating socio-cultural findings into usable design technical inputs. *International Journal of Disaster Risk Reduction*, 17, 173–184
- Rahmayati, Y. (2016b). Reframing “building back better” for post-disaster housing design: a community perspective. *International Journal of Disaster Resilience*

- in the Built Environment*, 7(4), 344–360.
- Rand, E. C., Hirano, S., & Kelman, I. (2011). Post-tsunami housing resident satisfaction in Aceh. *International Development Planning Review*, 33(2)
- Rapoport, A. (1969). *House form and culture*. Prentice-Hall, Inc.
- Roosli, R. (2010). *Managing disasters in Malaysia: the attitude of officials towards compliance with the MNSC Directive 20*. Doctoral thesis. Northumbria University. Retrieved from <http://nrl.northumbria.ac.uk/2925/>
- Roosli, R. (2014). The evaluation of participatory housing and technology after the tsunami (2005) in Malaysia. In *5th Brunei International Conference on Engineering and Technology (BICET 2014)*.
- Roosli, R., & Collins, A. E. (2016). Key Lessons and Guidelines for Post-Disaster Permanent Housing Provision in Kelantan, Malaysia. In *Procedia Engineering* (Vol. 145, pp. 1209–1217). Elsevier B.V.
- Roosli, R., & O'Brien, G. (2011). Social learning in managing disasters in Malaysia. *Disaster Prevention and Management: An International Journal*, 20(4)
- Rostam, K., Herman, I., & Mohd Noor, A. B. (2009). Kawasan penempatan semula mangsa tsunami di Malaysia: Analisis kualiti kejurangan dan kesejahteraan isi rumah. *Geografia - Malaysian Journal of Society and Space*, 5(1), 33–43. Retrieved from <http://www.ukm.my/geografia>
- Sadiqi, Z. (2014). *Post-Disaster Reconstruction Projects – A Logical Framework For Community Participation*. Queensland University of Technology.
- Sadiqi, Z., Coffey, V., & Trigunaryah, B. (2011). Post-disaster Housing Reconstruction: Challenges for community participation. *International Conference on Building Resilience: Interdisciplinary Approaches to Disaster Risk Reduction, and the Development of Sustainable Communities*, 1–9.
- Sadiqi, Z., Coffey, V., & Trigunaryah, B. (2013). Critical factors for successful housing reconstruction projects following a major disaster. In *Proceedings of the 19th Triennial CIB World Building Congress, Queensland University of Technology, Brisbane, QLD* (pp. 1–12). <https://doi.org/10.13140/2.1.5163.6484>
- Sanderson, D., & Sharma, A. (2008). Winners and losers from the 2001 Gujarat earthquake. *Environment and Urbanization*, 20(1), 177–186.
- Sanderson, D., Sharma, A., & Anderson, J. (2012). NGO permanent housing 10 years after the Gujarat earthquake: revisiting the FICCI-CARE Gujarat rehabilitation programme. *Environment and Urbanization*, 24(1), 233–247.

- Saunders, M., Lewis, P., & Thornhill, A. (2009). *Research Methods for Business Students. Research methods for business students* (5th ed., Vol. 5th). Pearson Education.
- Schilderman, T. (2010). Putting people at the centre of reconstruction. In M. Lyons, T. Schilderman, & C. Boano (Eds.), *Building Back Better - Delivering people-centred housing reconstruction at scale* (pp. 7–37). Practical Action Publishing
- Seneviratne, K., Amaratunga, D., & Haigh, R. (2016). Managing housing needs in post conflict housing reconstruction in Sri Lanka: gaps verses recommendations. *International Journal of Strategic Property Management*, 20(1), 88–100.
- Shafique, K., & Warren, C. M. J. (2015). Significance of community participation in success of post natural disaster reconstruction project – evidence from developing country. In *International Conference on Building Resilience, University of Newcastle, Australia*.
- Shaluf, I. M. (2007). Disaster types. *Disaster Prevention and Management: An International Journal*, 16(5), 704–717.
- Shaluf, I. M. (2008). Technological disaster stages and management. *Disaster Prevention and Management: An International Journal*, 17(1), 114–126.
- Shaluf, I. M., & Ahmadun, F.-R. (2006). Disaster types in Malaysia: an overview. *Disaster Prevention and Management: An International Journal*, 15(2),
- Shaluf, I. M., Ahmadun, F.-R., & Said, A. M. (2003). A Review of Disaster and Crisis. *Disaster Prevention and Management: An International Journal*, 12(1)
- Shenhar, A. J., Levy, O., & Dvir, D. (1997). Mapping dimensions of projects success. *Project Management Journal*.
- Steinberg, F. (2007). Housing reconstruction and rehabilitation in Aceh and Nias, Indonesia-Rebuilding lives. *Habitat International*, 31(1), 150–166.
- Syafrina, A. H., Zalina, M. D., & Juneng, L. (2015). Historical trend of hourly extreme rainfall in Peninsular Malaysia. *Theoretical and Applied Climatology*, 120, 259–285.
- Syed Hussain, T. P. R., & Ismail, H. (2013). Flood frequency analysis of Kelantan River Basin, Malaysia. *World Applied Sciences Journal*, 28(12), 1989–1995.
- Tafti, M. T., & Tomlinson, R. (2015). Best practice post-disaster housing and livelihood recovery interventions: winners and losers. *International Development Planning Review*, 37(2), 165–185.

- Tas, M., Tas, N., & Cosgun, N. (2010). Study on permanent housing production after 1999 earthquake in Kocaeli (Turkey). *Disaster Prevention and Management: An International Journal*, 19(1), 6–19.
- Tas, N., Cosgun, N., & Tas, M. (2007). A qualitative evaluation of the after earthquake permanent housings in Turkey in terms of user satisfaction-Kocaeli, Gundogdu Permanent Housing model. *Building and Environment*, 42(9)
- The World Bank. (2004). *Involuntary Resettlement Sourcebook - Planning and Implementation in Development Projects*. The International Bank for Reconstruction and Development. Retrieved from <http://documents.worldbank.org/curated/en/206671468782373680/pdf/301180v110PAPE1ettlement0sourcebook.pdf>
- Turner, J. F. C. (1972). Housing as Verb. In *Freedom to build - dweller control of the housing process* (pp. 148–175).
- Twigg, J. (2002). *Technology, post-disaster housing reconstruction and livelihood security* (No. Disaster Studies Working Paper No . 15). *Disaster Studies Working Paper*. Benfield Hazard Research Centre, London. (Vol. 15). Retrieved from www.abuhc.org/Publications/Working Paper 15.pdf
- UNICEF. (2005). Tsunami recovery in Malaysia: Strengthening communities. Retrieved January 4, 2018, from https://www.unicef.org/infobycountry/index_30003.html
- UNISDR. (2009). *UNISDR Terminology on Disaster Risk Reduction*. Retrieved from <http://www.unisdr.org/we/inform/publications/7817>
- Vahanvati, M., & Mulligan, M. (2017). A new model for effective post-disaster housing reconstruction: Lessons from Gujarat and Bihar in India. *International Journal of Project Management*, 35(5), 802–817.
- Wan Ahmad, W. I., & Abdurahman, S. M. (2015). Kelantan Flood 2014: Reflections from Relief Aid Mission to Kampung Kemubu, Kelantan. *Mediterranean Journal of Social Sciences*, 6(3), 340–344.
- Yilmaz, D. G. (2014). Adaptation of Rural Communities and Understanding their Socio-economic Vulnerability for Future. In *Procedia Economics and Finance* (Vol. 18, pp. 536–543). Elsevier B.V.
- Yin, R. K. (2011). *Qualitative Research from Start to Finish*. The Guilford Press.
- Yin, R. K. (2014). *Case Study Research – Design and Methods* (5th ed.). Sage Publications.